PEDRO SIQUEIRA DE MAGALHÃES

STUDY OF LOW-COST BUS BUSINESS MODELS AND THEIR APPLICABILITY IN BRAZIL

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

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Para Laís, Denise e Alexandre.

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The most valuable player is the one that
makes the most players valuable.

(Peyton Manning)

ABSTRACT

The purpose of this work is to identify low-cost bus business models from different parts of the world and check their applicability in the Brazilian market. It also identifies crucial factors to the development of that kind of business and investigates the relationship between low-cost buses and other modes of transport. To achieve those goals, the demand in Brazil was deeply analyzed and potential routes to the development of a low-cost bus business model were identified. Two of those corridors were compared qualitatively and quantitatively to 28 routes in Europe and in the United States, through analyses for the low-cost bus system and all its competitors and substitutes. Additionally, ideas of business implementation were presented. The research concludes that low-cost bus business models are potentially applicable in the Brazilian market. It revealed that recent changes in regulation were a determining factor for this kind of business. Finally, this study discusses the many benefits that may arise from the implementation of a low-cost bus business and suggests further analysis on the Brazilian bus market.

Key words: Low-Cost Bus. Business Models. Brazilian Bus Market. Transport.

RESUMO

A proposta deste trabalho é identificar modelos de ônibus de baixo custo em diferentes partes do mundo e checar a aplicabilidade desses modelos no mercado brasileiro. A pesquisa também identifica fatores cruciais para o desenvolvimento desse tipo de negócio e investiga a relação entre ônibus de baixo custo e outros meios de transporte. Para atingir esses objetivos, a demanda do Brasil foi profundamente analisada e rotas potenciais para o desenvolvimento de um modelo de negócio de ônibus de baixo custo foram traçadas. Dois corredores foram comparados qualitativa e quantitativamente a 28 rotas na Europa e nos Estados Unidos, por meio de análises de sistemas de ônibus de baixo custo e seus competidores. Ainda, ideias de implementação de negócio foram apresentadas. A pesquisa conclui que modelos de ônibus de baixo custo são potencialmente aplicáveis no mercado brasileiro. Ela revelou que as recentes mudanças na regulamentação foram determinantes para o desenvolvimento desse tipo de negócio. Finalmente, o estudo discute os muitos benefícios que podem ser gerados pela implementação de ônibus de baixo custo e sugere análises posteriores no mercado brasileiro de ônibus.

Palavras-chave: Ônibus de baixo custo. Modelos de negócio. Mercado brasileiro de ônibus. Transporte.

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LIST OF ABBREVIATIONS AND ACRONYMS

ANTT	Agência Nacional de Transportes Terrestres (National Agency of Land Transports)
ANAC	Agência Nacional de Aviação Civil (Civil Aviation National Agency)
CNT	Confederação Nacional do Transporte (National Transport Confederation)
FGTS	Fundo de Garantia por Tempo de Serviço (Guarentee Fund for Length of Service)
FIPE	Fundação Instituto de Pesquisas Econômicas (Foundation Institute of Economical Research)
GDP	Gross Domestic Product
IBGE	Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics)
INSS	Instituto Nacional do Seguro Social (National Institute of Social Security)
IT	Information Technology
KPI	Key Performance Indicator
SD	Standard Deviation
TAP	Transporte Aéreo de Passageiros (Air Transport of Passengers)
TRIP	Transporte Rodoviário Interestadual de Passageiros (Interstate Road Transport of Passengers)
UK	United Kingdom
US	United States

CONTENTS

1 INTRODUCTION

Brazil is a country with continental dimensions, in which transport integration plays a major role. Transportation is essential to the dislocation of the population between cities, being a highly significant activity to the economic construction and the social development of the nation. It contributes to create jobs, to a better income distribution, and to shorten distances, bringing gains for the country and granting the population access to goods and services.

In what relates to the transport of passengers, roads have 95% of the participation and basically are responsible for the whole transport system integration (CNT, 2015). Buses play a major role in Brazil, transporting around 50 million people each year in regular intercity routes (ANTT, 2016).

The scenario of bus transportation in Brazil is characterized by increasing competition, with changes in the regulation beginning to lead to a free market. However, the absence of good road conditions generates high costs of operation for the transport companies, mainly because of the constant maintenance of vehicles, burst tires, and higher fuel consumptions (CNT, 2015). Because of that, prices usually are high for customers and many people don't have conditions to afford traveling in Brazil.

In this context, the idea of low-cost services stepped up. That kind of business operates based on cost cutting, increasing utilization and earning extra profits from every possible source (BERSTER; WILKEN, 2005). Specifically for the bus sector, the low-cost services are showing amazing performance around the world. On the other hand of the traditional bus industry, the low-cost bus operators in Europe and North America are having huge growth rates in the number of passengers, routes, revenue and profit. Megabus, the first company to apply the low-cost concept to buses, saw passenger numbers in the United Kingdom grow 150% from 2009 to 2013, while customer journeys in mainland Europe grew 60% in only 12 months between 2014 and 2015 (STAGECOACH GROUP, 2015).

However, the application of low-cost businesses around the world is strictly related to the bus deregulation processes. Even though Brazil isn't deregulated yet, in June, 2015, Brazilian agencies modified the regulation aiming to a market based on the free competition. The first step to the application of a low-cost bus system in Brazil was made.

The purpose of this work is to identify low-cost bus business models from different parts of the world and check their applicability in the Brazilian market. It also identifies crucial factors for the development of that kind of business and investigates the relationship between low-cost buses and other modes of transport. This research analyzes every relevant aspect to the applicability of low-cost business models in Brazil, driving to some discussions and conclusions. The gains on the development of low-cost bus systems in Brazil may have a wide reach, from personal to general public benefits.

This thesis is structured in five chapters. After this introductory chapter, the literature review is presented in order to better understand the concept of low-cost and its transition to the bus market. The bus markets in Europe and in the United States were analyzed and a deep research on regulation was made, given the importance of that factor in the development of bus systems. Finally, low-cost bus business models around the world were characterized.

Following the literature review, chapter two describes step by step the methodology adopted to achieve the objectives of the study, including criteria for decisions and data collection.

Chapter three is devoted to expose all the results and findings of this thesis, and it is divided in seven main sections. The first section presents an overview on the Brazilian economy, politics, regulation and law. Then, a deep analysis is done on the Brazilian market, identifying overall passenger demand, bus passenger demand and selecting potential routes for a low-cost business. The next two sections are destined to compare those corridors qualitatively and quantitatively to low-cost bus routes in Europe and in the United States. Additionally, a comparison is made to competitors and substitutes of the low-cost bus. Afterwards, two pricing techniques were used in Brazil, in order to compare prices with Brazilian competitors. Finally, ideas of business implementation were presented.

Chapter four discusses the results by comparing them with the relevant statements of the literature review. Positive and negative points to the applicability of the low-cost bus business in Brazil are presented and discussed in order to draw the final conclusions.

The final chapter presents the conclusions drawn from the previous analysis and the discussion. It summarizes the most important findings of this study, shows its limitations and introduces possible future researches on the subject of low-cost buses.

2 LITERATURE REVIEW

This chapter gathers previous researches made on low-cost systems, as well as on the bus market in Europe and in the United States, the bus regulation, and information on low-cost bus systems. The goal is to establish the theoretical foundations on the subject and understand the current worldwide situation of low-cost buses. A special attention was given to the recent changes in the regulation in many European countries and in Brazil, factor that was considered really important to the development of low-cost bus systems. Finally, the last sections focus on identifying different low-cost business models, in order to obtain an insight on how to best implement and maintain such systems.

2.1 The low-cost bus market: origin, evolution and current market

This section will explore the origin of the low-cost concept and its transition to the bus market. Firstly, some techniques used in low-cost systems will be presented, showing how wide their applicability can be. Then, the bus market in some countries will be analyzed and also the changes that arose with the entry of low-cost carriers.

The initial findings led to the importance of the regulation to the development of low-cost systems, especially to the transport sector. The airline deregulation was essential to the development of low-cost air carriers, and now, the new trend of bus services deregulation around Europe was crucial for the low-cost bus companies to expand their business to international routes.

With that in mind, this section will be followed by an analysis on the bus regulation in Europe, in the United States, and in Brazil, where the applicability of the low-cost bus system will be studied.

2.1.1 Low-cost companies

“Low-cost” is a term that refers to a strategic orientation in which a company tries to cut costs at all levels of the organization, generally including a market campaign focused on the discounted prices (GROß; SCHRÖDER, 2007).

To apply a low-cost strategy, a company continuously analyzes and controls its most important costs and does an efficient asset management. To do so, there must be a special attention to distribution and communication in addition to the pricing policy (GROß & SCHRÖDER, 2007). According to Berster and Wilken (2005), the main goals of the low-cost strategy to reduce costs, increase utilization and earn extra profits from every possible source can be achieved by doing the following:

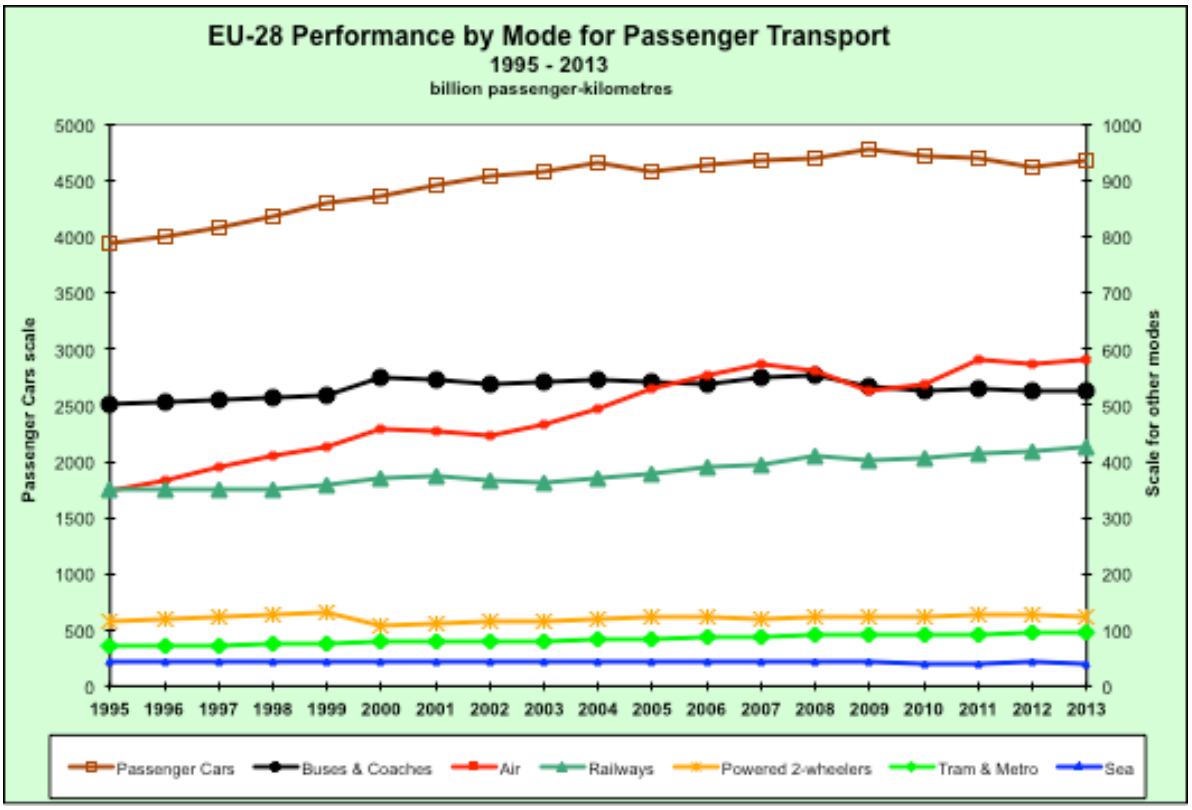
i) Utilizing yield management as a tool to conduct price and capacity and to highlight low costs;
ii) Optimizing costs in all business areas, such as staff costs, service costs and maintenance goals;
iii) Standardizing production and services;
iv) Selling directly to the final consumer in order to avoid commissions and transmission costs;
v) Charging for every service, no-frills;
vi) Utilizing assets to earn extra profit, such as selling space for advertising.

Based on the above points, low-cost companies started to take the market and offered significant competition against traditional players. Furthermore, these companies were also responsible to bring a whole new niche to the market, people who were firstly excluded from it due to low-income availability. Today, low-cost companies are very related to travel and tourism, being present among hotels, such as Formule 1 and EasyHotel, and all kinds of transportation, from ships to huge airline companies, such as Southwest and Ryanair.

2.1.2 The bus market

In recent years, the bus industry in Europe is flat, alternating small growths and shrinks, as we can see in **Figure 1**. The United States follow the same trend, where the passenger kilometers traveled also alternates positively and negatively, according to the U.S. Department of Transportation (2016). Some variations in the oil and gasoline prices are responsible for slightly changes, especially in the last years (STAGECOACH GROUP, 2015).

Figure 1 - EU-28 performance by mode for passenger transport

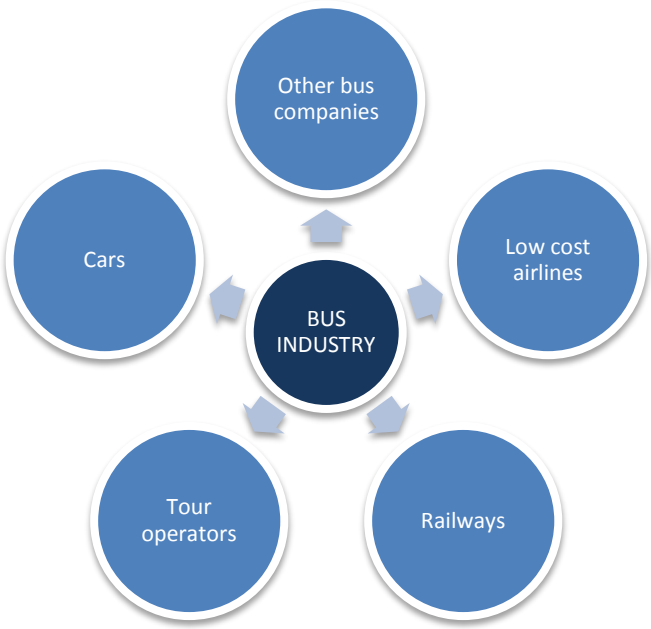


Source: European Union Report (2015)

However, following the deregulation of the bus market, Germany saw the number of passengers jump from 8.2 million in 2013 to 16 million in 2014. In France, the government estimates that the 110,000 passengers in 2014 will become 5 million by the end of 2016 (STAGECOACH GROUP, 2015). So, if the liberalization trend continues, there must be more space for the bus carriers in mainland Europe.

Despite the potential growth, there is a tough competition faced by the whole industry, what is driving both turnover and profit to a critical minimum. Line operation was very limited in most countries until recent years. Many countries, such as France and Germany, didn't allow bus lines running in parallel with railway services (VAN DE VELDE, 2009; AUGUSTIN et al., 2014), until the deregulation of their bus markets, in 2013. Cars represent more passenger kilometers traveled than twice the combination of all the other transport methods. Another huge competitor is the low-cost airlines, which are extending routes to new places every year. Tour operators are also important, because they can organize single trips without official permission or route license. And finally, the bus companies compete between themselves, always trying to succeed in a very limited market.

Figure 2 - Competition in the bus industry



Source: adapted from Groß and Schröder (2007)

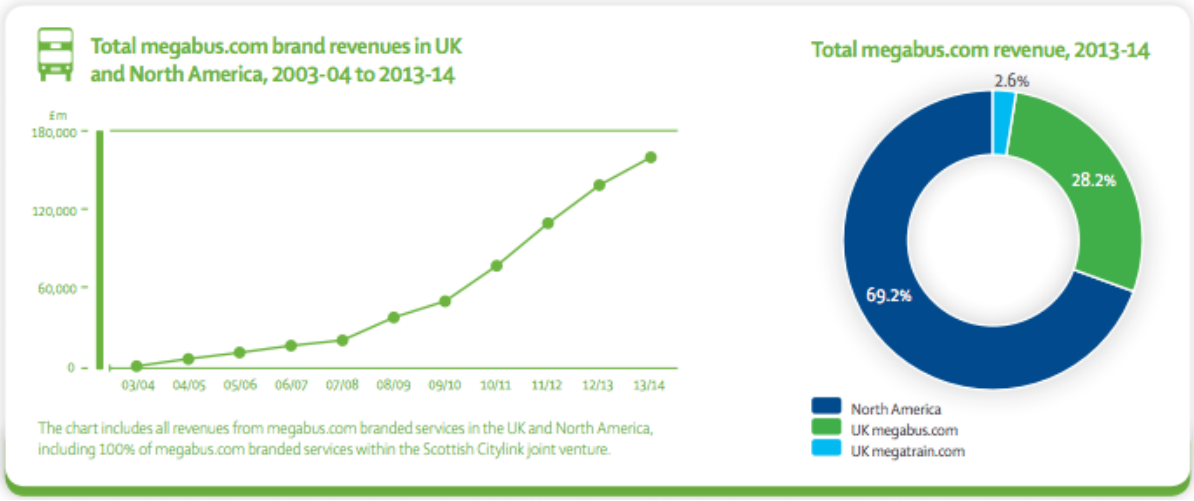
2.1.3 The low-cost buses

For buses, the presence of low-cost carriers was only possible with the deregulation of the bus market. Until 2013, intercity bus traveling was still strongly regulated in most western European countries in favor of the railway companies. The exception to it was the Great Britain bus market, which deregulation started in 1980 and allowed the creation of the first low-cost bus company in 2003, Megabus (WHITE; ROBBINS, 2012).

On the other hand of the traditional bus industry, the low-cost bus operators in Europe and North America are having huge growth rates in the number of passengers, routes, revenue and profit. In the UK, Megabus passenger numbers grew 150% from 2009 to 2013, while customer journeys in mainland Europe grew 60% in only 12 months between 2014 and 2015 (STAGECOACH GROUP, 2015).

In the US, the low-cost carriers Megabus and BoltBus accounted for nearly 80% of the operations growth from 2013 to 2014, which was up 3.9% (SCHWIETERMAN et al., 2015). Megabus revenues are skyrocketing since 2003 and the presence in North America is remarkable, as we can see on **Figure 3**.

Figure 3 - Megabus revenues through time



Source: Stagecoach Group (2014)

In continental Europe, with the liberalization of the bus market in potential markets, such as France, Germany and Italy, the mileage is expected to four fold year-on-year (STAGECOACH GROUP, 2015). Also, a Stagecoach research in May 2015 indicated that 35% of passengers in France previously didn't travel via any mode, showing the potential that the low-cost carriers can bring for the whole market.

2.2 Regulation of the intercity bus market

In Europe, long-distance bus services were always secondary when compared to other transportation methods. Railways or airlines attract much more political and media attention, are more visible and require much more infrastructure investment, especially from public sources (VAN DE VELDE, 2009). However, in countries where the deregulation was appropriately implemented, allowing competition, coaches became responsible for the mobility of the less-wealthy and time-rich citizens (VAN DE VELDE, 2009; WHITE; ROBBINS, 2012). This is consistent with the evidence of very low income elasticity for coach travel in comparison with other modes. The results of Dargay and Clark's (2010) studies show that long distance travel is strongly related to income: air is most income-elastic, followed by rail, car and finally coach.

The concept of low-cost bus is strictly related to the regulation of markets, because the free competition opens possibilities for really narrow margins. In order to obtain market share, even traditional companies have to lower their prices and the full implementation of the low-cost strategy grants some competitive advantages to its players. More recently, the entrance of low-cost operators in some countries is taking place immediately after the deregulation of the markets (ENGERT, 2014; STAGECOACH GROUP, 2015).

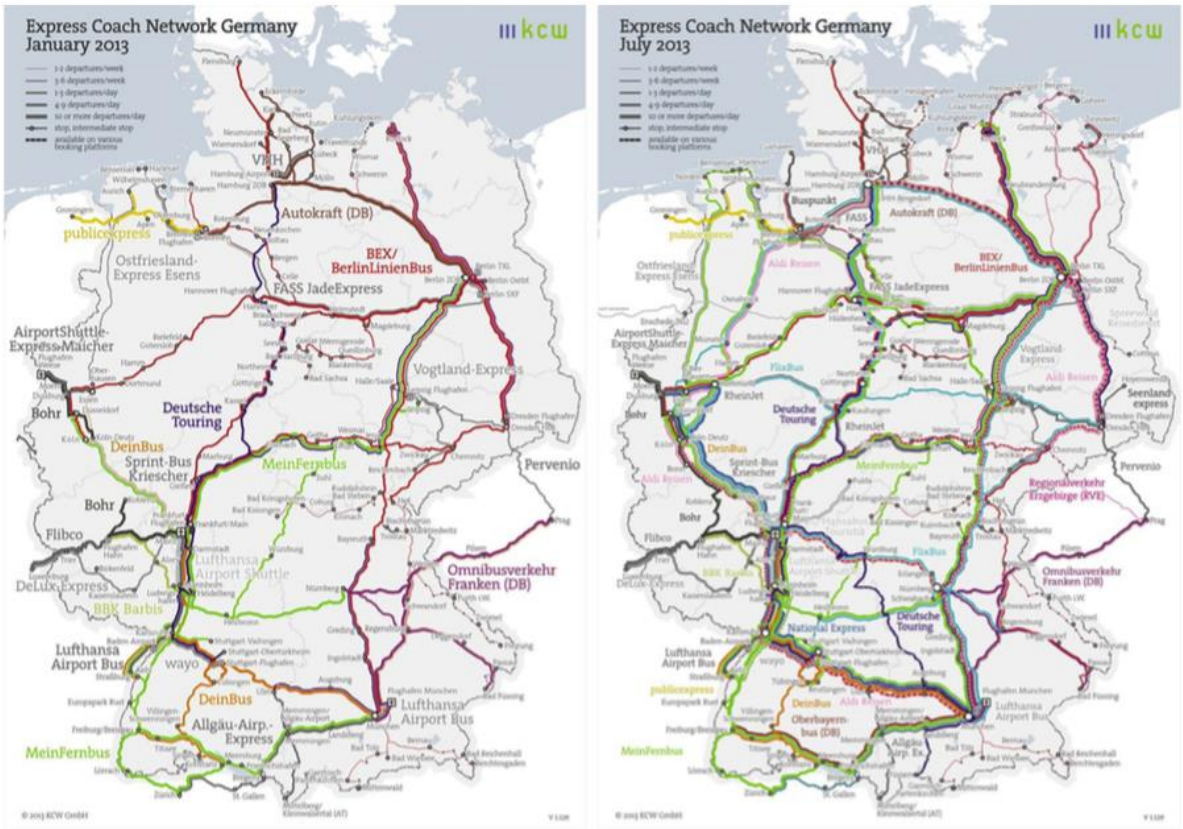
2.2.1 Regulation in Europe

The British coach market was the first one to be fully deregulated, with the 1980 Transport Act. Firstly, it was still necessary to give a 28-day prior request to start operating, but after the 1985 Transport Act, not even this authorization is necessary (VAN DE VELDE, 2009; WHITE; ROBBINS, 2012). However, even with the free competition in the Great Britain, the monopoly of National Express lasted until 2003, when there was the arrival of Megabus and its no frills, low-cost approach, focusing in a whole new market niche: students, young people without driving license and elderly people (WHITE; ROBBINS, 2012).

In mainland Europe, Sweden and Norway were among the first countries to deregulate their market. Sweden started its gradual liberalization since 1994 and the market was liberalized in 1998. Even though operators decide on fares, regional public transport authorities (county authorities) may still block the establishment of some routes (ALEXANDERSSON et al., 2010). Privately owned companies mainly serve the Swedish coach market, whereas three players provide 79% of the total supply in terms of coach kilometers (VAN DE VELDE, 2009). Almost all lines are connected to Stockholm, functioning as a hub. Norway was liberalized in 2003, with a virtually free entry since 1997. Again, regional public transport authorities may ask for requirements in some routes. Accordingly to Alexandersson et al. (2010), the Norwegian coach market is characterized by cross-ownership of two partners: the State-owned NSB for medium routes and Norway Bussekspress for long-distance routes. The cooperation between them has enabled an extensive route network, which covers most of Norway. In these two countries, long-distance buses had to face the opposition of railway companies that feared competition and worked to avoid the deregulation process (ALEXANDERSSON et al., 2010).

In Germany, the initial regulation allowed new services only when they represented a significant improvement over existing service (VAN DE VELDE, 2009). But then, in January 2013, the total deregulation for new long-distance bus lines was established. Previous legislation was highly protective in favor of Germany's national railway operator, Deutsche Bahn (BERIA; GRIMALDI; LAURINO, 2013; AUGUSTIN et al. 2014). **Figure 4** below, presented by Augustin et al. (2014), shows a significative growth from the start of the deregulation and after half year. The highlight in Germany became Flixbus, which in 2015 became the national market leader, detaining 71% of the roadmap kilometers (IGES INSTITUTE, 2016).

Figure 4 - German network growth after 6 months of deregulation



Source: Augustin et al. (2014)

Italy, in stages, concluded its deregulation in 2014. The bus system in the country, differently from Germany or France, already existed and mainly supplied: long distance services, in partial competition with rail and air transports; medium distance services, where rail services didn't exist, lacked quality and comfort, or were too expensive; and as tourist services, usually seasonally. In 2011, Italy had 171 lines running all over the year and 50 more

seasonally (BERIA; GRIMALDI; LAURINO, 2013). Operators differ significantly in size and no national operator dominates the market (VAN DE VELDE, 2009). Despite of the competition with the railways, in 2013, trains in Italy accounted for over 20 billion passenger-kilometers, while buses summed up to only 3 billion passenger-kilometers (BERIA; GRIMALDI; LAURINO, 2013). After the deregulation, Megabus and Flixbus soon entered the Italian bus market, in 2015. Today, long distance coach and rail services are mainly complementary, and coach services have often filled the qualitative and quantitative gaps of railways.

In France, national coach services were almost absent until 2015, because historically interregional transport is a rail monopoly (VAN DE VELDE, 2009). Since December 2009, law allows international services to provide internal cabotage, under the condition that no more than half the passengers board inside France. In 2012, iDBUS (now OUIBUS), a subsidiary of the French rail company SNCF, started operating international services with internal cabotage, in competition with the existing Eurolines services (BERIA; GRIMALDI; LAURINO, 2013). Finally in 2015, the Macron Law initiated the deregulation of the bus market and is expected to result in 5 million new bus passengers and the creation of 22,000 new jobs within 2016 (GOEURO, 2015; STAGECOACH GROUP, 2015).

Spain is still a major Western Europe country that hasn't deregulated its bus market. Until 1990, the bus services were under state control and concessions were directly awarded, without public tendering (VAN DE VELDE, 2009). However, today, intercity bus services are mainly carried out by private companies through concessions, which are regulated according to competitive procedures for new services and with frequency, services and schedules defined within a contract (BERIA; GRIMALDI; LAURINO, 2013).

What can be seen from the above examples is that the liberalization and deregulation of the coach sector is being a success in those countries that have implemented it, allowing a greater competition, lower prices, reaching new passengers and contributing for the quality of the systems. Van de Velde (2009) even suggested that in countries that have removed railway protection and deregulated the coach sector, coaches tend to capture more passengers from the cars than from trains, to conclude that coach deregulation is being beneficial from an overall transport policy point of view.

2.2.2 Regulation in the United States

Like Great Britain, the United States faced the deregulation of the bus market in the 1980s, with the Bus Regulatory Reform Act of 1982. As in Europe, the bus deregulation only happened after a long period of trains being untouchable by the non-threatening regulated bus monopolies.

In the US, the deregulation act attracted lots of new more efficient operators, which usually didn't survive because couldn't compete with huge monopolies. New entrants were squeezed out of the market shortly after entry or were eliminated by large operators due to mergers and acquisition (AUGUSTIN et al., 2014). However, Augustin et al. (2014) conclude that, due to price wars with these new competitors, large operators such as Greyhound and Trailways needed to evaluate and reform their management, fare and controlling system substantially in order to survive.

In 2006, the British Megabus entered the US market with the low-cost strategy and finally offered real threat to Greyhound. The company's answer came fast in order not to lose the biggest markets to the competitor. Greyhound created BoltBus, in 2008, which also applies a low-cost strategy focused in yield management.

2.2.3 Regulation in Brazil

The economical activity related to the Interstate Road Transport of Passengers (TRIP - Transporte Rodoviário Interestadual de Passageiros) has always been regulated by the Brazilian government in almost every aspect: entry of new companies, qualitative and quantitative aspects of the service execution, and mechanisms of prices and rates. Since the promulgation of the 1988 Federal Constitution, the entry of new players in the TRIP markets hasn't been depending exclusively on the will or capabilities of a company. To operate a TRIP line, the firm needed a grant permission, which could only be earned through a bidding process. However, the recent resolutions in the regulation are opening space to a more competitive market.

The demand of the road transport by buses increased steadily until 2005: the number of passengers grew from 80 millions in 1980 to around 141 million in that year (SILVA, 2012). After 2005, however, the number of passengers started to decrease. Considering only the long-

range trips, or trips with over 75 kilometers, the number of passengers was 67 million in 2005, then decreased to around 58 million in 2008 (SILVA, 2012), and, accordingly to a research contracted by the ANTT and done by Fundação Instituto de Pesquisas Econômicas (FIPE) between 2009 and 2010, it was expected a new increase up to 66.7 million passengers in 2010.

The Decrees that regulate the TRIP established October 2008 as the final deadline for the permission contracts of the sector. Since then, the service has been done based on special authorizations issued by the National Agency of Land Transports (ANTT - Agência Nacional de Transportes Terrestres), the organization responsible for all the land transports' regulation. Also, some judicial decisions have been allowing the continuous exploration of some lines that were not covered by the Agency's authorizations.

From 2008 to 2014, the government tried to choose companies to operate a group of routes through bidding processes. The idea was to offer groups of routes that included high profitable lines, but also some that wouldn't grant profits. In this way, better routes would pay off the worse ones and the model would give a better integration for small cities. In this highly regulated model, the ANTT was responsible for determining how many routes would attend each city, the timetable and the prices. Due to the regulation suppressing the open market between the carriers, the interstate transportation didn't experience a fare reduction during these years.

However, changes started to occur in 2014, when the Law 12.996, sanctioned on June 18, updated the whole model. The biggest change was related to the article 13 of the Law 10.233/01. The new law allowed the interstate passenger transportation services to be granted as authorizations, like it already happened in many other countries. Ana Patrizia Gonçalves Lira, director of the ANTT, explained in 2014 "if 30 or 40 companies want to run the line Rio de Janeiro-São Paulo and they are apt (have the safety and quality requirements) to do the service, we are going to authorize them". Lira (2014) concluded that the authorization presupposes a free market, so additionally to letting all the interested able companies to operate the lines, the government would also allow them to choose their routes. The above law gave ANTT the deadline of one year to determine the new criteria and to structure the new system.

Finally, in June 29, 2015, the resolution 4.770 regulated all the system. Companies wouldn't have exclusive lines, which means that many carriers could ask authorizations for the same line; maximum prices must be obeyed, but there wouldn't be fares, letting the companies

to set their own ticket prices. Among the demands for the companies to earn an authorization are:

i) Legal regularity;
ii) No legal labor problems;
iii) Tax compliance;
iv) Financial capacity;
v) Experience in the passenger transportation sector;
vi) Vehicle inspection once a year to check the emissions of pollutants and general conditions of the fleet;
vii) Appropriate garages and footholds;
viii) Fleet monitoring system;
ix) Maximum age of each vehicle must be 10 years of use and average age of the fleet shall be 5 years.

The change in the TRIP market is being controversial by some agencies and by the media. The government and most of the competitors believe that, with the open market, the services tend to improve, bringing more benefits to the users, such as lower prices and better quality (e.g. investments in more modern and comfortable fleets). The break of the lines and routes limitations gives the companies an alert to review what they offer today to the public and what they could offer as a differential to attract more customers. On the other side, there are some companies and agencies that believe the new system is going to harm small cities, generating a lower offer of lines and higher prices.

The main differences between Brazilian's new system and most of the European deregulated countries lie on some financial, infrastructural and qualitative aspects. Financially, there will be a maximum ticket price defined by the government for the following five years, in order to avoid prejudices to the passengers, while studies about demand and costs are done; in what concerns the infrastructure, companies will need well-structured bus terminals to serve as bus stops, and the government don't want it to be a limitation for the market, so there must be construction of both private and public terminals in the next years; and qualitatively, the Brazilian government has a lot of rules on the hygiene of the buses, frequency of breaks, late departures, bus stops, among others, and grants a lot of consumer rights related to ticket issue, ticket exchange, late departures etc.

2.3 Business models for low-cost bus systems

This section will present low-cost business models found around the world, in order to have an overview on how they work, how to better implement them and how to maintain such systems. Companies from America, Europe and Asia were analyzed and presented very different approaches for the business, which will be explained and discussed.

Specific characteristics from each model were identified: companies can be divided in public, private and State-owned; their business models vary from some very operational approaches to others totally focused on the strategic management. Each singularity will be analyzed in 8 different low-cost bus business models.

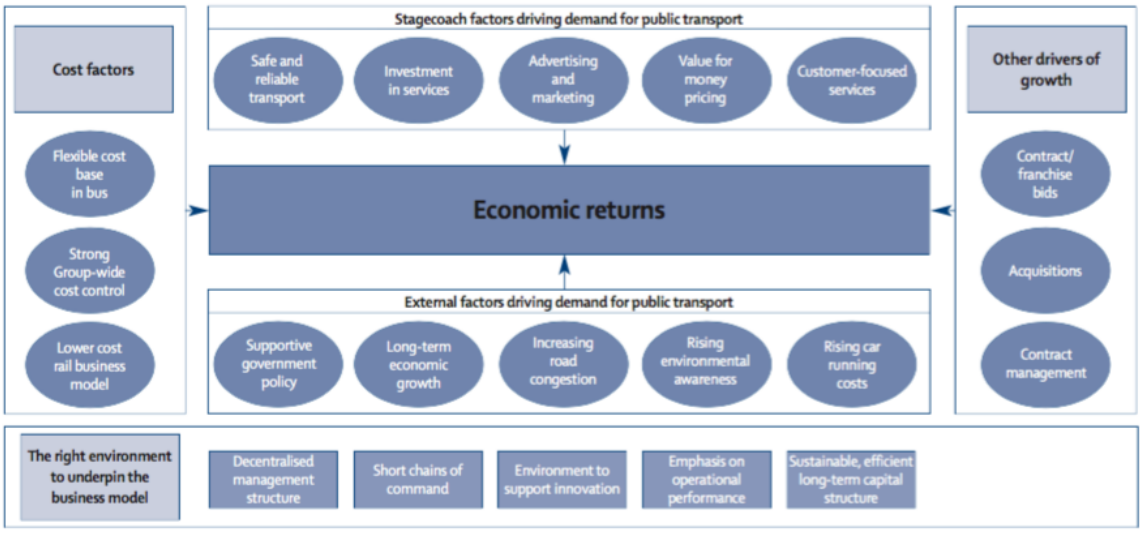
2.3.1 Megabus model

Megabus is a low-cost intercity coach service subsidiary of the huge English company Stagecoach Group, which gave the company financial resources to withstand an unprofitable period of operation until demand for its services built up. It started in the United Kingdom in 2003, entered the United States market in 2006, and has expanded throughout mainland Europe (STAGECOACH GROUP, 2015).

The company was the first one to see that the aggressive cost-cutting airline business model could be implemented for the intercity bus service. Firstly, to reduce costs, Megabus works with reduced personnel, with employees playing many roles. For example, the driver is also responsible for checking tickets, announcing stops and packing the luggage. Also, the company only sells tickets via Internet or phone, another way to reduce costs.

The main characteristic of Megabus is the yield management, which, according to Natessine and Shumsky (2002), is a pricing strategy that anticipates and influences consumer behavior in order to maximize revenue and profit. For that, it's used variable pricing, in which bus seats are sold at different prices depending on the time they're sold. With that in mind, to increase utilization, the company owns a fleet of characteristic double decker buses, with 70% more seats than a standard single-deck coach, and starts selling tickets at £1/€1/$1, plus 50 pence/50 cents for reservation (STAGECOACH GROUP, 2015).

Figure 5 - Stagecoach business model



Source: Stagecoach Group Annual Report (2015)

According to the Stagecoach Group Annual Report (2015), the Megabus business model is designed to be sufficiently flexible to respond to development in the market and changes in demand both in Europe and in the United States. The key features are:

i) Decentralized management structure, in order to local management quickly respond to local market variations;
ii) Light regulated bus operations, allowing management to vary prices, operating schedules and timetables in response to developments in each local market;
iii) Flexible cost base, in which operating mileage and operating costs can change according to the demand.

As of 2015, Megabus has 150 coaches in Europe, which move 5 million passengers across 150 locations in the UK, France, Germany, Italy, Belgium, Netherlands, Spain and Luxembourg. In North America, the fleet is composed by 250 coaches, responsible for the transportation of 10 million customers to 130 locations, linking 40 US states and 2 Canadian provinces (STAGECOACH GROUP, 2015).

Main points: Yield pricing, variable management, cost cutting, no-frills.

2.3.2 Flixbus model

Flixbus was founded in 2011 in Germany, but only launched its first route in 2013, after the German bus market deregulation and the end of the rail monopoly (FLIXBUS, 2016). The company's speed of expansion was and is impressive. Already in 2014, Flixbus was all over Germany, with a robust network. In 2015, after the merger with the competitive startup MeinFernbus, it became the national market leader, detaining 71% of the roadmap kilometers (IGES INSTITUTE, 2016), what gave it strength to the international expansion. The company opened subsidiaries in Milan and Paris. In 2016, it expanded to central and Eastern Europe, as well as Spain and the United Kingdom (FLIXBUS, 2016).

According to an interview conceded by Jochen Engert (2014), co-founder of Flixbus, the company is "like the McDonalds out there". Flixbus does everything related to the product: scheduling, network planning, bus branding, marketing, communications, sales, IT, ticketing, and all the service towards the customer. However, the company doesn't own any bus, since the bus driving part happens together with the local partners. They are medium sized private companies throughout Germany – over 50 companies across the country – that do the operations for Flixbus. These companies bring in the assets, the drivers, they drive the buses, and they deliver the product the way Flixbus wants them to deliver. All these companies act like franchisees, allowing Flixbus to scale faster and with less capital than it would've needed to do so with its own drivers and buses.

On top of that, the company has a revenue sharing model, basically to share the risk of not so profitable routes with the operators. So, once a line goes very well, the operators are going to be very profitable. Once it's not going so well Flixbus is going to share the risk of utilization with them. With that in mind, it's easier to grow the network. And that lets the company with a great incentive to do good marketing, to do good sales, and it provides the operators an incentive to deliver good quality service, with friendly drivers (ENGERT, 2014).

In the year of 2015, 20 million passengers traveled with Flixbus. Many routes have the 1€ tickets for the first buyers. As of today, the company is reaching a total of 100,000 daily connections to 800 destinations in 19 countries, being Europe's largest long-distance bus network (FLIXBUS, 2016).

Main points: "Franchise" business model, revenue sharing, risk sharing, network expansion.

2.3.3 Simple Express model

While we see Megabus and Flixbus operating all over Europe, Simple Express is characterized by a more regional approach. The company belongs to the Lux Express Group and operates mostly in the Baltics, with some links to Russia. In its routes, the company didn't have low-cost bus competitors until September 2015, with the arrival of SuperBus (SUPERBUS, 2016).

Lux Express was already known for its low prices and the great comfort for its customers. Simple Express has even low prices, and the comfort for the trips is the same: coaches have Wi-Fi, bathroom, comfortable reclining seats, outlets for each pair of seats and even individual touch screen media devices, with movies, series, games, music and Internet (LUX EXPRESS GROUP, 2016). The only difference to Lux Express is that there's less leg space and no free coffee. Also, the routes are still few, reaching only the main cities.

The business model of the group is based on attracting people for long journeys based on pricing and comfort. Some adjustments were made to fit more people in each bus and there is a yield pricing strategy, with tickets starting at 3€. In order to cut costs, the tickets are sold online, but also by the driver if there are free seats. For the whole group, the 2015 results showed impressive 1.9 million passengers transported and an increase of 15% compared to the year before (LUX EXPRESS GROUP, 2016).

Main points: Yield pricing, regional, comfort.

2.3.4 Other high quality models

In Europe, some companies, like the Polish PolskiBus, the Finnish OnniBus and the Estonian SuperBus, don't see low-cost and high quality as opposites. They all belong to the same group – Highland Global Transport –, focus on their national markets and use marketing as a way to reach more customers in routes that other low-cost operators don't have. The stops are usually in the street and, for many routes, the customer has to sign for the bus to stop.

PolskiBus sells tickets starting at 1 zloty, or 25 euro cents, connect 34 cities in Poland and recently has expanded its network to 7 other international locations. Since 2011, the company has carried more than 14 million passengers (POLSKIBUS, 2016). OnniBus was

created in 2014, already connects over 40 cities in Finland and sells tickets from 1€, while SuperBus started in 2015, connects 5 cities in the Baltics and also sells tickets from 1€ (ONNIBUS, 2016; SUPERBUS 2016).

Main points: Yield pricing, group, regional, quality.

2.3.5 Eurolines/Baltour model

Eurolines is a network of 29 co-operating coach companies from all over Europe offering connections and integrated ticketing. Baltour operates in Italy for more than 50 years and controls 100% of Eurolines Italia (EUROLINES, 2016). With low-cost companies spreading around Italy and the whole Europe, Baltour started to sell tickets for 1€ and is using it as marketing to attract more customers. The company is an example of traditional operators that only lower their prices in order to stay competitive, even though their business models stay the same.

These kinds of operators are bringing profit to a critical minimum, trying to compensate lower prices with a higher volume. However, Eurolines has a very well developed network, reaching over 1200 destinations (EUROLINES, 2016), which still gives to its members some competitive advantage.

Main points: traditional service, marketing, network.

2.3.6 BoltBus model

BoltBus was created in 2008 in the United States by the gigantic Greyhound, a bus company with over 100 years of experience in America (BOLTBUS, 2016). BoltBus was an answer to Megabus arriving in the US and the comeback of the bus market, with some characteristics that Greyhound hadn't had before.

In order to act faster and not to lose the biggest markets to competitors, Greyhound created a new brand highly focused on quality and ease of use. The branding idea was not to relate the new company to the parent company and its old well-known issues, targeting a whole

new niche in the bus market. For example, BoltBus, unlike Greyhound, insures that all tickets sold are for reserved seating and that there will be no overselling (BOLTBUS, 2016).

According to the BoltBus website (2016), the business model of the company includes tickets starting at $1, with online sales, and the prices are controlled via the yield management model. It's possible to buy tickets from the bus driver, but they are 30% more expensive than the online price. In order to cut costs and ticket prices, buses don't operate in the main stations. And, unlike other low-cost companies, BoltBus has a loyalty program, which rewards frequent clients with early boarding.

BoltBus operates a fleet of 101 buses in the northeast region and in the west coast (BOLTBUS, 2016). According to a study published by the Chaddick Institute for Metropolitan Development (2014), the company, aside with Megabus, saves consumers $1.2 billion annually compared to other models of trips that travelers indicate they would use if these bus services were not available. The same report also says that these companies have added service at a rate far faster than any other transportation mode.

Main points: Branding, yield pricing, loyalty program

2.3.7 Southeast Asia model

The lack of regulation in some Southeast Asia countries, even with respect to safety, makes possible a low-cost approach for the bus system. Traveling by bus around Thailand, Cambodia, Laos and Vietnam is by far the cheapest way, compared to the existing trains and even low-cost airlines.

The business models vary from country to country, but they are always focused on the locals and on tourists traveling with a low budget. There are mainly two of them:

i) Companies controlled by the government, like the Thai bus operator Baw Khaw Saw, which sells tickets at the bus terminals for a cheap price, usually travels during the day, packing as many people as possible inside the bus (not necessarily seated), and stops often, slowing considerably the trip time.
ii) Private companies, such as the Cambodian Mekong Express, which sells express services to long-range destinations, through local travel agencies. The routes are

both during the day and overnight, and the carriers offer a more comfortable service, many times with beds onboard (MEKONG EXPRESS, 2016).

Main points: volume, many stops / local travel agent selling, comfort

2.3.8 Vietnam model

The low-cost bus business model in Vietnam is only possible due to the lack of regulation in the country. Traveling Vietnam by bus is very cheap and convenient. The main competitors are trains, which are very slow, more expensive than buses and don't reach some important cities, like Hoi An. However, they insure more safety than traveling on the road. Low-cost airlines also offer competition, but they are more expensive and restricted to very few cities.

The whole business depends on travel agencies and hotels, which sell the tickets mostly to low-budget travelers and locals. The customers are always picked up directly from their accommodation, or from the travel agent where they have booked their ticket. The driver then has to drive through heavy traffic to different hotels and travel agents, picking up more passengers, so it takes quite a while before the bus gets officially on the road. Due to the usual long distance and time traveled, the buses are single decker with three rows of bunk beds through it. Many times, the beds are reserved for tourists and many locals pay even less to sit on the aisles, so the companies earn additional revenue. Traveling Vietnam by bus has the added bonus of a free night's accommodation on any overnight bus journeys, as well as a door-to-door trip.

According to the company Kim Tours (2016), one of the few with online selling, the great differential of using bus, especially for tourists, is the possibility of traveling with an open ticket, also called hop-on hop-off. Companies sell the routes south-north and north-south in which it's possible to stop in a range of cities before the final destination, where the customers can stay for as long as they want. Usually, the customers only have to reconfirm when they are traveling the next route with advance at the company's booking office. Most of the times, the prices reflect on the comfort the passengers get.

Main points: Local travel agent selling, long trips, overnight, hop-on hop-off.

2.4 Overview on the models

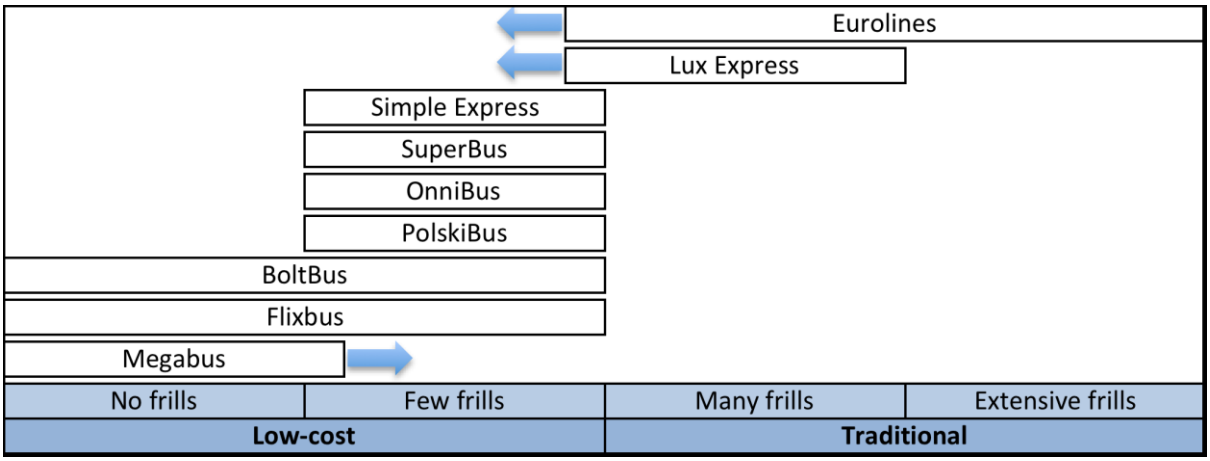
Based on the description of the above companies, and accordingly to Groß and Schröder (2007), it is possible to identify different types of low-cost implementation:

i) Companies that fully implement the low-cost strategy, applying techniques to reduce costs, increase utilization and earn extra profits from every possible source;
ii) Companies that partially implement the low-cost strategy or implement some elements of it;
iii) Traditional operators that only lower their prices in order to stay competitive.

Furthermore, it's possible to see a totally different approach in Southeast Asia, which is only possible with the lack of regulation for road trips in some countries, even related to the safety of passengers.

It's becoming more and more difficult to separate the carriers between these categories and, many times, companies identify themselves in marketing campaigns as low-cost only to attract customers. Figure 6 tries to identify trends in each of the above listed companies and to place them accordingly to the low-cost level they have implemented.

Figure 6 - Low-cost operators according to the low-cost level they have implemented



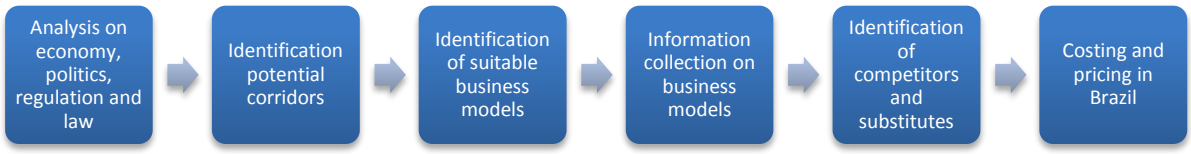
Source: author

3 OBJECTIVES AND METHODOLOGY

The main goals of this research are to identify different business models for low-cost buses and to check their hypothetical introduction in the Brazilian transport market. In order to achieve these objectives, a methodology consisting of six main steps (Figure 7) was followed not only for the Brazilian market, but also for the European and American markets, in a way to create comparisons:

i) Analysis on economy, politics, regulation and law
    a) General aspects for the country
    b) Specific aspects for the bus market
    c) Risk analysis
ii) Identification of potential corridors
    a) Demand in Brazil
    b) Route distances and times
    c) Road quality
iii) Identification of suitable business models
    a) General qualitative information
    b) Selection of similar corridors in Europe and in the United States
iv) Information collection on business models
    a) Data collection
    b) Understanding yield management pricing
    c) Benchmarking on selected companies
v) Identification of competitors and substitutes
    a) Data collection
    b) Comparison to low-cost buses
    c) Benchmarking on transportation methods
vi) Costing and pricing in Brazil
    a) Pricing based on comparison with benchmark of competitors and substitutes in Europe and in the United States
    b) Costing of business in Brazil
    c) Pricing using cost-plus model to crosscheck of values

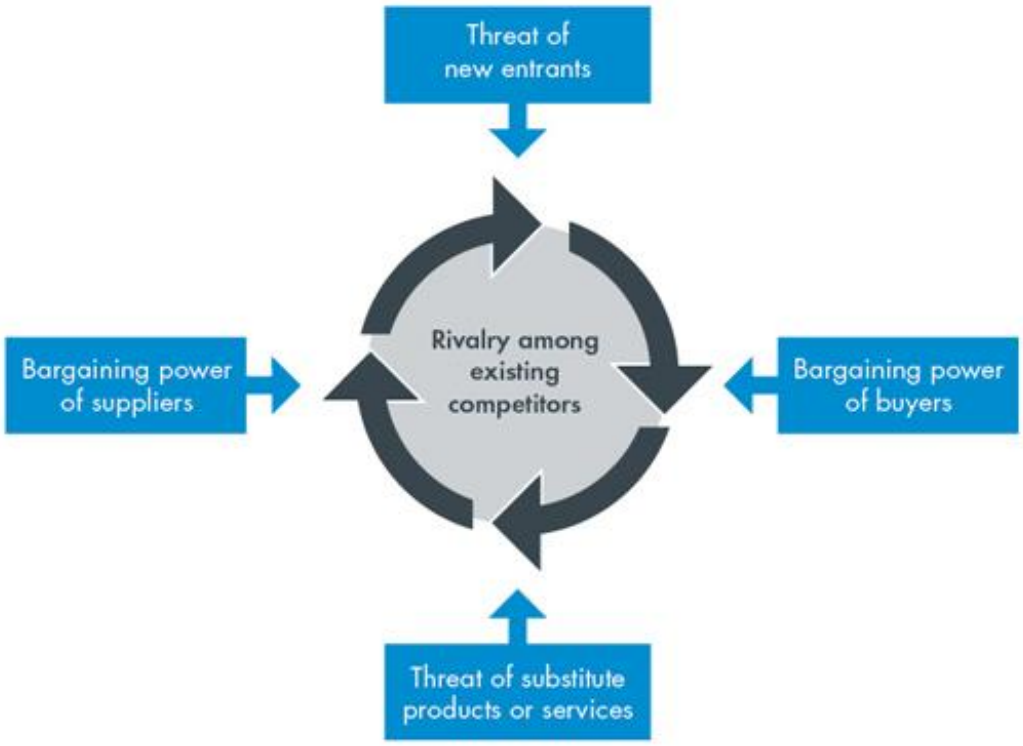
Figure 7 - Methodology main steps



Source: author

The methodology used and the series of steps previous explained are also based on the Porter's five forces framework. Basically, it analyzes the environment in which a firm is inserted and its attractiveness, by accessing how five different forces act to drive the overall profitability up or down. The stronger these forces are defined, the lower the attractiveness will be. In the specific situation of this study, the analysis will be made from the outside, to check how the Brazilian bus market works. The representation of the five forces, as defined by Michael Porter (2008), can be seen in the **Figure 8** below:

Figure 8 - Porter's five forces framework



Source: Porter (2008)

i) Threat of new entrants refers to the probability that new competitors might entry the industry, driving profitability low. High profitability will always attract new

entrants, unless the incumbents, or the very industry structure, block that entrance. Usual barriers to entry the bus market include government policies, high capital requirements, economies of scale, switching costs and customer loyalty. In the present case, where it's being analyzed the entrance of a low-cost bus company in Brazil, the lower the barriers, the better. However, if the company indeed manages to enter the market, it has to start working on creating barriers for future competitors.

ii) Threat of substitute products or services relates to the existence of products or services that are not direct competitors to the ones offered by the firm, but may be perceived as a substitute by its consumers. For instance, in the bus industry, we can list cars, railways, airplanes or even ferries. Potential factors for this force include perceived level of product differentiation, ease of substitution, switching costs, customers' price sensitivity and propensity to substitute.

iii) Bargaining power of buyers indicates how powerful customers, or bus passengers, can capture more value from the industry participants by demanding lower prices, better quality, better conditions etc. For the bus industry, the main factors for this force would be price sensitivity, availability of substitutes, type of buyer (companies or people) and availability of information.

iv) Bargaining power of suppliers indicates how the suppliers may capture more value and drive down profitability by charging higher prices, limiting quality, passing on costs or offering worse conditions overall. Potential factors for this force include concentration of suppliers, price sensitivity for the industry participants, degree of differentiation of inputs, availability of inputs substitutes, competition for inputs with other industries and switching costs.

v) Rivalry among existing competitors, the final force, relates to the many forms of competition in any industry, such as price competition, introduction of new products, advertising campaigns, suppliers or buyers exclusivity contracts, power over distribution channels etc. One huge factor, which is the main discussion of this work, is the differentiation through a low-cost approach. Other factors that determine rivalry include industry growth, number of participants in the industry, ratio between fixed and variable costs, existence of exit barriers, benefits for being the industry leader, degree of differentiation of the product and innovation rate in the industry.

The study of these forces will help the understanding of the bus industry structure, which can explain the current state of the market and gives basis to forecast its future. This information is crucial in developing a strategy, as it aids in positioning the company in the market, exploiting industry change and building an organizational structure suitable to maximize profitability in that industry.

3.1 Analysis of the economy, politics, regulation and law

The first step aims at understanding a wide range of aspects, such as economy, politics, regulation and law, which are considered relevant to the development of a low-cost bus business. Those aspects were mainly analyzed in Brazil and some of them were compared to figures in Europe and in the United States.

For the economical analysis, the data collected included the gross domestic product (GDP), public budget, interest rates, inflation and debt. About politics, the current political crisis in Brazil was explained. After that, the focus of discussion turned to regulation and law, based on the information previously gathered during the literature review.

Specific aspects for the transportation market and the bus market were also analyzed and compared. Based on that information, an initial risk analysis was developed.

3.2 Identification of potential corridors

For the second step of this work, demand in Brazil for transportation was extensively analyzed, especially the demand for buses. In Brazil, the transportation methods are basically airplanes, buses and cars. Since both airplane market and bus market are deeply regulated, information on the demand could be precisely gathered in some government agencies' websites.

The elaboration of the demand database followed some steps:

i) Gathering information from the statistic annual reports for the Air Transport of Passengers (TAP - Transporte Aéreo de Passageiros) and the Interstate Road Transport of Passengers (TRIP - Transporte Rodoviário Interestadual de Passageiros). The TAP market data was collected from the Civil Aviation

National Agency (ANAC - Agência Nacional de Aviação Civil) database, present in its statistic annual reports. For the TRIP market, the database used was from the National Agency of Land Transports (ANTT - Agência Nacional de Transportes Terrestres) statistic annual reports. The range of the data collected is from 2013 to 2015, since, before 2013, ANTT information didn't differentiate between road trips and semi-urban trips;

ii) Exclusion of international markets for both services;

iii) Exclusion of TRIP markets with semi-urban characteristics.

The analysis of the transportation flow was realized through methods that aim the measurement of the absolute density of the connection between two states (or regions), considering departures and arrivals for both of them. With that said, it was used the variable T_{ij} to represent the aggregate demand through the sum of: flow of passengers from the state (or region) *i* to the state (or region) *j* (I_{ij}); and flow of passengers from the state (or region) *j* to the state (or region) *i* (I_{ji}). The Equation 1 (WANG; JIN, 2007; MARTINS, 2007) represents how aggregate demand was calculated:

$$T_{ij} = I_{ij} + I_{ji} \; (i, j = 1, 2, 3, \dots, n) \qquad (1)$$

Another analysis, utilized by FIPE (2010) in a report for ANTT, was identifying the number of passengers in departure or arrival by each state (or region), in order to understand how many passengers a single state (or region) deals with annually.

In addition to that, an overview on the road quality was made.

Based on all the data collected and the markets with the largest demands, some routes were selected as potential to the implementation of the low-cost business. For these routes, distances and estimated times were gathered to be compared to similar routes run by low-cost companies in Europe and in the United States. The factors considered to the selection of routes were:

- Presence of high demand;
- Growth in the TRIP market;
- Presence of roads in good condition;

- Presence of potential markets in the middle of the route, in order to allow partial stops and link more than two cities. It was identified in the literature review as a common practice for low-cost companies;
- Presence of students, identified in the literature review as one of the main customers of the low-cost service.

3.3 Identification of suitable business models

The literature review came up with eight low-cost bus approaches, involving at least twelve companies in three different continents. Among these business models, a qualitative analysis was made in order to narrow the research for a more quantitative analysis.

Considering the possibility of gathering quantitative information (public companies), the business models route extensions, and the concept of low-cost, three companies were selected: Megabus in Europe, Megabus in the United States and Flixbus. For each potential route selected in Brazil, other three routes were selected from these companies.

The factors considered for the selection of routes were:

- Routes that begin and end in big cities;
- Similarity to Brazil;
- Presence of competitors and substitutes;
- Routes with similar distances to the Brazilian ones;
- Routes with partial stops.

In the United States, the idea was to collect data in interstate routes; in Europe, data was gathered in both international and national routes. The main goals on selecting these three routes are to open space for a qualitative analysis and to check the feasibility of the selected Brazilian routes.

3.4 Information collection on business models

For Megabus in Europe, Megabus in the United States and Flixbus, a more qualitative analysis was made. In order to do so, the database elaboration was composed by two different steps:

i) Selection of two Brazilian routes and two routes for each company, based on the qualitative analysis. The selected corridors in Brazil were Belo Horizonte (MG) – São Paulo (SP) and Rio de Janeiro (RJ) – São Paulo (SP), because the qualitative analysis identified them as the most common kind of route worldwide, basically linking two large cities in what relates to population and economy, and having partial stops.
ii) Collecting data on the selected routes, in order to achieve a better understanding on how the business model works, especially with respect to yield management pricing. The parameters gathered were:
    - Route distance;
    - Route time;
    - Price when buying 1 day before;
    - Price when buying 1 week before;
    - Price when buying 2 weeks before;
    - Price when buying 4 weeks before;
    - Price when buying 8 weeks before;
    - Number of trips per day for each route.

    The prices vary depending on the day due to the yield management strategy used by most of the low-cost companies. For the price analysis, the collection of data was made during a whole week, in order to avoid a sample biased by the day in which it was collected. In order to simplify things, the routes were considered just one-way.

3.5 Identification of competitors and substitutes

The collection of data on competitors and substitutes was developed in two parts: the first one concerning a comparison to the low-cost bus routes in Europe and in the US, and creating a benchmark; the second one on the selected routes in Brazil.

For the data collection in Europe and in the US, the selected competitors were other bus carriers, while the substitutes were airplanes, trains and cars. In order to make a good comparison, the same parameters gathered for low-cost bus routes were collected for other transportation methods, always with the same approach. It was identified a benchmark that correlates the low-cost bus data with other transportation methods data.

In this step, in order to create an analysis that includes every route for each company, data reorganization was made in the following way:

i) All prices for low-cost companies were fixed at 1, or 100%;

Table 1 - Prices before reorganization

	Low-Cost Bus				
	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before
London - Paris	27,29	25,35	24,50	26,50	24,25
London - Lille	26,14	25,14	24,50	26,00	23,31
Lille - Paris	7,86	5,57	5,29	5,00	5,00
	Normal Bus				
	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before
London - Paris	55,85	53,48	33,79	40,54	46,33
London - Lille	39,58	39,00	36,49	37,45	39,00
Lille - Paris	8,00	8,00	9,00	9,00	9,00

Source: author

Table 2 - Prices after reorganization

	Low-Cost Bus				
	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before
London - Paris	1,00	1,00	1,00	1,00	1,00
London - Lille	1,00	1,00	1,00	1,00	1,00
Lille - Paris	1,00	1,00	1,00	1,00	1,00
	Normal Bus				
	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before
London - Paris	2,05	2,11	1,38	1,53	1,91
London - Lille	1,51	1,55	1,49	1,44	1,67
Lille - Paris	1,02	1,44	1,70	1,80	1,80

Source: author

ii) The same proportion was kept for every other transportation method;

iii) An average was calculated including every route of each company, creating a relationship between the low-cost bus prices and the alternative transportation prices for each period of time. The example in Table 3 shows that, on average, the price one day before traveling for normal buses is 53% more expensive than the price for low-cost buses.

Table 3 - Average calculation for each period of time

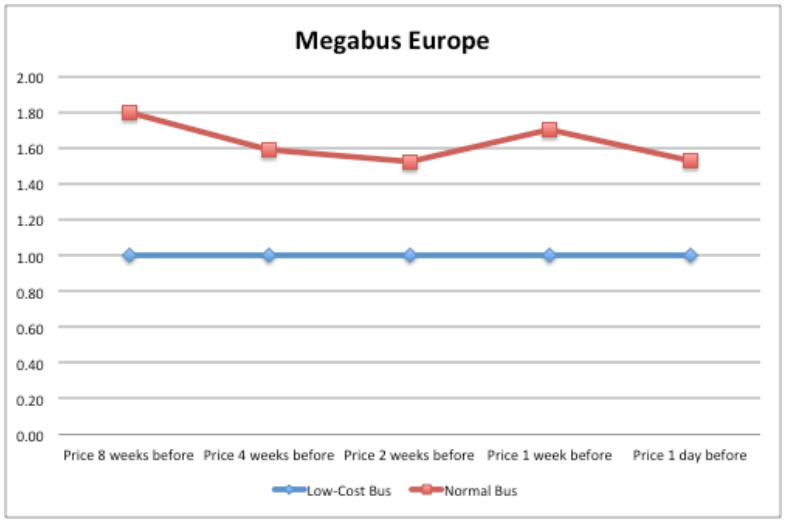
	Low-Cost Bus				
	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before
London - Paris	1,00	1,00	1,00	1,00	1,00
London - Lille	1,00	1,00	1,00	1,00	1,00
Lille - Paris	1,00	1,00	1,00	1,00	1,00
	1,00	1,00	1,00	1,00	1,00

	Normal Bus				
	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before
London - Paris	2,05	2,11	1,38	1,53	1,91
London - Lille	1,51	1,55	1,49	1,44	1,67
Lille - Paris	1,02	1,44	1,70	1,80	1,80
	1,53	1,70	1,52	1,59	1,79

Source: author

iv) Finally a chart was created comparing the transportation models with the low-cost bus.

Figure 9 - Example of the final chart comparing transportation methods



Source: author

A total of 8 routes from Megabus Europe, 13 routes from Flixbus and 7 routes from Megabus US were analyzed, in order to obtain a better result.

3.6 Costing and pricing in Brazil

In Brazil, the market is basically composed by traditional bus carriers, airplanes and cars. An analysis was made on those transportation methods, gathering the same parameters previously mentioned. Based on the benchmark from the European and American companies, a target price was identified for the low-cost model in Brazil, through comparison with competitors and substitutes.

In order to check if this price is plausible and doable in the Brazilian market, a cost plus analysis was made. Firstly, a costing analysis took place, identifying every possible source of cost in the business. After that, a markup percentage was added, based on a profit margin that covers opportunity costs in Brazil. Finally, the new price was crosschecked with the one previous found through comparison with competitors and substitutes.

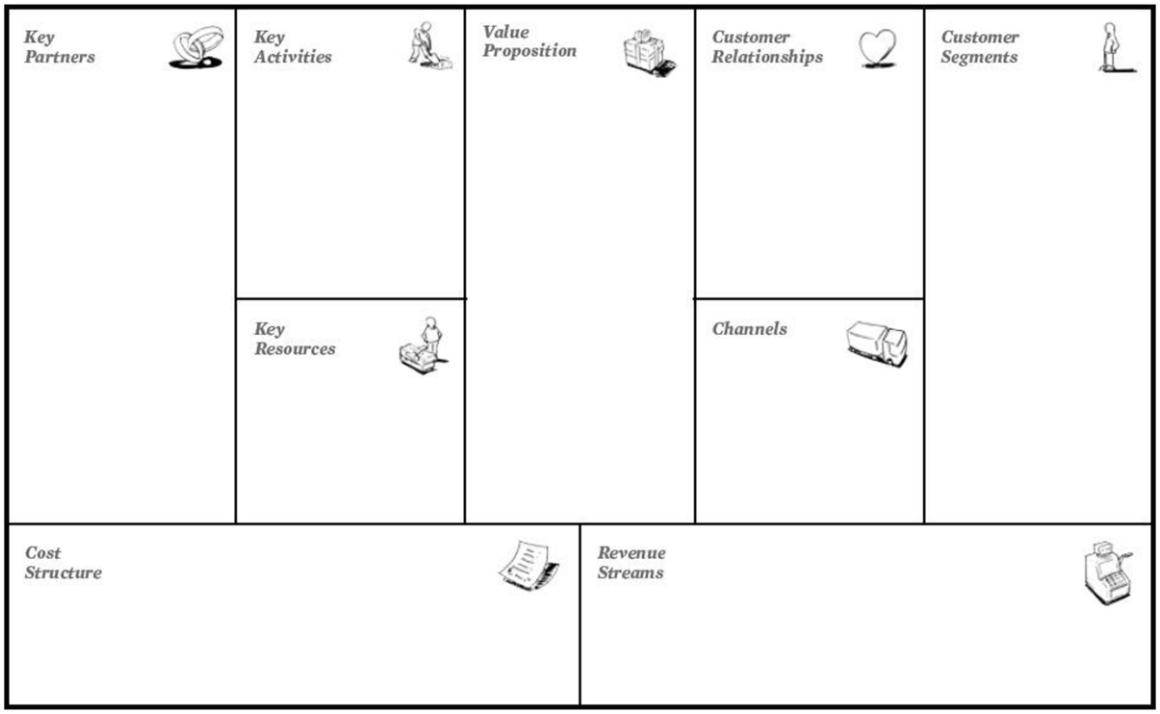
For the cost analysis, it was identified direct costs (fixed and variable) and indirect costs. Fixed costs are those that don't vary depending on the company level of activity or the utilization of buses. Variable costs are those that vary according to the utilization of vehicles, which means that they relate to the distance covered by the bus during the period. The gathering of values for the whole costing process was based on the analysis presented by Silva (2010, 2012), in which the author made the strategic management of costs for a bus company in Brazil.

3.7 Implementation in Brazil

Finally, ideas of how a business model could be implemented in Brazil were debated, focusing on three main factors: the fleet, the website and the advertising.

In order to understand a possible low-cost bus business model that could be used in Brazil, the Canvas model was used. It's a practical and versatile tool used all around the world that allows identifying every key aspect of a business model in a single chart, as shown in **Figure 10**.

Figure 10 - Canvas model utilized for the analysis of business models



Source: Osterwalder (2004)

The Canvas model was first developed by Alexander Osterwalder, in 2004, and is composed by nine elements that, together, cover all the main areas of a business: clients, offer, infrastructure and financial viability. The nine elements of Canvas are:

- Key partners: main suppliers, strategically alliances between non-competitors, strategically alliances between competitors, joint-ventures;
- Key activities: development of software, advertising, production etc.;
- Key resources: all kinds of resources, that could be physical, financial, intellectual or human;
- Value proposition: the value a company is offering, by solving a problem or matching a necessity of consumers. Among the attributes that include the value proposition are price, performance, personalization, design, brand or status and convenience;
- Customer relationships: personal, self-service or automatized systems that interact with clients. The choice of the kind of relationship that meets the customer and the business model deeply influences the general experience of each client;

- Channels: how to reach the customer through communication, distribution and sales. They are important because they create the client's general experience, spread knowledge about the company and even provide post-sales support;
- Customer segments: identifying the market niche that the company must focus, allowing a better understanding of the client and his/her necessities, at the same time that this niche is big enough in order to be financially attractive;
- Cost structure: identifying costs of every kind, and focusing in the most important for the business model;
- Revenue streams: sources of money in the company, which can be the sales of products, services, advertising etc.

4 RESULTS

This chapter presents the results of this study in a logical sequence, as described in the methodology section. Initially, a macro analysis of some Brazilian aspects is made, considering economy, politics, regulation and law. Then, the process of selection of potential corridors is detailed through a demand database analysis for transportation. Subsequent to this, there is the selection of suitable low-cost business models, based on the literature review and some qualitative factors; followed by the creation of a database with the collection of some quantitative parameters. Then, the data is compared to the same parameters for competitors and substitutes. Afterwards, an analysis of prices in the Brazilian market will be made. Finally, the comparison of all these results leads to a final discussion and conclusion.

4.1 Analysis of the economy, politics, regulation and law

The first part of the chapter is more focused in macro information about the Brazilian market. Results will be presented for a wide range of aspects, such as economy, politics, regulation and law, which are considered relevant to the development of a low-cost bus business.

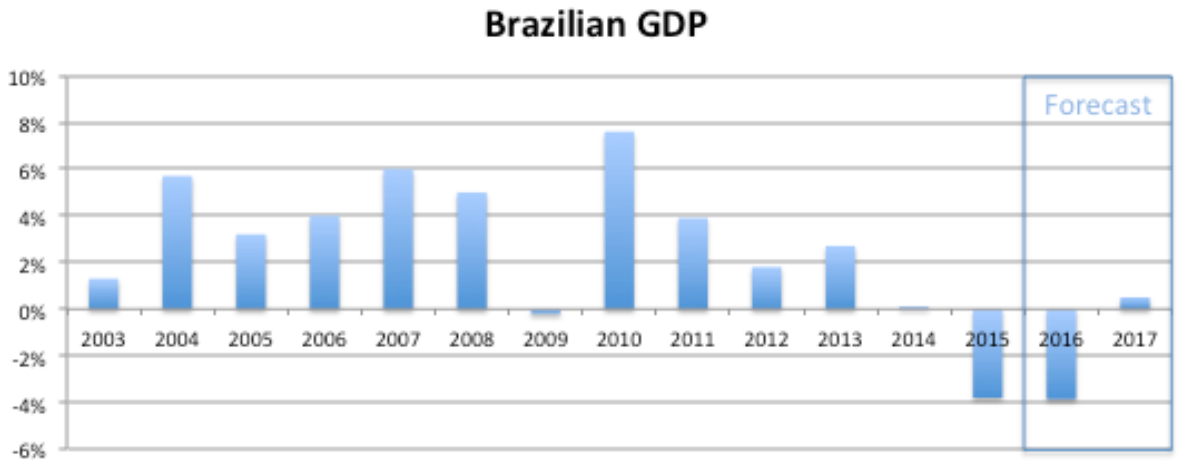
4.1.1 Economy

In 2011, Brazil was being considered the country of the future. The economy had just faced a 7.5% GDP growth in 2010, measurements after the 2008 global crisis boosted the labor market and strengthened the domestic demand, and also the country had been selected to host the 2014 FIFA World Cup and the 2016 Olympic Games, expecting a huge amount of investment for the following years. However, the economy, then considered stable and mature, happened to not follow the expectations.

In the past few years, the Brazilian economy is facing a huge slowdown. If the country resisted the 2008 financial crisis, now it seems that internal problems are taken Brazil down. It grew by 2.2% a year, on average, during Dilma Rousseff's first term in office, from 2011 to 2014. However, in 2015, the GDP fell 3.8%, and the expectations as of June 2016 are that the index is expected to shrink 3.9% in the year (CENTRAL BANK OF BRAZIL, 2016).

According to the IMF, Brazil would be the second worst GDP index in 2016, being only ahead of Venezuela, which is expected to shrink 6%.

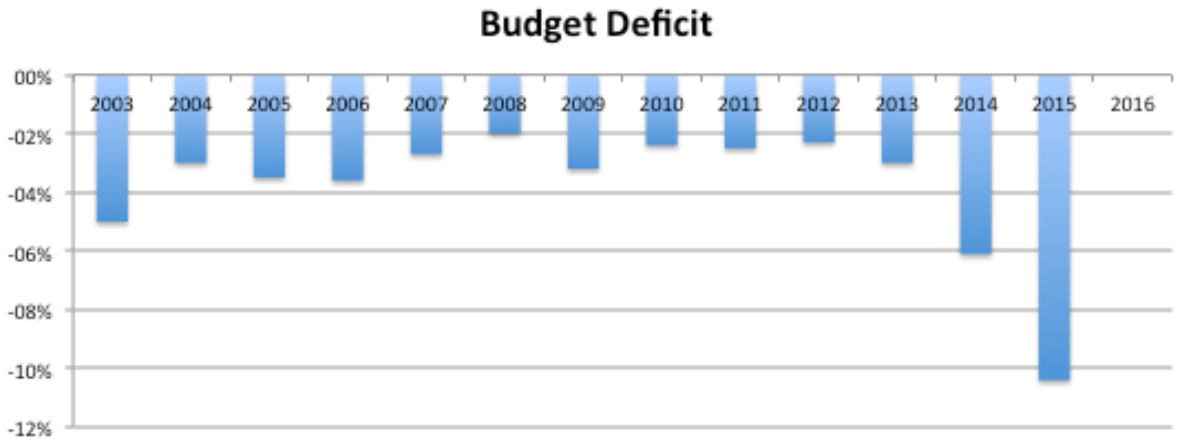
Figure 11 - Brazilian GDP % change on a year earlier



Source: Central Bank of Brazil (2016)

At the same time Ms. Rousseff was reelected, in 2014, the budget deficit doubled to over 6% of the GDP and reached 10.4% in the following year. The gross government debt now is reaching 70% of the GDP, but the high interest rates of over 14% are making borrowing really costly.

Figure 12 - Brazilian budget in % of GDP

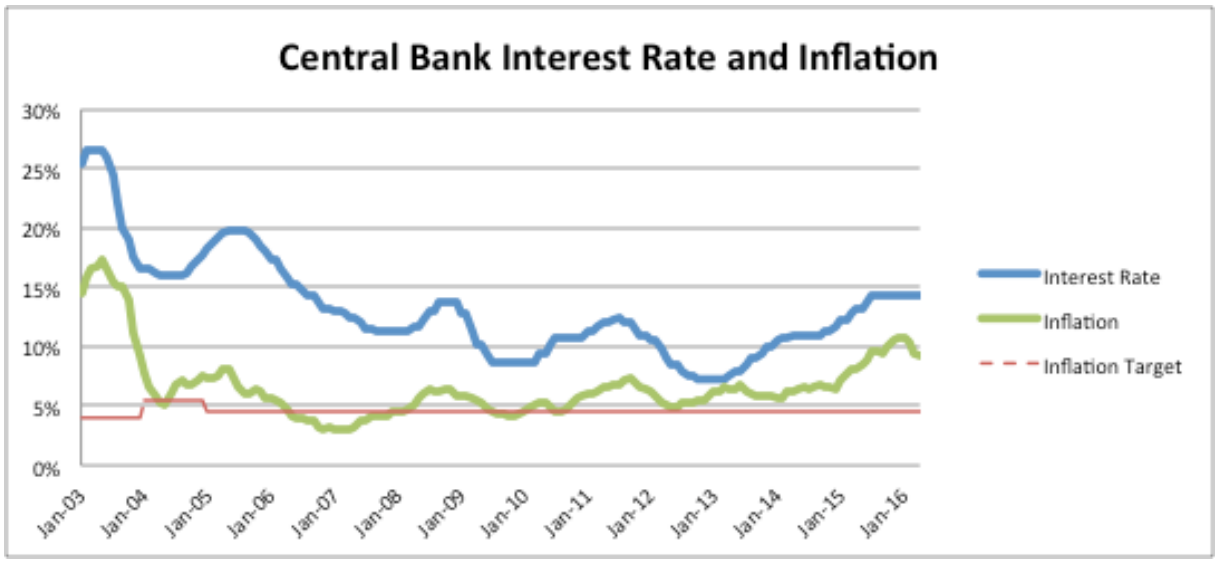


Source: Central Bank of Brazil (2016)

Also, the inflation in Brazil is climbing way above the Central Bank's self imposed upper limit of 6.5% and its target of 4.5%. By the end of 2015 and beginning of 2016, the

inflation was above 10% and, in order to contain an even higher index, the Bank has increased the benchmark interest rate. Since July 2015, the rate has been kept at 14.25%.

Figure 13 - Central Bank interest rate and inflation



Source: Central Bank of Brazil (2016)

Just as macro economical indicators, micro economical indicators aren't performing well. Excessive bureaucracy, poor infrastructure and strong currency made many sectors of the industry uncompetitive through the years, and that is now affecting directly the population. Real wages are falling, unemployment reached double digits in the first trimester of 2016 (10.9% according to IBGE, 2016), and also the government is cutting expenses on unemployment insurance.

The entire situation left the population with very little disposable income, and almost every sector, including transports, was experiencing slowdown. The whole sector faced a decrease of 2.03% from 2013 to 2015, and specifically the number passengers who travelled interstate routes by bus fell 15.49% during the same years (ANTT, 2016).

Concluding, the economical situation that Brazil is facing doesn't have a clear solution and many of the problems are deep-rooted to the country's society. As a result, Brazil's economy will take a while to recover and, until that happens, investments in any sector must be deeply analyzed. However, the future recover of the economy could bring new opportunities for innovative ideas, such as the low-cost buses.

4.1.2 Politics

All the economic problems observed in the previous chapter are strictly related to the political crisis that Brazil is facing right now. On April 17th, 2016, the lower house of Congress voted to start impeachment proceedings against Dilma Rousseff over accusations of accounting trickery to hide the true size of the budget deficit. On May 12th, Ms. Rousseff was stripped of her presidential duties for up to six months, after the Senate voted to begin the impeachment trial. The final decision was held on August 31st, 2016, and Ms. Rousseff left permanently the presidency, after suffering the impeachment. She was replaced by her vice-president, Mr. Michel Temer.

The situation only showed that Brazil was being run by a government without any support from the congress. Since Dilma Rousseff's reelection, in 2014, she saw her popularity fall along with the economy, especially due to the massive corruption scandal involving the state-run oil firm, Petrobras, some huge private infrastructure firms, such as Odebrecht, and many Brazilian politicians, including Ms. Rousseff's close aides and the former president Luiz Inácio Lula da Silva, who belongs to the same party of Ms. Rousseff.

Also, one of the main causes of the Brazilian slowdown is the economical politics submission to the party politics. Positions in the government have always been traded for the political support of the many parties and this mechanism is affecting many sectors of the Brazilian society, such as education, public health, safety and, obviously, the economy.

Finally, the government is facing the lack of credibility, since the corruption scandals are only stacking up and still a lot of people are being left unpunished. Even though the new government had the best of intentions, it wouldn't have enough credibility to get the support of the national economy different sectors. And this is probably the biggest situation the country has to solve in order to let the crisis behind.

4.1.3 Regulation and law

As explained in the literature review section, changes in the TRIP market started to occur in 2014, when the Law 12.996, sanctioned on June 18, allowed the interstate passenger transportation services to be granted as authorizations, like it had already happened in many

other countries. The new law authorization idea presupposes a free market, so additional to letting all the interested able companies to operate the lines, the government would also allow them to choose their routes.

Finally, in June 29, 2015, the resolution 4.770 regulated all the system. Companies wouldn't have exclusive lines, which means that many carriers could ask authorizations for the same line; maximum prices must be obeyed, but there wouldn't be fares, letting the companies to set their own ticket prices.

This mark is of great importance for this study, because the low-cost business models studied in the literature need free competition and an open market in order to be profitable. With the previous system of concessions, used in Brazil, the insertion of a low-cost bus company wouldn't make sense, because there were no competitors and prices were set by the government.

4.2 Identification of potential corridors

The selection of potential corridors for the development of low-cost bus routes was based on the demand for transport. In Brazil, the transportation methods are basically airplanes, buses and cars. Since both airplane market and bus market are deeply regulated, information on the demand could be precisely gathered in some government agencies' websites.

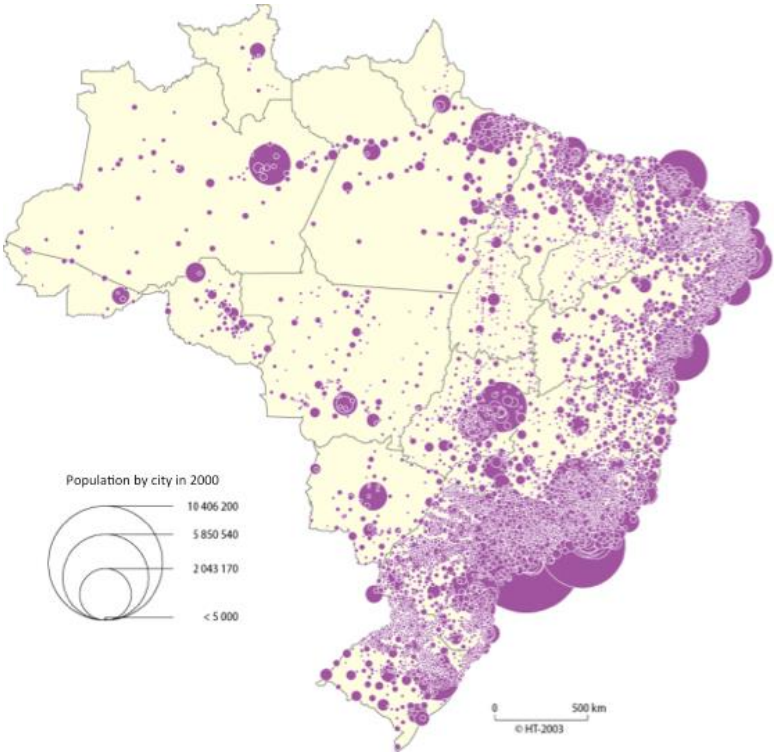
The first analysis will be made taken into consideration all the passengers in Brazil, both from planes or buses. In order to do so, the connections between two regions will be measured by the number of passengers, according to the Equation 1, explained in the methodology section.

After that, a second analysis will be focused only on the Brazilian TRIP market. The flow between regions will be measured, and then the approach will be narrowed to the Brazilian states, identifying departures and arrivals in each one of them. Tables containing the entire passenger flow between the states, for buses and airplanes, between 2013 and 2015, can be checked in the appendix section of this research.

4.2.1 Population distribution and the road system

The population in Brazil is irregularly distributed on its territory. The country is composed by five regions: North, Northeast, Midwest, Southeast and South. Accordingly to the Brazilian Institute of Geography and Statistics (IBGE), the regions Northeast, Southeast and South together correspond to 88% of the population, distributed in only 36% of the country's area. While the Southeast region has a demographic density of 87 inhabitants by square kilometer, the numbers in the North region and in the Midwest region are, respectively, 4.1 inhabitants/km^2 and 8.7 inhabitants/km^2. The population is concentrated in the coastal region, especially in the Southeast and in the Northeast, as it's possible to see in **Figure 14**.

Figure 14 - Brazil population distribution

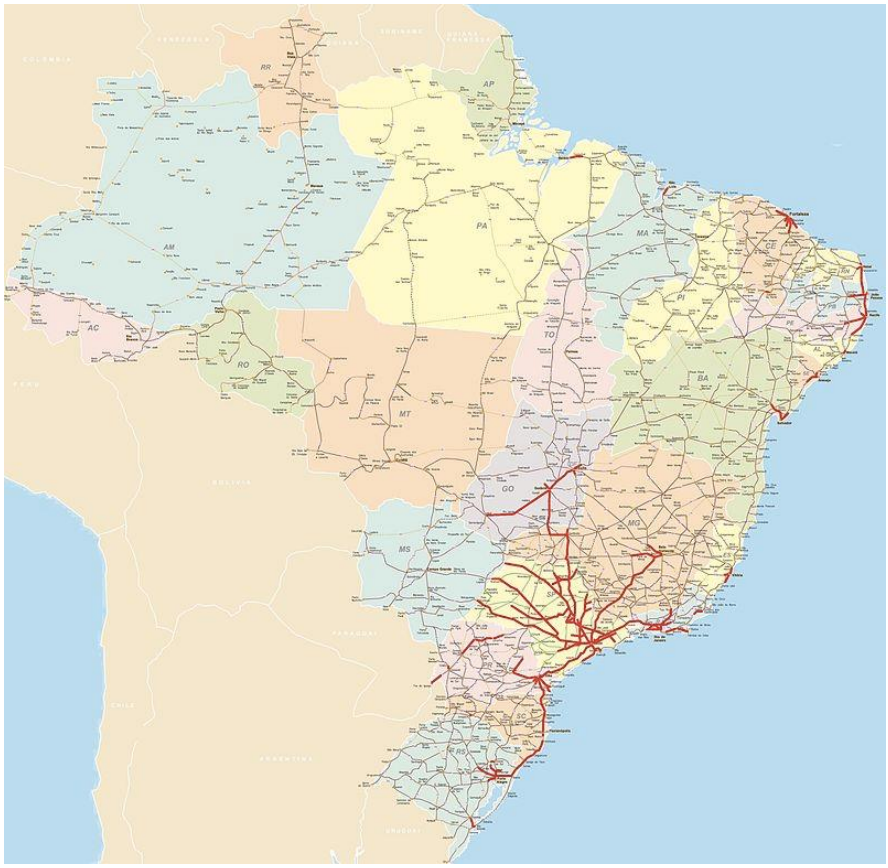


Source: adapted from IBGE Census (2000)

Just as the population distribution, the investments in roads are not equally divided for the whole country. In Brazil, the road transportation is the main logistical system and accounts for almost 1.8 million kilometers, being the fourth largest in the world. There are state and federal roads and usually the busiest ones, and also the better ones, are administrated and conserved by private companies through concessions.

As **Figure 15** shows, the road transportation of passengers in Brazil comprehends a wide and intricate network, making possible long trips that would only be done by planes in other nations. However, the figure also shows a very small percentage of two-lane roads and their restriction to a small area. It's possible to see that São Paulo is the state with the most two-lane highways. Overall, this kind of roads is present in the Southeast, South and coastal Northeast.

Figure 15 - Brazilian roads with two-lane highways in red

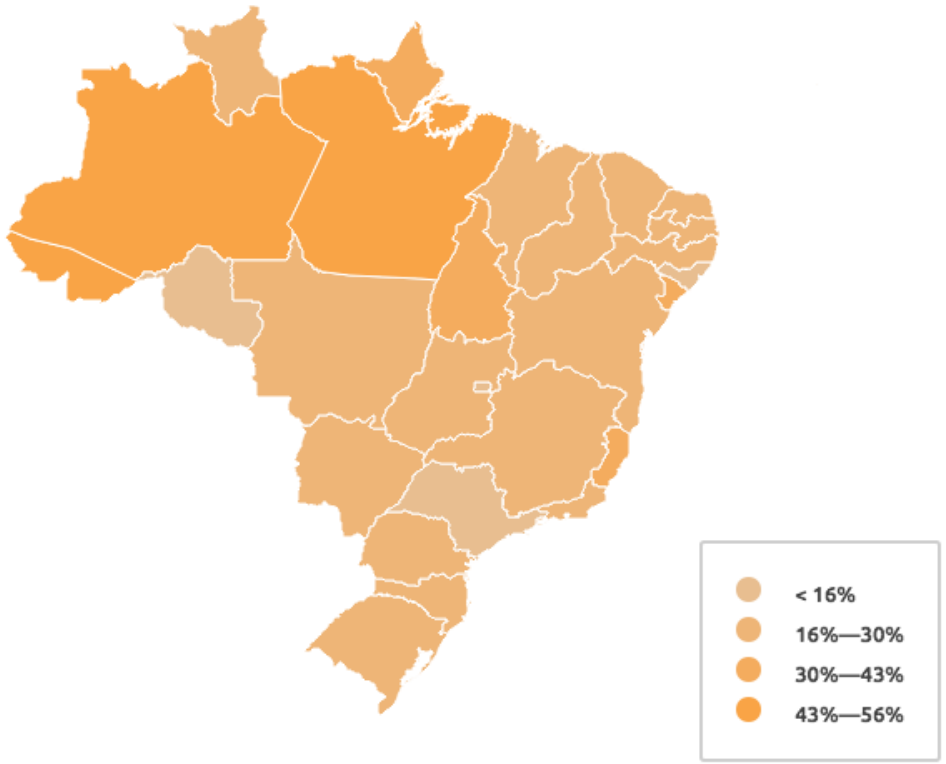


Source: adapted from ANTT (2016)

And two-hand roads are not the only problem. The quality of the roads varies throughout the territory. According to the CNT Road Report (2015), 78.6% of the almost 1.8 million kilometers of roads is unpaved. Also, 22.4% of the Brazilian roads is facing bad conditions. However, according to the same report, the numbers in recent years are getting better. From 2007 to 2015, the number of good roads jumped from 26% to 43%, while the number of roads in bad conditions fell from 33% to 22%.

Figure 16 shows the percentage of bad roads by state. Only São Paulo (3%), Alagoas (4%), Distrito Federal (5%) and Rondônia (15%) made the cut for the best category. Other states below the national average were also few: Rio de Janeiro (17%), Bahia (19%), Mato Grosso do Sul (19%), Paraná (19%), Ceará (21%) and Paraíba (21%).

Figure 16 - Percentage of bad roads by state



Source: CNT (2015)

The study of the road quality is important in determining the routes for a new investment. For a low-cost business, the initial focus should be in more reliable routes, because the low margins don't open spaces for extra costs that may arise from trips in bad roads, such as high maintenance and break of equipment. Also, routes in roads with bad conditions would make the schedule more unpredictable, which could generate delays or leave buses unattended.

4.2.2 Regional and inter-regional passenger flow for TAP and TRIP markets

The analysis of the demand evolution for TAP and TRIP markets was based on data from 2013 to 2015, because before 2013, ANTT, which is responsible for the TRIP market,

didn't differentiate between road trips, which is the focus of this research, and semi-urban trips. The information was put together into regional and inter-regional flows, resulted from the pair combination of all five regions in Brazil: North (N), Northeast (NE), Midwest (CO), Southeast (SE) and South (S).

For each region, or pair of regions, the following Table 4 presents the number of passengers in each year between 2013 and 2015, the sum of passengers through these years, a cumulative number starting from the region with the most passengers and decreasing, as well as relative percentage and cumulative percentage. Also, it's possible to check the demand variation from 2013 to 2015.

Table 4 - Regional and inter-regional aggregate demand for TAP and TRIP markets

	Route	Passengers 2013	Passengers 2014	Passengers 2015	Passengers 2013-2015	Cumulative Passengers	Relative Percentage	Cumulative Percentage	Variation 2013 to 2015
1	SE	45.088.896	43.853.946	40.835.565	129.778.407	129.778.407	29,11%	29,11%	-9,43%
2	SE-S	21.364.448	22.104.531	22.178.744	65.647.723	195.426.130	14,72%	43,83%	3,81%
3	NE-SE	20.815.170	21.875.130	21.206.946	63.897.246	259.323.376	14,33%	58,16%	1,88%
4	CO-SE	15.656.194	17.182.022	16.212.800	49.051.016	308.374.392	11,00%	69,16%	3,56%
5	NE	10.632.407	10.709.214	10.991.123	32.332.744	340.707.136	7,25%	76,42%	3,37%
6	S	10.157.690	9.276.156	8.991.013	28.424.859	369.131.995	6,38%	82,79%	-11,49%
7	NE-CO	5.810.240	5.910.141	6.339.569	18.059.950	387.191.945	4,05%	86,84%	9,11%
8	CO	6.139.557	5.129.660	5.369.522	16.638.739	403.830.684	3,73%	90,57%	-12,54%
9	N-CO	3.687.738	3.932.192	4.112.002	11.731.932	415.562.616	2,63%	93,20%	11,50%
10	N	3.379.506	3.667.554	3.517.237	10.564.297	426.126.913	2,37%	95,57%	4,08%
11	N-SE	2.332.867	2.353.208	2.471.198	7.157.273	433.284.186	1,61%	97,18%	5,93%
12	CO-S	2.035.155	2.025.122	2.205.644	6.265.921	439.550.107	1,41%	98,58%	8,38%
13	N-NE	1.831.828	1.833.454	1.542.730	5.208.012	444.758.119	1,17%	99,75%	-15,78%
14	NE-S	297.797	292.120	226.638	816.555	445.574.674	0,18%	99,94%	-23,90%
15	N-S	94.912	98.659	93.521	287.092	445.861.766	0,06%	100,00%	-1,47%
TOTAL		**149.324.405**	**150.243.109**	**146.294.252**	**445.861.766**	-	**100,00%**	-	**-2,03%**

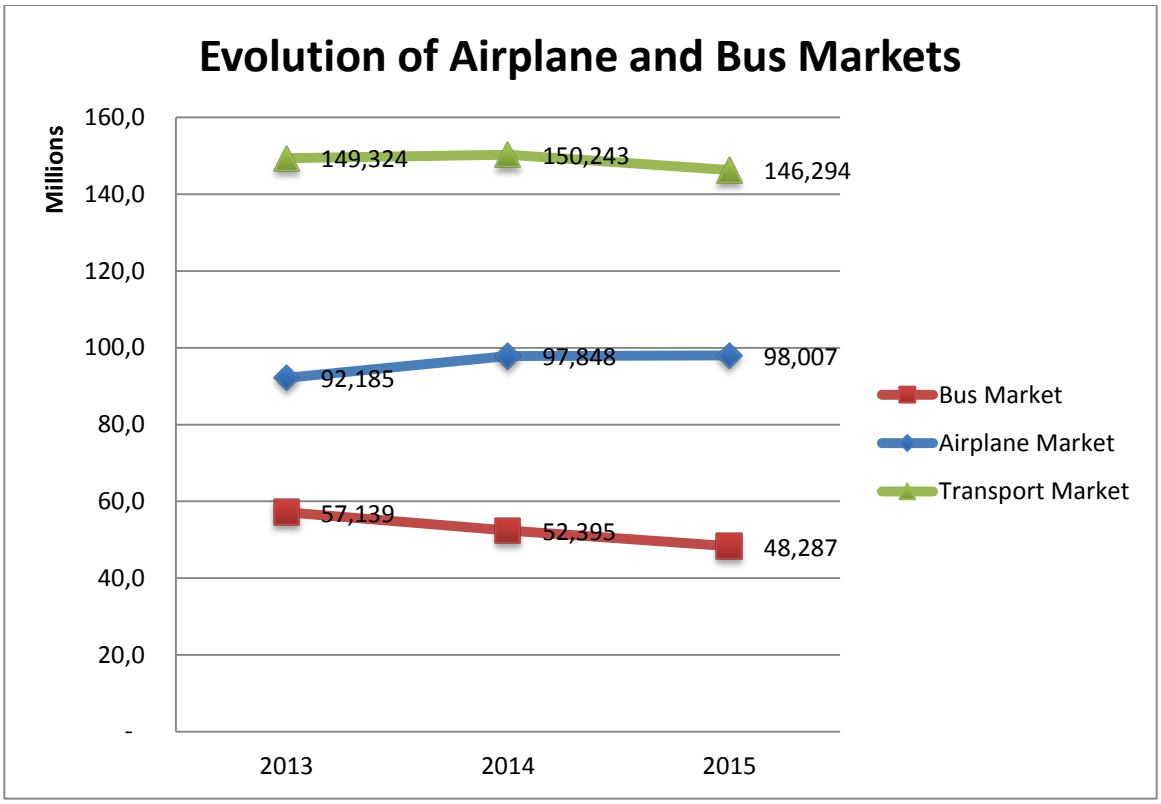
Source: ANTT (2016), ANAC (2016)

Legend: North (N), Northeast (NE), Midwest (CO), Southeast (SE), South (S)

As showed in Table 4, the Southeast region accounts for the largest number of passengers, reaching 29.11% of the total. Also, the first five routes together represent over three quarters of all passengers transported (Southeast-South: 14.72%; Northeast-Southeast: 14.33%; Midwest-Southeast: 11.00%; Northeast: 7.25% – all five combined: 76.42%). Also, it's possible to see that the market shrank 2.03% in three years and, in absolute values, the region most responsible for that is Southeast, which shrank 9.43%, or over 2 million passengers.

However, the fall in the number of passengers must be addressed to either the airplane market or the bus market. **Figure 17** shows that the airplane market has been consistently growing, while the bus market is shrinking, being the last one the responsible for a reduction in the whole sector.

Figure 17 - Evolution of airplane and bus market



Source: ANTT (2016), ANAC (2016)

A plausible explanation for the situation could be the fact that the airplane market is more flexible, specifically in what relates to lower barriers to entry, more competition between companies and lower prices. Since the Brazilian bus market was open to competition in the second semester of 2015, it can face a new growth during the following years if it follows the European trend exposed in the literature review. Following the deregulation of the bus market, Germany saw the number of passengers jump from 8.2 million in 2013 to 16 million in 2014. In France, the government estimates that the 110,000 passengers in 2014 will become 5 million by the end of 2016 (STAGECOACH GROUP, 2015). However, the growth in Brazil is expected to be lower, because the bus system is already fully developed, while in Europe the main mode of transport before deregulation was trains, leaving plenty of space for the bus system development.

4.2.3 Regional and inter-regional passenger flow for the TRIP market

For the second part of this analysis, the focus will be turned only to the TRIP market. The construction of the table was the same used for the whole market, as it's possible to see in Table 5 below:

Table 5 - Regional and inter-regional aggregate demand for the TRIP market

	Route	Passengers 2013	Passengers 2014	Passengers 2015	Passengers 2013-2015	Cumulative Passengers	Relative Percentage	Cumulative Percentage	Variation 2013 to 2015
1	SE	24.014.868	21.936.808	19.443.592	65.395.268	65.395.268	41,44%	41,44%	-19,04%
2	S	7.412.901	6.330.522	6.293.136	20.036.559	85.431.827	12,70%	54,13%	-15,11%
3	NE	5.551.249	5.280.287	5.742.602	16.574.138	102.005.965	10,50%	64,63%	3,45%
4	SE-S	4.918.678	4.637.004	4.047.820	13.603.502	115.609.467	8,62%	73,25%	-17,71%
5	CO	4.313.567	3.130.944	3.236.734	10.681.245	126.290.712	6,77%	80,02%	-24,96%
6	CO-SE	3.484.240	3.646.106	2.870.153	10.000.499	136.291.211	6,34%	86,36%	-17,62%
7	NE-SE	2.904.498	2.826.415	2.435.199	8.166.112	144.457.323	5,17%	91,53%	-16,16%
8	NE-CO	1.164.996	1.205.618	1.049.605	3.420.219	147.877.542	2,17%	93,70%	-9,90%
9	N-CO	943.502	1.067.126	997.556	3.008.184	150.885.726	1,91%	95,61%	5,73%
10	N-NE	913.639	769.589	662.602	2.345.830	153.231.556	1,49%	97,09%	-27,48%
11	N	707.015	711.743	798.396	2.217.154	155.448.710	1,40%	98,50%	12,92%
12	CO-S	611.635	600.247	535.998	1.747.880	157.196.590	1,11%	99,60%	-12,37%
13	N-SE	116.590	164.491	86.789	367.870	157.564.460	0,23%	99,84%	-25,56%
14	N-S	51.786	59.745	63.303	174.834	157.739.294	0,11%	99,95%	22,24%
15	NE-S	30.030	28.524	23.530	82.084	157.821.378	0,05%	100,00%	-21,65%
TOTAL		**57.139.194**	**52.395.169**	**48.287.015**	**157.821.378**	-	**100,00%**	-	**-15,49%**

Source: ANTT (2016)

Legend: North (N), Northeast (NE), Midwest (CO), Southeast (SE), South (S)

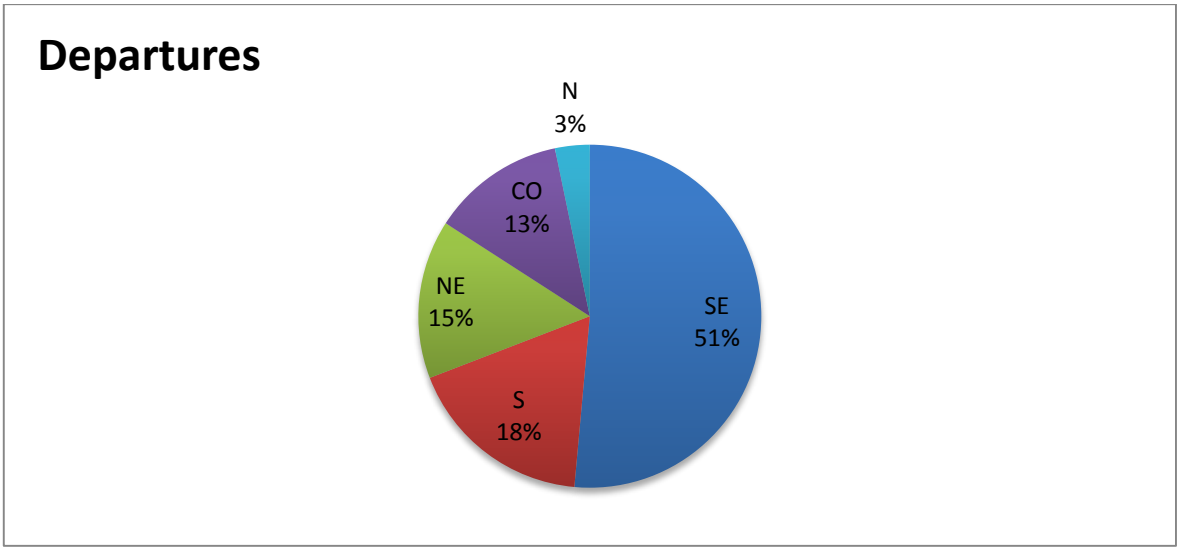
Table 5 shows that 41.44% of all passengers is traveling inside the Southeast region, which is the most representative region for the bus market. Adding the South region and the connection Southeast-South, it accounts for over 60% of all the national TRIP market (South: 12.70%; Southeast-South: 8.62%). Despite the great representativeness, the demands in these regions are shrinking double digits from 2013 to 2015, following the slowdown of the whole TRIP market.

Possible reasons for this reduction could be the economy slowdown itself, added to the increase of airplane passengers in the Southeast routes by 1.51% and in the Southeast-South routes by 10.25% during the period (ANAC, 2016).

Another important hub of passengers is the Northeast region, with 10.50% of all the TRIP market. An interesting fact is that this region is facing an increasing rate of passengers (3.45% between 2013 and 2015).

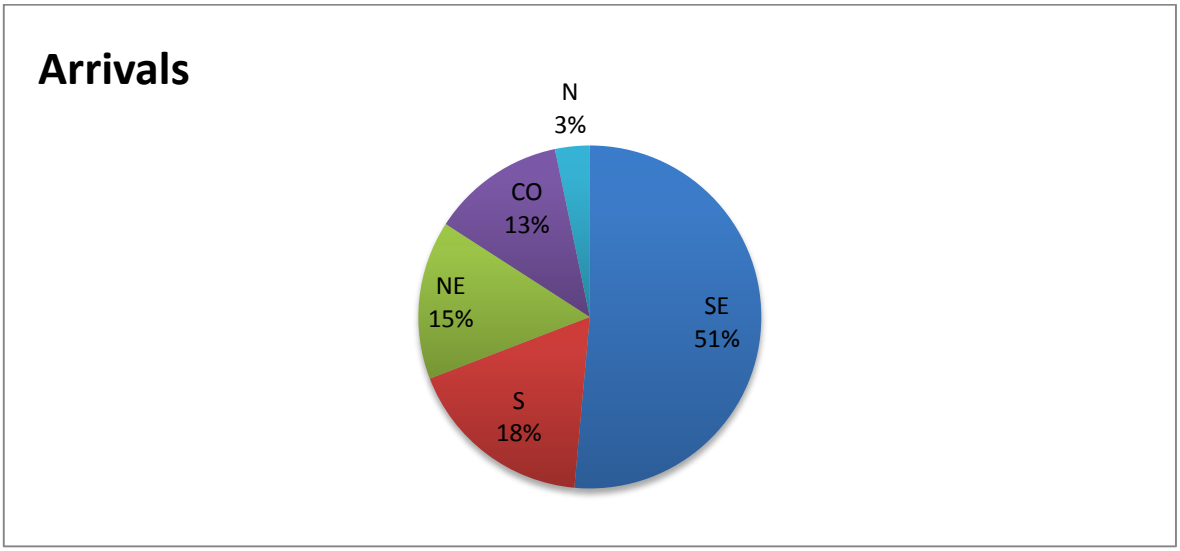
Not considering routes, but only departures, the Southeast region is responsible for more than half of the passengers starting their trip, as it's possible to see in Figure 18. The numbers for arrivals keep the same proportion and can be observed in Figure 19.

Figure 18 - Passengers departures by region from 2013 to 2015



Source: ANTT (2016)

Figure 19 - Passengers arrivals by region from 2013 to 2015

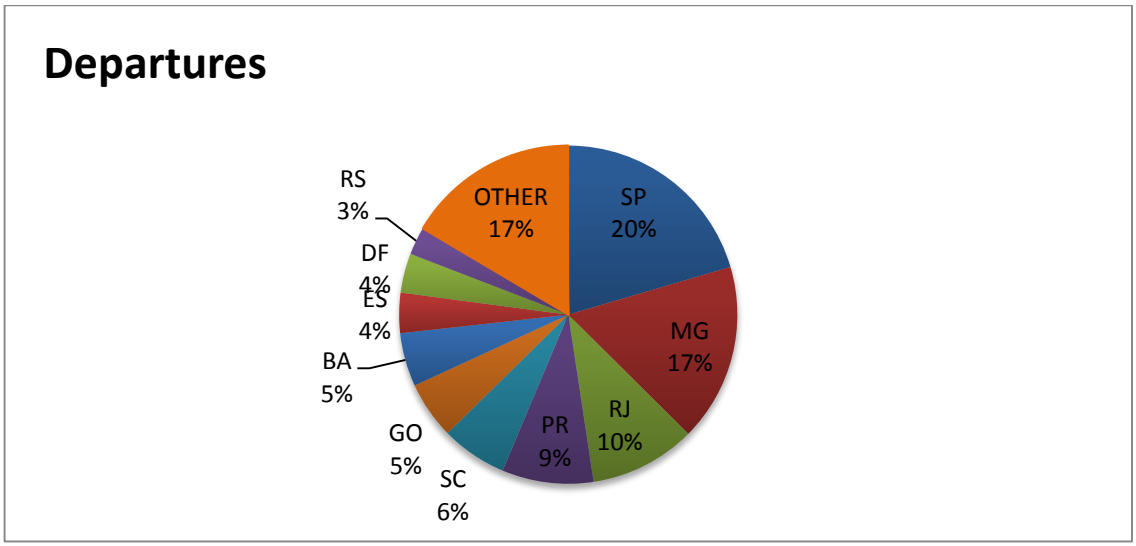


Source: ANTT (2016)

4.2.4 Interstate passenger flow for the TRIP market

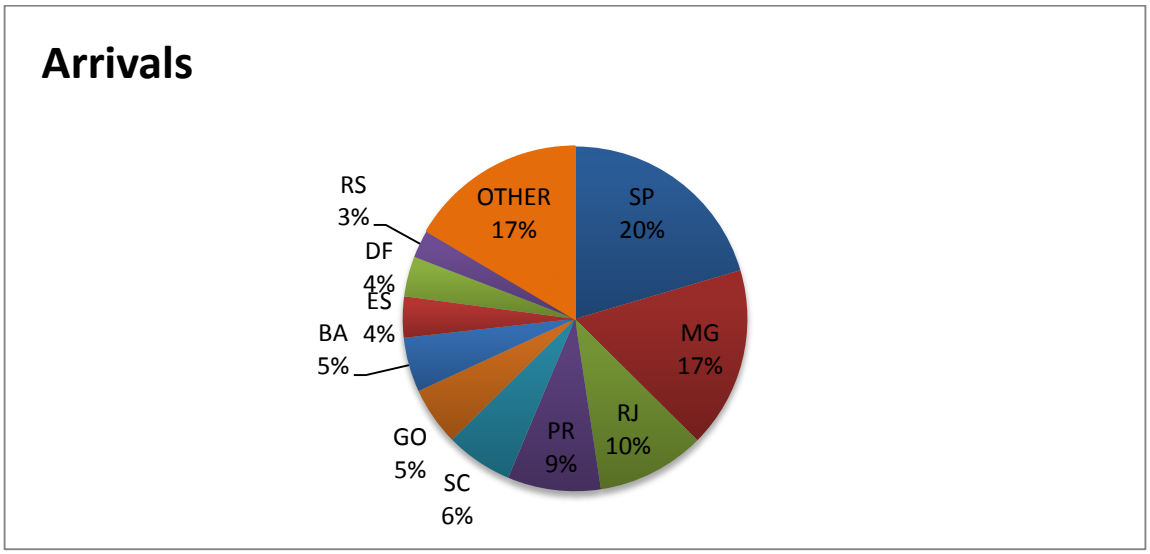
Narrowing the research a little more, departures and arrivals can be divided by states, in order to understand the importance of each one of them for the TRIP market. Departures and arrivals by state can be seen, respectively, in Figure 20 and in Figure 21.

Figure 20 - Passengers departures by state from 2013 to 2015



Source: ANTT (2016)

Figure 21 - Passengers arrivals by state from 2013 to 2015



Source: ANTT (2016)

Based on the information of departures and arrivals by states, the first analysis is related to the fact that the percentage of passengers in departures and arrivals is the same for every state. This data shows insignificant internal migration or other population movements through buses.

Also, it's possible to see that São Paulo (SP) represents 20% of the passengers in transit, followed by Minas Gerais (MG), with 17%, and Rio de Janeiro (RJ), with 10%. These three states belong to the Southeast region. The next two states with the largest number of passengers' departures and arrivals belong to the South region and are Paraná (PR), with 9%, and Santa Catarina (SC), with 6%. Together, the first five states account for 62% of all national departures and arrivals of the TRIP market.

Finally, the last analysis will identify the top 15 demanded routes between states. One more time, the connections between two states will be measured by the number of passengers, according to the Equation 1, explained in the methodology section. The results can be observed in the Table 6 below.

Table 6 - Interstate aggregate demand for the top 15 routes of the TRIP market

	Route	Passengers 2013	Passengers 2014	Passengers 2015	Passengers 2013-2015	Cumulative Passengers	Relative Percentage	Cumulative Percentage	Variation 2013 to 2015
1	MG-SP	6.959.554	6.448.042	5.406.585	18.814.181	18.814.181	11,92%	11,92%	-22,31%
2	RJ-SP	3.851.697	3.690.079	3.496.796	11.038.572	29.852.753	6,99%	18,92%	-9,21%
3	MG-RJ	3.856.386	3.500.974	3.468.329	10.825.689	40.678.442	6,86%	25,77%	-10,06%
4	PR-SP	3.887.238	3.700.069	3.220.280	10.807.587	51.486.029	6,85%	32,62%	-17,16%
5	PR-SC	2.782.622	2.330.314	2.551.862	7.664.798	59.150.827	4,86%	37,48%	-8,29%
6	SP	2.800.368	2.415.319	1.657.545	6.873.232	66.024.059	4,36%	41,83%	-40,81%
7	DF-GO	2.787.742	1.580.950	1.661.885	6.030.577	72.054.636	3,82%	45,66%	-40,39%
8	MG	2.114.980	1.911.571	1.792.122	5.818.673	77.873.309	3,69%	49,34%	-15,27%
9	RS-SC	1.769.298	1.557.632	1.581.157	4.908.087	82.781.396	3,11%	52,45%	-10,63%
10	ES-MG	1.708.155	1.685.363	1.505.055	4.898.573	87.679.969	3,10%	55,56%	-11,89%
11	RJ	1.308.972	940.640	913.723	3.163.335	90.843.304	2,00%	57,56%	-30,20%
12	SP-MS	1.038.288	979.073	905.558	2.922.919	93.766.223	1,85%	59,41%	-12,78%
13	PR	1.046.566	930.698	703.271	2.680.535	96.446.758	1,70%	61,11%	-32,80%
14	SC	967.835	815.549	867.365	2.650.749	99.097.507	1,68%	62,79%	-10,38%
15	ES-RJ	838.029	782.296	700.389	2.320.714	101.418.221	1,47%	64,26%	-16,42%

Source: ANTT (2016)

Legend: Distrito Federal (DF), Espírito Santo (ES), Goiás (GO), Mato Grosso do Sul (MS), Minas Gerais (MG), Paraná (PR), Rio de Janeiro (RJ), Rio Grande do Sul (RS), São Paulo (SP), Santa Catarina (SC)

As showed in Table 6, most of the top 15 TRIP routes involves states from the Southeast region: Espírito Santo (ES), Minas Gerais (MG), Rio de Janeiro (RJ) and São Paulo (SP). The first three routes alone – MG-SP, RJ-SP and MG-RJ – represent over a quarter of all passenger

flow. However, an interesting point to be noticed is that all of the top 15 TRIP routes lost passengers during the last couple of years, most of them with a double digit percent variation.

4.2.5 Selection of routes in Brazil

Based on all the information and data collected, some points were selected to determine the routes in which the applicability of the low-cost will be tested. These points are:

i) Presence of high demand;
ii) Growth in the TRIP market;
iii) Presence of roads in good condition;
iv) Presence of potential markets in the middle of the route, in order to allow partial stops and link more than two cities. It was identified in the literature review as a common practice for low-cost companies;
v) Presence of students, identified in the literature review as one of the main customers of the low-cost service.

According to these points, the following routes were selected to be compared to other routes in Europe and in the United States in order to check if a low-cost business model could fit them:

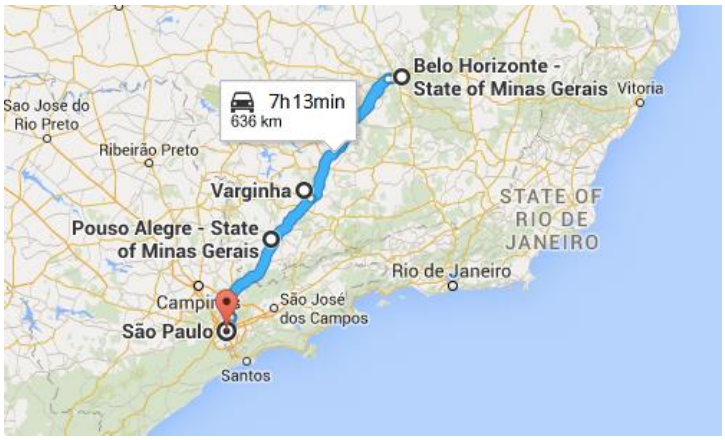
i) Belo Horizonte (MG) – São Paulo (SP): those are the capitals of the states that had the most departures and arrivals. Also, the route between these states was identified as the one with the most passengers transported. In order to avoid a long route, two other stops were inserted in between, which are average cities with a good student public. The two-lane road is under concession of a private company, being in good conditions.

Table 7 - Route Belo Horizonte (MG) – São Paulo (SP)

Departure	Distance (km)	Time (hh:mm)	Arrival
Belo Horizonte-MG	311	03:29	Varginha-MG
Varginha-MG	126	01:27	Pouso Alegre-MG
Pouso Alegre-MG	199	02:17	São Paulo-SP
TOTAL	**636**	**07:13**	**TOTAL**

Source: author

Figure 22 - Route Belo Horizonte (MG) – São Paulo (SP)



Source: map generated with Google Maps

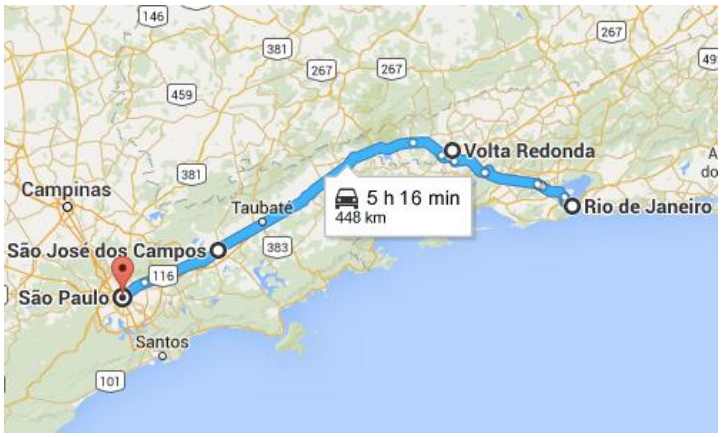
ii) Rio de Janeiro (RJ) – São Paulo (SP): those are the capitals of the states that were ranked, respectively, third and first in departures and arrivals. Also, the route between these states was identified as the second one with the most passengers transported. Two other stops were inserted in between, in cities with big universities, such as Universidade Federal Fluminense and Instituto Tecnológico da Aeronáutica. The two-lane road is under concession of a private company, being in good conditions.

Table 8 - Route Rio de Janeiro (RJ) – São Paulo (SP)

Departure	Distance (km)	Time (hh:mm)	Arrival
Rio de Janeiro-RJ	138	01:49	Volta Redonda-RJ
Volta Redonda-RJ	225	02:28	São José dos Campos-SP
São José dos Campos-SP	85	00:59	São Paulo-SP
TOTAL	**448**	**05:16**	**TOTAL**

Source: author

Figure 23 - Route Rio de Janeiro (RJ) – São Paulo (SP)



Source: map generated with Google Maps

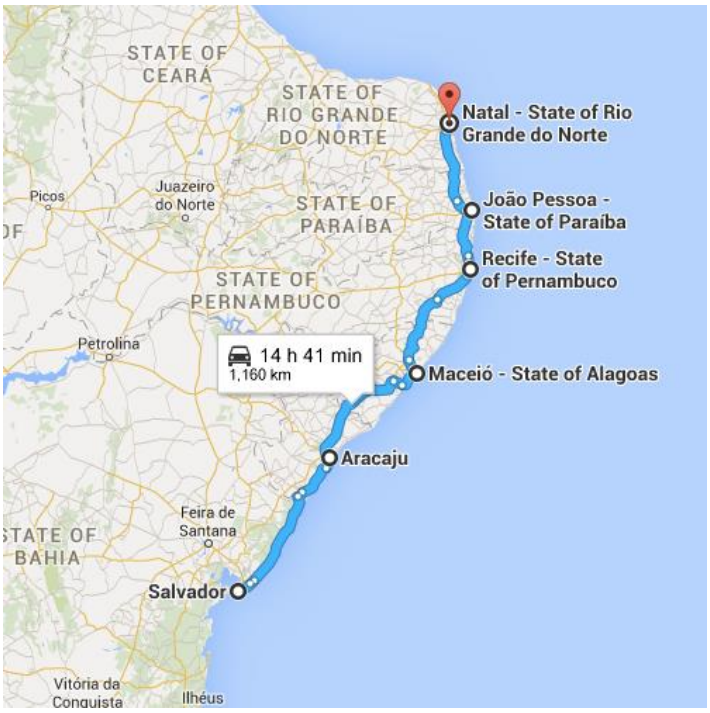
iii) Route Salvador (BA) – Natal (RN): this route takes into consideration the internal market of the Northeast, which was ranked third in the regional analysis. The line goes through six capital cities in the coastal region, area with a high population. Also, the routes in the Northeast region were ones with substantial demand to have a growth between 2013 and 2015, another reason to the choice of this corridor. Parts of the roads have not two lanes, but overall, the conditions are good.

Table 9 - Route Salvador (BA) – Natal (RN)

Departure	Distance (km)	Time (hh:mm)	Arrival
Salvador-BA	325	03:53	Aracaju-SE
Aracaju-SE	273	03:32	Maceió-AL
Maceió-AL	156	03:25	Recife-PE
Recife-PE	120	01:41	João Pessoa-PB
João Pessoa-PB	186	02:10	Natal-RN
TOTAL	**1060**	**14:41**	**TOTAL**

Source: author

Figure 24 - Route Salvador (BA) – Natal (RN)



Source: map generated with Google Maps

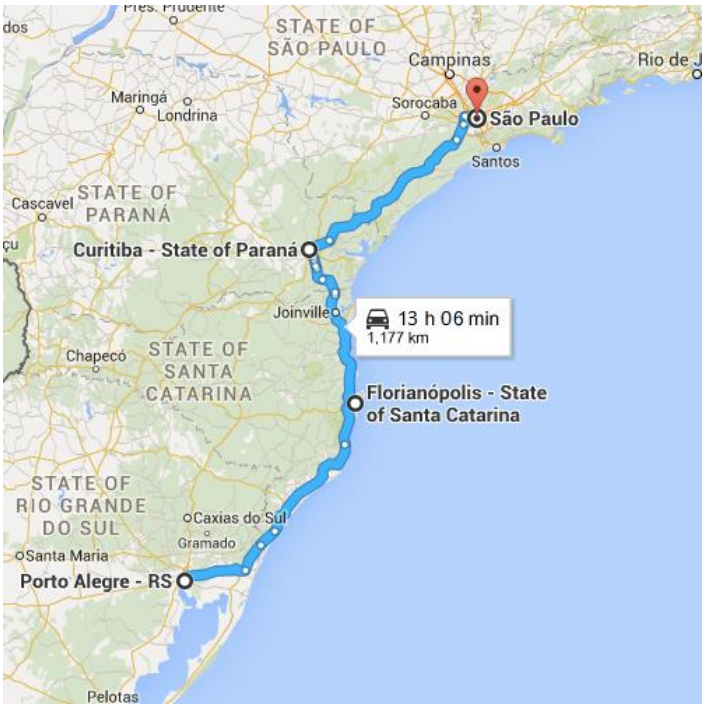
iv) Route Porto Alegre (RS) – São Paulo (SP): the route is explained by the fact that the South region is the second one with most passengers transported and also the connection South-Southeast is ranked fourth in that list. In the interstate analysis, the corridor covers the routes numbers three (PR-SP) and four (PR-SC). It crosses four capitals and the roads are good, even though the time destined between stops are higher than any other suggested route, reaching almost 5 hours.

Table 10 - Route Porto Alegre (RS) – São Paulo (SP)

Departure	Distance (km)	Time (hh:mm)	Arrival
Porto Alegre-RS	461	04:44	Florianópolis-SC
Florianópolis-SC	307	03:31	Curitiba-PR
Curitiba-PR	409	04:51	São Paulo-SP
TOTAL	**1177**	**13:06**	**TOTAL**

Source: author

Figure 25 - Route Porto Alegre (RS) – São Paulo (SP)



Source: map generated with Google Maps

v) Santos (SP) – Franca (SP): this last route focuses in attending the internal market of the state of São Paulo, ranked sixth in the interstate analysis. The roads conditions are great between these cities and, moreover, each one of these cities has huge universities, such as Universidade Estadual de Campinas, the second largest in the country, Universidade Estadual Paulista, Universidade Federal de São Carlos and *campi* of Universidade de São Paulo. So, this corridor could serve as connection for students to reach São Paulo and, from there, take another route to other states.

Table 11 - Route Santos (SP) – Franca (SP)

Departure	Distance (km)	Time (hh:mm)	Arrival
Santos-SP	73	01:16	São Paulo-SP
São Paulo-SP	95	01:16	Campinas-SP
Campinas-SP	147	01:41	São Carlos-SP
São Carlos-SP	104	01:12	Ribeirão Preto-SP
Ribeirão Preto-SP	89	01:03	Franca-SP
TOTAL	**508**	**06:28**	**TOTAL**

Source: author

Figure 26 - Route Santos – Franca (SP)

Source: map generated with Google Maps

Overall, it's possible to see São Paulo (SP), the city with the most departures and arrivals, serving as a hub to four of the five listed routes. There are also many universities situated in the biggest Brazilian city, including Universidade de São Paulo, the largest in Brazil, which counts with almost 100,000 students enrolled. The Northeast route wouldn't be connected to the other ones due to the long distance needed for connection and also the bad conditions of roads. It would only serve as a regional corridor.

The following steps of this research will focus on comparing these routes to similar ones in Europe and in the United States.

4.3 Identification of suitable business models

This part of the section has a more qualitative approach in order to narrow the research for a more quantitative analysis. The main idea is to find similar routes to those selected in Brazil, with the goal of creating good comparisons between the already existing business models and a possible model to be implemented in Brazil.

Between the eight low-cost bus approaches identified in the literature review, involving at least twelve companies in three different continents, it's possible to divide the bus carriers through many different ways: public or private; regional, national or international; fully low-cost model, partial low-cost model or traditional.

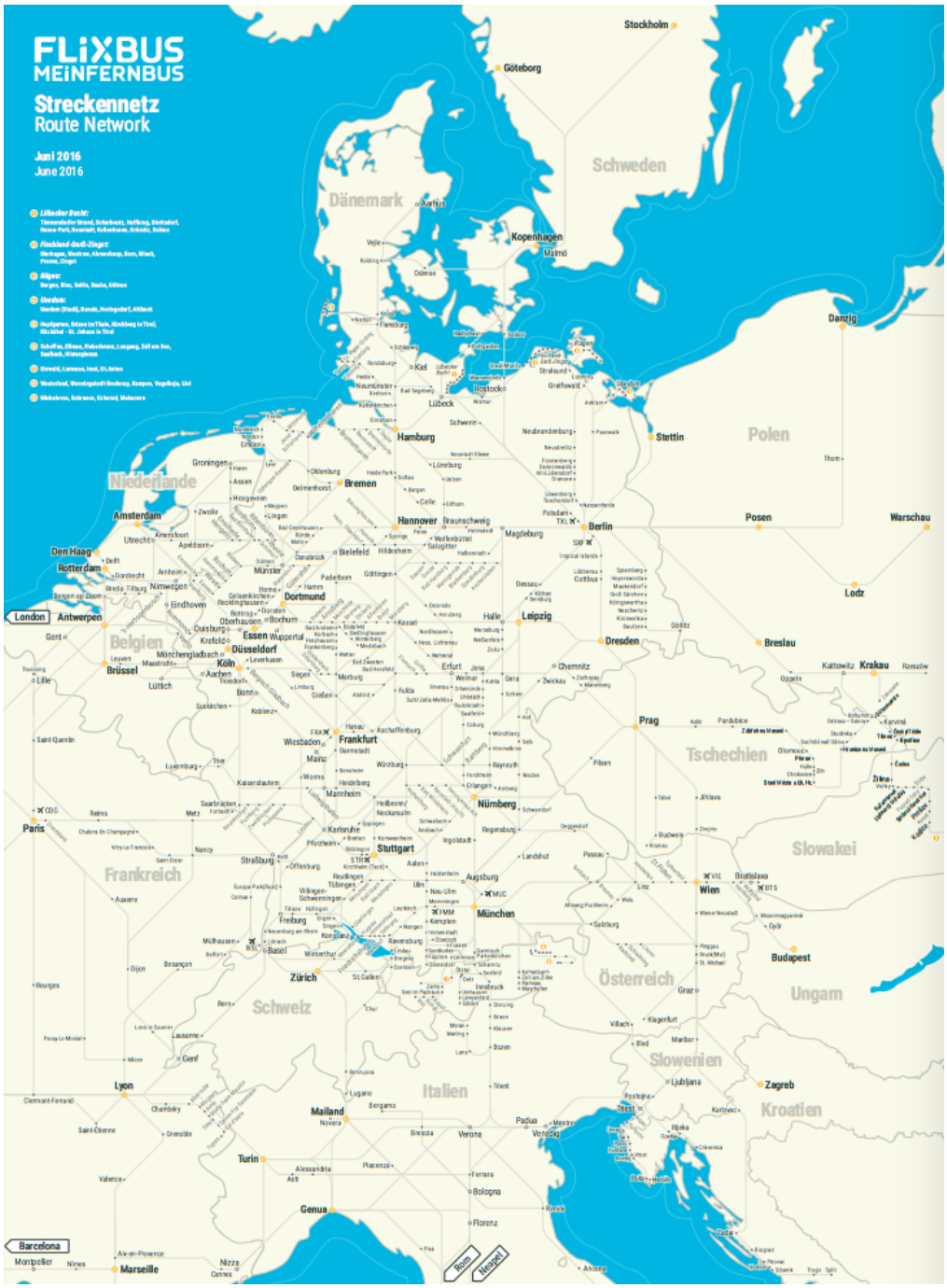
The first limitation for a further collection of data could be the difficulty of accessing information from the companies. Considering this point, Megabus is a branch of a large public company, Stagecoach Group, what makes it easier to gather data, based on public sources. BoltBus is under Greyhound, a branch of the huge FirstGroup, another public company. All the other companies are private, with some of them, like Flixbus and Lux Express releasing reports from time to time.

Considering how big the Brazilian territory is, the comparison with business models applied in large extensions could generate better results. For that, it's possible to focus both in Europe and in the United States. In Europe, two players are spread all over the continent: Megabus and Flixbus. With the recent deregulation of many countries, these bus carriers have been consistently expanding their business and have created a very complex network, with many connections throughout Western Europe, as it's possible to check in **Figure 27** and in **Figure 28**.

Figure 27 - Megabus network map

Source: Megabus website (2016)

Figure 28 - Flixbus route network



Source: Flixbus website (2016)

Megabus network is more developed in the United Kingdom, while Flixbus detains 71% of the roadmap kilometers in Germany, including all competitors (IGES INSTITUTE, 2016). As of today, Flixbus has reached the most developed network in mainland Europe, with 358 routes and almost all of them involving multiple stops or, in other words, connecting more than two cities (FLIXBUS, 2016).

In the United States, Megabus has the most developed route map, and similarly to what was proposed in Brazil, it's divided in two main regions: the Central-East and the West. That similarity shows that the disconnection of the listed routes in Brazil is plausible and may not affect a good operation of the whole system. It's possible to see the Megabus US network in **Figure 29**.

Figure 29 - Megabus network map

Source: Megabus website (2016)

Considering that Megabus and Flixbus are companies genuinely developed with the low-cost idea, given their huge network extension, and also considering that these companies have more available data and reports, they were the selected bus carriers in order to make comparisons. Both Megabus Europe and US will be analyzed.

For the selection of routes in the chosen companies, the criteria used was: routes that begin and end in big cities, firstly to make it more similar to those in Brazil, and secondly due to the presence of more competitors and substitutes; routes with similar distances to the Brazilian ones; and routes with partial stops. For each corridor in Brazil, three routes will be selected: one from Megabus Europe, one from Flixbus and one from Megabus United States. The main goals on selecting these three routes are to open space for a qualitative analysis and to check the feasibility of the selected Brazilian routes.

4.3.1 Megabus Europe

Many corridors were identified in the Megabus network in Europe, and for each one of the routes in Brazil, a similar one was selected. Table 12 shows the selected routes. During the selection of routes and analyzing the selected ones, some conclusions could be drawn for each one of the Brazilian itineraries:

i) Belo Horizonte (MG) – São Paulo (SP): This kind of route showed to be very common for Megabus, with one long partial and other smaller ones. The route Paris – Amsterdam starts and ends in very big cities and the distance and time between them are close to the ones for the route Belo Horizonte – São Paulo.
ii) Rio de Janeiro (RJ) – São Paulo (SP): The route linking the two largest cities in Brazil was compared to another linking two of the most populous cities in Europe: London and Paris. Even though the distance was not so long, there's still a partial stop, showing that this practice is common, no matter what kind of route it is.
iii) Route Salvador (BA) – Natal (RN): this route was compared to another with similar distance inside Italy, involving its four most important cities: Turin, Milan, Rome and Naples. It showed that even very long routes are possible. However, for the estimated corridor time of 11:08, Megabus reserves 14:15, including stops and some time for packing luggage and boarding passengers. Taken it into consideration, the Brazilian route could reach figures over 18 hours, and no routes this long were found in Europe.
iv) Route Porto Alegre (RS) – São Paulo (SP): the comparison with the route Milan – Paris showed the presence of consecutive long partials and a single one with 466km, more than any Brazilian partial. However, the Porto Alegre – São Paulo route is still very long and, considering rest time, could reach a time over 16 hours, value not found among Megabus's routes in Europe.
v) Santos (SP) – Franca (SP): this last route focuses in attending the internal market and some smaller cities. The route Turin – Venice has the same purpose and covers only Northern Italy. Very small partials are acceptable, as it's possible to see a partial with only 39km for the Italian route. Both corridors are very similar, with no more than 2 hours between each stop.

Table 12 - Similar Megabus routes in Europe

Departure - Arrival	Distance (km)	Time (hh:mm)
Belo Horizonte - Varginha	311	03:29
Varginha - Pouso Alegre	126	01:27
Pouso Alegre - São Paulo	199	02:17
TOTAL	**636**	**07:13**

Departure - Arrival	Distance (km)	Time (hh:mm)
Paris - Brussels	320	03:15
Brussels - Antwerp	53	00:49
Antwerp - Amsterdam	159	01:54
TOTAL	**532**	**05:58**

Departure - Arrival	Distance (km)	Time (hh:mm)
Rio de Janeiro - Volta Redonda	138	01:49
Volta Redonda - São José dos Campos	225	02:28
São José dos Campos - São Paulo	85	00:59
TOTAL	**448**	**05:16**

Departure - Arrival	Distance (km)	Time (hh:mm)
London - Lille	276	03:52
Lille - Paris	225	02:21
TOTAL	**501**	**06:13**

Departure - Arrival	Distance (km)	Time (hh:mm)
Salvador - Aracaju	325	03:53
Aracaju - Maceió	273	03:32
Maceió - Recife	156	03:25
Recife - João Pessoa	120	01:41
João Pessoa - Natal	186	02:10
TOTAL	**1060**	**14:41**

Departure - Arrival	Distance (km)	Time (hh:mm)
Turin - Milan	141	01:45
Milan - Bologna	213	02:25
Bologna - Florence	109	01:37
Florence - Rome	273	03:00
Rome - Naples	225	02:21
TOTAL	**961**	**11:08**

Departure - Arrival	Distance (km)	Time (hh:mm)
Porto Alegre - Florianópolis	461	04:44
Florianópolis - Curitiba	307	03:31
Curitiba - São Paulo	409	04:51
TOTAL	**1177**	**13:06**

Departure - Arrival	Distance (km)	Time (hh:mm)
Milan - Turin	143	01:47
Turin - Lyon	317	03:37
Lyon - Paris	466	04:16
TOTAL	**926**	**09:40**

Departure - Arrival	Distance (km)	Time (hh:mm)
Santos - São Paulo	73	01:16
São Paulo - Campinas	95	01:16
Campinas - São Carlos	147	01:41
São Carlos - Ribeirão Preto	104	01:12
Ribeirão Preto - Franca	89	01:03
TOTAL	**508**	**06:28**

Departure - Arrival	Distance (km)	Time (hh:mm)
Turin - Milan	141	01:45
Milan - Verona	160	01:56
Verona - Padua	96	01:12
Padua - Venice	39	00:38
TOTAL	**436**	**05:31**

Source: author

4.3.2 Flixbus

For Flixbus, the same approach was taken and five similar corridors were selected, as it's possible to see in Table 13. The comparison between the routes can be checked:

i) Belo Horizonte (MG) – São Paulo (SP): The Flixbus route Paris – Amsterdam is the same route selected for Megabus Europe, only changing the partial stops. Again, this shows a very common approach of corridor composed by one big partial and other small ones, in order to connect two big centers.

ii) Rio de Janeiro (RJ) – São Paulo (SP): for this route, the goal was again to connect two big cities, like Paris and Zurich. There's the presence of mid-stops in order to obtain more demand for the route.

iii) Route Salvador (BA) – Natal (RN): this route was compared to another that starts and Czech Republic, basically crosses the whole Germany, finishes in the

Netherlands and still is shorter than the Brazilian corridor, taking only two thirds of its time. That gives the idea of how big the Salvador – Natal route is. Even though Flixbus has routes with much more stops than both of these, none of them reaches a 14:41 time.

iv) Route Porto Alegre (RS) – São Paulo (SP): the route was compared to the same one selected for Megabus Europe. However, for the Flixbus Milan – Paris corridor, one of the partials was broken into two, in order to pull a greater demand. The longest partial remained the same. Again the total time of the route seems to be pretty high, with nothing similar for the company.

v) Santos (SP) – Franca (SP): the internal São Paulo market was compared to the internal German market. There were many routes that could be applicable for this situation. The chosen one connects six cities in basically the same time of the Brazilian route. Flixbus also has corridors connecting as many of 23 cities in less than 10 hours (including stops), showing how fast partials can be.

Table 13 - Similar Flixbus routes

Departure - Arrival	Distance (km)	Time (hh:mm)
Belo Horizonte - Varginha	311	03:29
Varginha - Pouso Alegre	126	01:27
Pouso Alegre - São Paulo	199	02:17
TOTAL	**636**	**07:13**

Departure - Arrival	Distance (km)	Time (hh:mm)
Paris - Antwerp	348	03:30
Antwerp - Utrecht	128	01:31
Utrecht - Amsterdam	48	00:44
TOTAL	**524**	**05:45**

Departure - Arrival	Distance (km)	Time (hh:mm)
Rio de Janeiro - Volta Redonda	138	01:49
Volta Redonda - São José dos Campos	225	02:28
São José dos Campos - São Paulo	85	00:59
TOTAL	**448**	**05:16**

Departure - Arrival	Distance (km)	Time (hh:mm)
Zurich - Basel	87	01:06
Basel - Mulhouse	37	00:34
Mulhouse - Belfort	41	00:00
Belfort - Paris	499	04:30
TOTAL	**664**	**06:10**

Departure - Arrival	Distance (km)	Time (hh:mm)
Salvador - Aracaju	325	03:53
Aracaju - Maceió	273	03:32
Maceió - Recife	156	03:25
Recife - João Pessoa	120	01:41
João Pessoa - Natal	186	02:10
TOTAL	**1060**	**14:41**

Departure - Arrival	Distance (km)	Time (hh:mm)
Prague - Dresden	149	01:46
Dresden - Leipzig	120	01:18
Leipzig - Halle (Saale)	45	00:37
Halle (Saale) - Hanover	223	02:17
Hanover - Amsterdam	374	03:48
TOTAL	**911**	**09:46**

Departure - Arrival	Distance (km)	Time (hh:mm)
Porto Alegre - Florianópolis	461	04:44
Florianópolis - Curitiba	307	03:31
Curitiba - São Paulo	409	04:51
TOTAL	**1177**	**13:06**

Departure - Arrival	Distance (km)	Time (hh:mm)
Milan - Turin	143	01:47
Turin - Chambéry	207	02:31
Chambéry - Lyon	112	01:13
Lyon - Paris	466	04:16
TOTAL	**928**	**09:47**

Departure - Arrival	Distance (km)	Time (hh:mm)
Santos - São Paulo	73	01:16
São Paulo - Campinas	95	01:16
Campinas - São Carlos	147	01:41
São Carlos - Ribeirão Preto	104	01:12
Ribeirão Preto - Franca	89	01:03
TOTAL	**508**	**06:28**

Departure - Arrival	Distance (km)	Time (hh:mm)
Dresden - Leipzig	120	01:18
Leipzig - Göttinger	227	02:08
Göttinger - Kassel	49	00:42
Kassel - Dortmund	164	01:47
Dortmund - Leverkusen	76	00:48
TOTAL	**636**	**06:43**

Source: author

4.3.3 Megabus United States

Finally, the same process was made for the routes in the United States. Some conclusions could be drawn for each one of the Brazilian itineraries, based on the comparison to the US routes:

i) Belo Horizonte (MG) – São Paulo (SP): The selected route in the United States has the same number of stops, basically the same distance, but a different division of partials. However, the route Los Angeles – San Francisco clearly links two regions, just as the route Belo Horizonte – São Paulo.
ii) Rio de Janeiro (RJ) – São Paulo (SP): Again, the goal in this comparison was to connect two of the most important cities for each country. While in Brazil the two largest cities were connected, in the US the capital city, Washington, and the largest city, New York, are respectively the beginning and the end of this corridor.
iii) Route Salvador (BA) – Natal (RN): For the bigger routes, the United States showed to be much more alike to the routes selected in Brazil. The route Chicago – Atlanta has an approach very similar to the Salvador – Natal route. Both routes mainly connect important cities and state capitals, with the North American corridor linking the Midwest to the Southeast region. Differently from the routes in Europe, the overall distance is higher, reaching over one thousand kilometers.
iv) Route Porto Alegre (RS) – São Paulo (SP): the corridor Chicago – New York was one of the longest found for low-cost companies. Megabus reserves 18:15, including stops and some time for packing luggage and boarding passengers, to cover its 1.351 kilometers. Just like the Brazilian route, this corridor has three long partials (with over 300 kilometers) and links two regions: Midwest and Northeast. The presence of this kind of route in the US turned the Porto Alegre – São Paulo route plausible.
v) Santos (SP) – Franca (SP): just like this route focuses in the state of São Paulo, the Toronto – New York route focuses in the state of New York. Except for the initial stop, all the stops are within the state of New York, making a good comparison for interstate routes.

Table 14 - Similar Megabus routes in the United States

Departure - Arrival	Distance (km)	Time (hh:mm)
Belo Horizonte - Varginha	311	03:29
Varginha - Pouso Alegre	126	01:27
Pouso Alegre - São Paulo	199	02:17
TOTAL	**636**	**07:13**

Departure - Arrival	Distance (km)	Time (hh:mm)
Los Angeles - Burbank	19	00:19
Burbank - San Jose	531	04:56
San Jose - San Francisco	78	00:57
TOTAL	**628**	**06:12**

Departure - Arrival	Distance (km)	Time (hh:mm)
Rio de Janeiro - Volta Redonda	138	01:49
Volta Redonda - São José dos Campos	225	02:28
São José dos Campos - São Paulo	85	00:59
TOTAL	**448**	**05:16**

Departure - Arrival	Distance (km)	Time (hh:mm)
Washington - Baltimore	62	01:04
Baltimore - New York	325	03:34
TOTAL	**387**	**04:38**

Departure - Arrival	Distance (km)	Time (hh:mm)
Salvador - Aracaju	325	03:53
Aracaju - Maceió	273	03:32
Maceió - Recife	156	03:25
Recife - João Pessoa	120	01:41
João Pessoa - Natal	186	02:10
TOTAL	**1060**	**14:41**

Departure - Arrival	Distance (km)	Time (hh:mm)
Chicago - Indianapolis	295	02:52
Indianapolis - Louisville	183	01:51
Louisville - Nashville	283	02:40
Nashville - Chattanooga	214	02:02
Chattanooga - Atlanta	189	01:50
TOTAL	**1164**	**11:15**

Departure - Arrival	Distance (km)	Time (hh:mm)
Porto Alegre - Florianópolis	461	04:44
Florianópolis - Curitiba	307	03:31
Curitiba - São Paulo	409	04:51
TOTAL	**1177**	**13:06**

Departure - Arrival	Distance (km)	Time (hh:mm)
Chicago - Toledo	396	03:47
Toledo - Cleveland	189	01:54
Cleveland - State College	386	03:59
State College - New York	380	03:55
TOTAL	**1351**	**13:35**

Departure - Arrival	Distance (km)	Time (hh:mm)
Santos - São Paulo	73	01:16
São Paulo - Campinas	95	01:16
Campinas - São Carlos	147	01:41
São Carlos - Ribeirão Preto	104	01:12
Ribeirão Preto - Franca	89	01:03
TOTAL	**508**	**06:28**

Departure - Arrival	Distance (km)	Time (hh:mm)
Toronto - Buffalo	159	01:43
Buffalo - Buffalo Airport	17	00:17
Buffalo Airport - Rochester	110	01:07
Rochester - Syracuse	140	01:25
Syracuse - New York	397	04:01
TOTAL	**823**	**08:33**

Source: author

4.3.4 Final conclusions on routes

Based on the comparisons with Megabus Europe, Flixbus and Megabus US, it was possible to address some conclusions for each route. All of them are plausible for a low-cost bus model, with some being more common than others. Following, the main considerations for each route are described:

i) Belo Horizonte (MG) – São Paulo (SP): Very common route; links two big cities/regions; it has a longer partial, followed by smaller ones; it has many similar routes for all companies analyzed.

ii) Rio de Janeiro (RJ) – São Paulo (SP): Very common route; links very important cities; even though the demand is very high for the routes it was compared to, there's always at least one partial stop; it has many similar routes for all companies analyzed.

iii) Route Salvador (BA) – Natal (RN): Longer route than usual; no similar route was found in Megabus Europe and Flixbus, but Megabus US has some routes that are even longer than this one, making the Brazilian corridor plausible; just like in the US route, partials are not very long, usually coming under 300 kilometers.

iv) Route Porto Alegre (RS) – São Paulo (SP): Longer route than usual; no similar route was found in Megabus Europe and Flixbus, but Megabus US has some routes that are even longer than this one, making the Brazilian corridor plausible; just like in the US route, partials are pretty long, usually coming over 300 kilometers.

v) Santos (SP) – Franca (SP): Interstate market; very common; considering the given proportions, it has similar routes for all companies analyzed (internal Italian market, internal German market, state of New York market).

Overall, the European routes are shorter due to the presence of cities very close to each other and with demand for transportation. In markets such as the United States, where the distance between cities can be longer, routes may go for more kilometers. The Brazilian reality is a mix of those two situations: The Southeast region is where there is more demand and cities are closer, which opens possibilities for many different routes. However, the distance between markets of other regions are bigger, driving to longer corridors.

4.4 Information collection on business models

For this step of the work, data will be collected in order to better understand the price management used by the selected companies. For this analysis, two corridors of each company were selected, all of them related to the same Brazilian routes: Belo Horizonte (MG) – São Paulo (SP) and Rio de Janeiro (RJ) – São Paulo (SP). Those corridors were selected because they link two large cities in Brazil in what relates to population and economy. Also, the presence of big cities in the middle of the route was a plus. Finally, the qualitative comparisons with Megabus Europe, Flixbus and Megabus United States showed that this is a very common kind route worldwide, connecting huge cities that are not so far from each other.

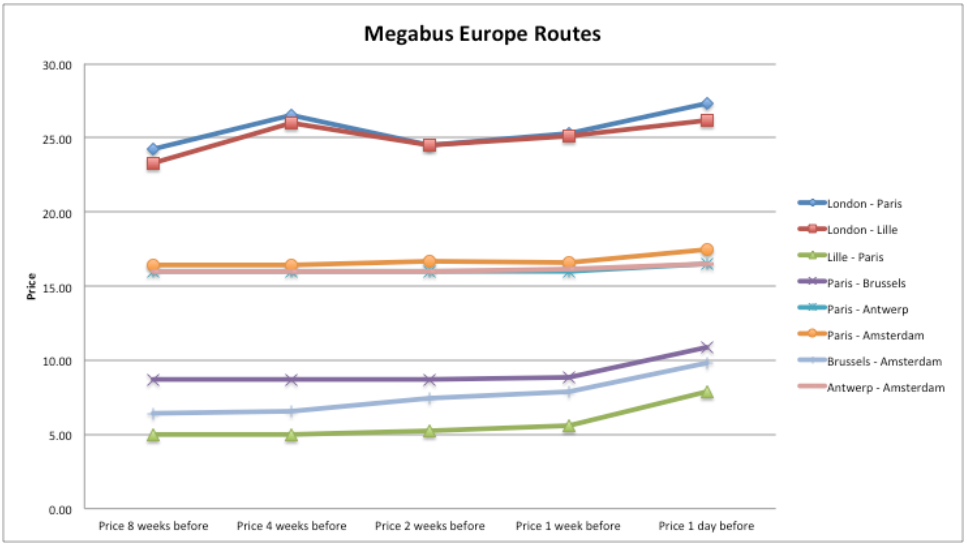
For this part of the analysis, firstly information about price through time will be collected. The yield management pricing is a system in which prices vary according to time and demand. Since it's very difficult to infer the demand for each route (the information is private), the analysis will be taken only according to time and the conclusions will be extended to the demand. Data was collected every day during a whole week, in order to avoid information biased by the day in which it was collected. Prices were gathered in a range of 1 day, 1 week, 2 weeks, 4 weeks and 8 weeks before departure, and their variation will be analyzed. The complete table with averages and standard deviations for each route can be checked in the appendix section.

Based on that data, some conclusions will be drawn, which will set ground for a further analysis of competitors and substitutes for the low-cost buses. A total of 28 routes were analyzed: 8 from the Megabus Europe corridors, 13 from the Flixbus corridors and 7 from the Megabus US corridors.

4.4.1 Megabus Europe

The corridors analyzed were London – Paris, composed by 3 routes, and Paris – Amsterdam, composed by 5 routes. The Brussels – Antwerp part was not covered, since there is no route due to legal reasons. Figure 30 shows the average price variation through time.

Figure 30 - Megabus Europe routes' price variation



Source: author

As it's possible to see, the biggest variation of prices comes between one week and one day to the trip. Two routes, London to Paris and London to Lille, had a decrease of price from 4 weeks to 2 weeks before the trip date, but overall, the closer to the trip, the higher prices will be. The percentage variations for all routes, from each week to one day before traveling, are shown in the charts of Figure 31.

In those charts, the red line consists in the average of the routes' price variation. Prices are on average 13.88% more expensive the day before, than one week before. The standard deviation (SD), however is high: 14.09%. This value shows that while some routes have a very high variation, others vary just a few. In fact, this can be observed in the charts, where basically three routes account for the biggest changes.

The price increase from 2 weeks to the day before the trip averages 16.87% (SD of 16.66%); from 4 weeks to one day the average increases to 18.44% (SD of 22.83%); and from 8 weeks to one day before traveling, the average price goes up 21.50% (SD of 21.73%).

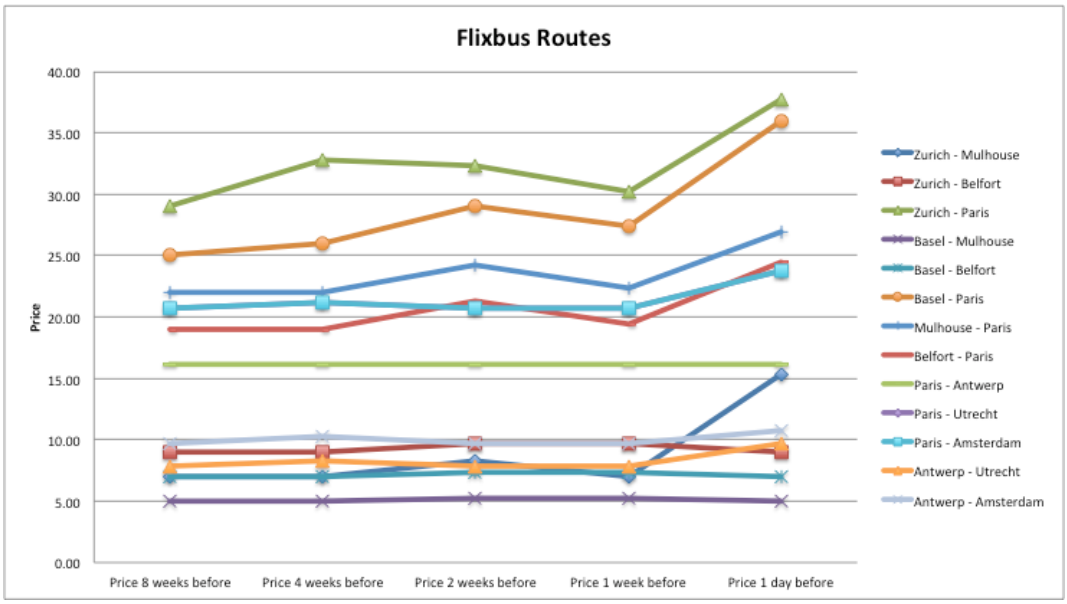
Figure 31 - Price percentage variation for Megabus Europe routes

Source: author

4.4.2 Flixbus

The Flixbus corridors chosen contained more partial stops, so more routes were analyzed. The corridors are Zurich – Paris, composed by 8 routes, and Paris – Amsterdam, composed by 5 routes. The partial routes Zurich – Basel, Mulhouse – Belfort and Utrecht – Amsterdam don't exist due to legal reasons. The following Figure 32 shows the variations for all 13 routes analyzed.

Figure 32 - Flixbus routes' price variation

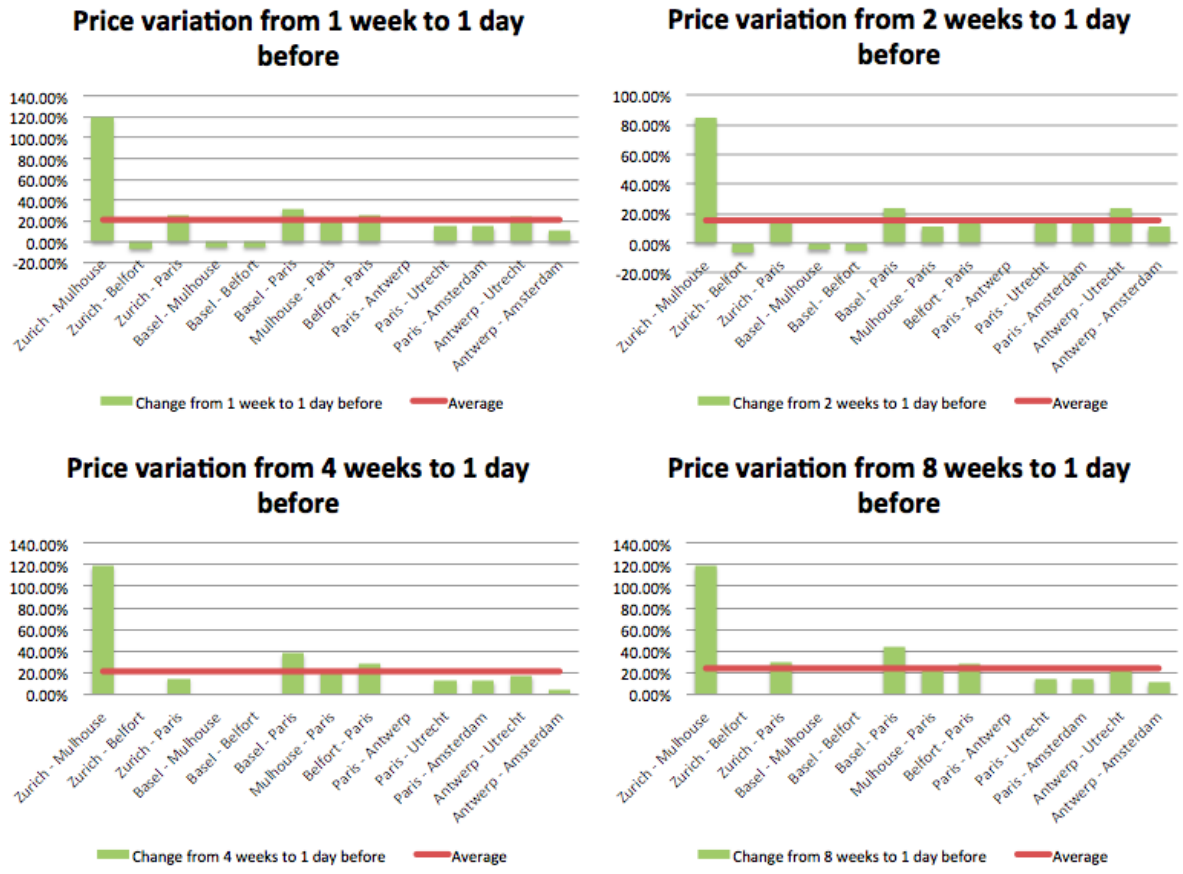


Source: author

For Flixbus routes, again the largest price variation comes from one week to one day before traveling. However, there's a huge difference to the Megabus Europe price management. For Flixbus, the price one week before the trip is on average 3.44% (SD of 5.04%) cheaper than 2 weeks before. It can be understood as a strategy by Flixbus to boost sales when the trip is approaching, in case of low sales until that point.

In the charts of Figure 33, prices are on average 20.77% (SD of 32.26%) more expensive the day before the trip, than one week before. The standard deviation is high basically because of the route Zurich – Mulhouse, responsible for increasing the average. The price increase from 2 weeks to the day before the trip averages 15.34% (SD of 23.41%); from 4 weeks to one day the average increases to 20.75% (SD of 31.92%); and from 8 weeks to one day before traveling, the average price goes up 23.75% (SD of 31.81%).

Figure 33 - Price percentage variation for Flixbus routes



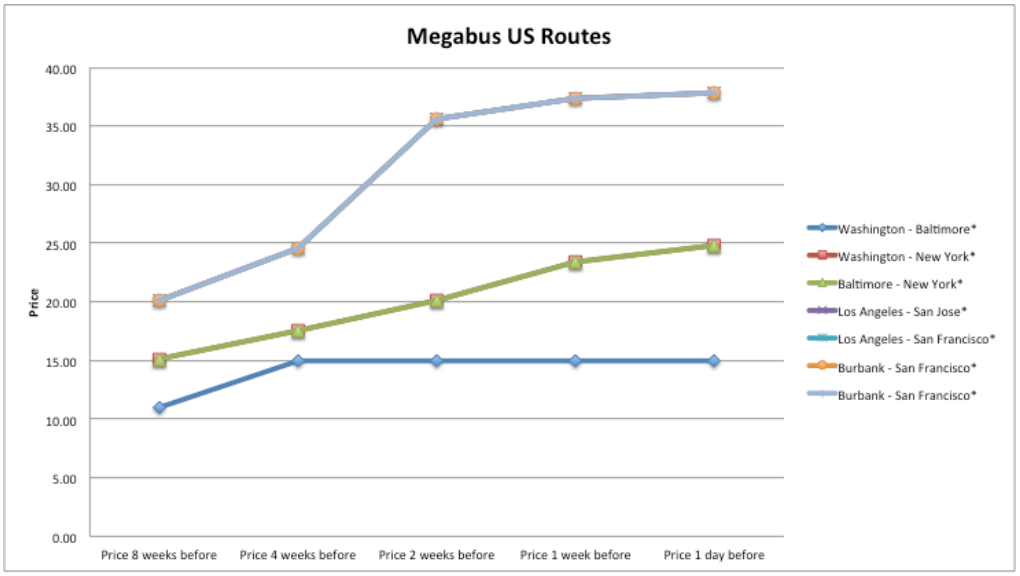
Source: author

4.4.3 Megabus United States

Megabus US corridors analyzed were Washington – New York, with 3 different routes, and Los Angeles – California, with 4 routes. The partials Los Angeles – Burbank and San Jose – San Francisco are not sold due to small distances. As it's possible to see in Figure 34, the US customer may get much better fares buying 4 weeks, or even 8 weeks before the traveling.

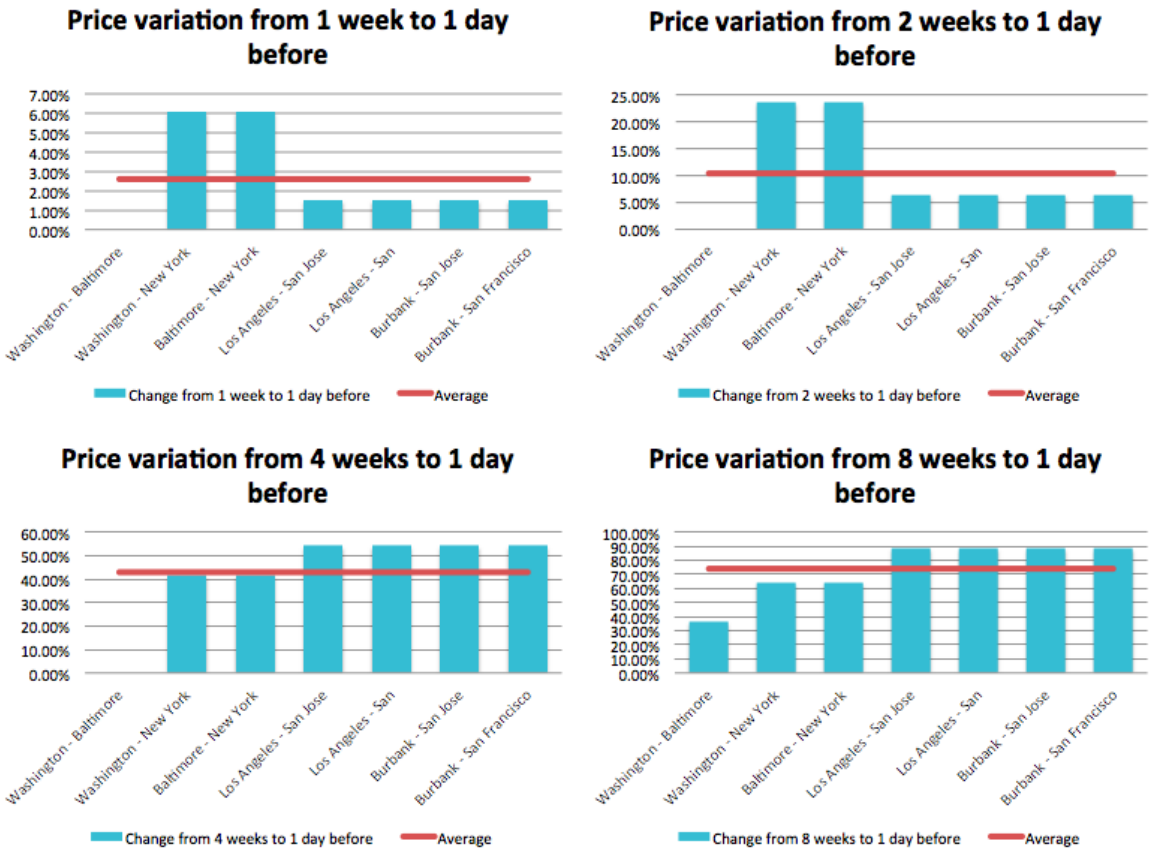
As it's possible to check in the charts of Figure 35, prices are on average only 2.61% (SD of 2.45%) more expensive the day before the trip, than one week before. The price increase from 2 weeks to the day before the trip averages 10.43% (SD of 9.34%); from 4 weeks to one day the average skyrockets to 42.78% (SD of 19.78%); and from 8 weeks to one day before traveling, the average price goes up 74.05% (SD of 20.18%).

Figure 34 - Megabus US routes' price variation



Source: author (* prices in US dollars)

Figure 35 - Price percentage variation for Megabus US routes



Source: author

4.5 Identification of competitors and substitutes

This part of the work will compare prices through time of competitors and substitutes with the low-cost bus approach. Based on that, in Europe and in the US, it'll be possible to identify a relationship between all the transportation methods. With this benchmark, the idea is to use the comparison to get to a plausible price in the Brazilian market, which will be analyzed after.

The main competitors and substitutes for the Brazilian routes are traditional buses, planes and cars, since the train transportation of passengers is not developed in the country. In Europe and in the United States, other substitute is the railways.

For the data collection, the same approach used for the low-cost bus prices was taken. Data was collected every day during a whole week – the same week when low-cost bus prices were collected –, in order to avoid information biased by the day in which it was collected. Prices were gathered in a range of 1 day, 1 week, 2 weeks, 4 weeks and 8 weeks before departure. The complete table with averages and standard deviations for each route and each transportation method can be checked in the appendix section.

For the collection of data on normal buses, the focus was on traditional bus lines, such as Eurolines in Europe and Greyhound in the US. Trains considered were both low-speed and high-speed. For planes were considered both low-cost and traditional carriers. The focus was getting the cheapest price for each transportation method in each period of time. Car prices take into consideration fuel and tools. When considering car sharing, the values were gathered in car sharing facilitators and applications, not just by dividing the car price. In case of lack of information from any of the competitors or substitutes, the comparison was not made for that specific route.

4.5.1 Competitors and substitutes in Europe and in the United States

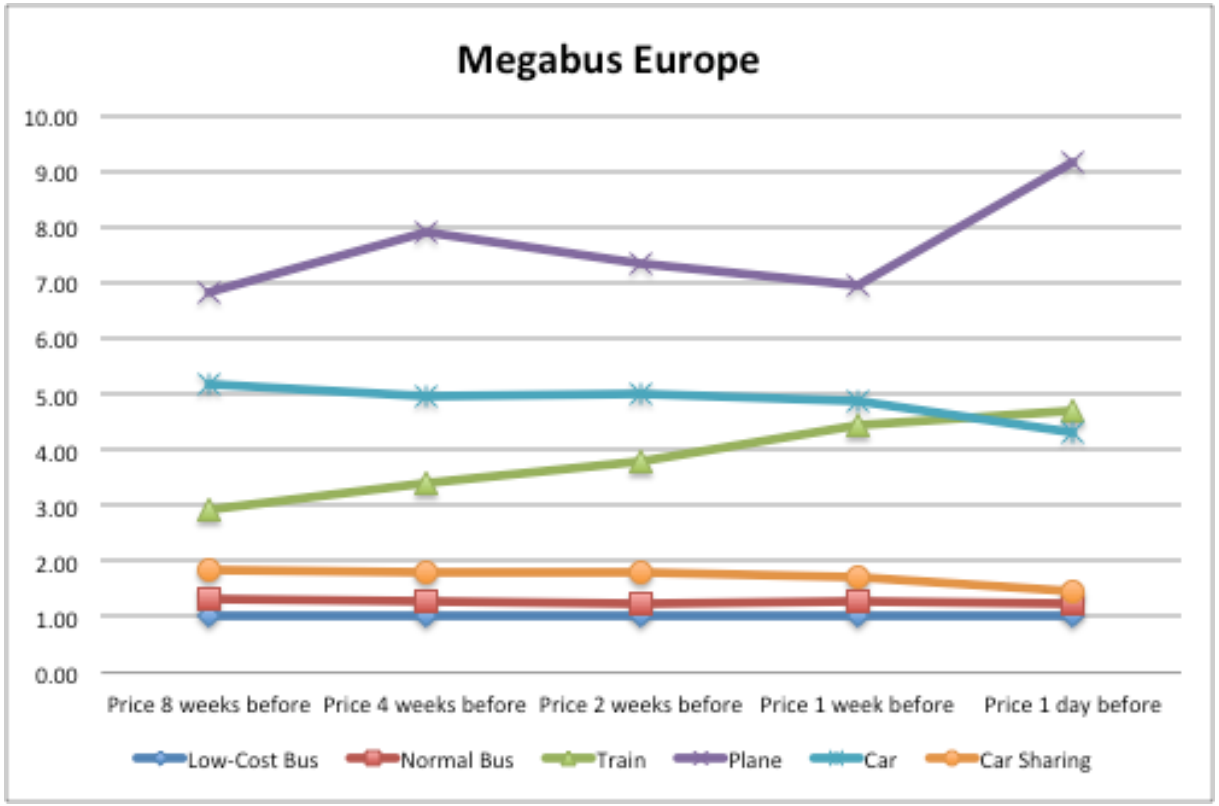
As better explained in the methodology section, in order to create an analysis that includes every route for each company, data reorganization was made. All prices for low-cost companies were fixed at 1 (or 100%) and the proportion of prices was kept between all the transportation methods and the low-cost buses, for each period of time.

Considering the average proportion for each company, the results showed that, overall, low-cost buses are indeed the cheapest way of traveling in Europe and in the US. Some conclusions can be drawn for each company analyzed.

Considering the 8 Megabus Europe routes analyzed, as showed in Figure 36, for every period of time, the low-cost bus average price is lower compared to competitors and substitutes. Normal buses are the biggest competitors, but still they are consistently at least 20% more expensive than Megabus. Car sharing is from 46% to 86% more expensive, being relatively cheaper when the trip approaches. Buying a train ticket can be from 2.9 to 4.7 times more costly than buying Megabus. Finally, traveling by plane is 6.8 to 9.2 times more expensive, depending on how much time before departure the low-cost bus tickets are bought.

Through time, normal buses relative prices are constant, car and car sharing get relatively cheaper, and trains and planes get relatively more expensive.

Figure 36 - Modes of transport comparison for the 8 analyzed Megabus Europe routes

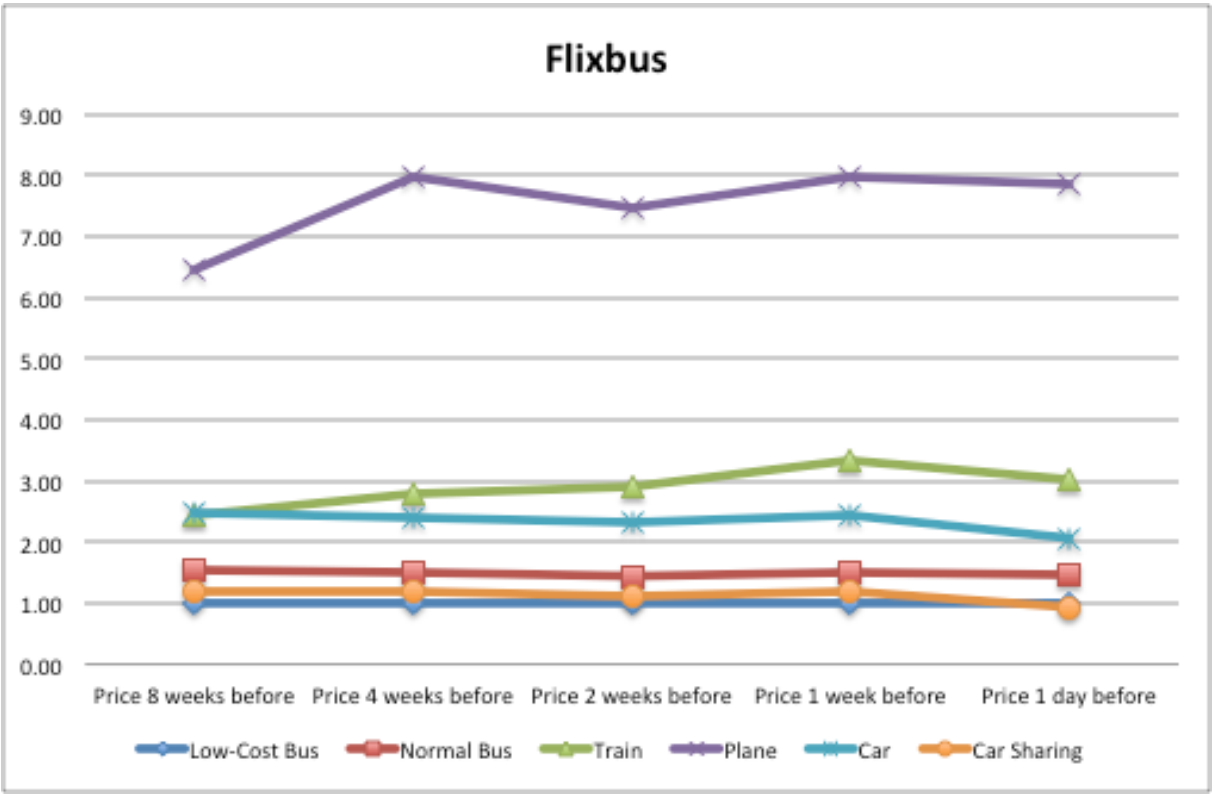


Source: author

For Flixbus's 13 routes analyzed, Figure 37 shows that the proportion between competitors/substitutes prices and low-cost buses prices is much less elastic through time, meaning that it varies less with the time, when compared to Megabus's routes.

Car sharing is the cheapest way of traveling when considering one day before departure, being 4% cheaper than traveling with a low-cost carrier. For all the other time periods analyzed, low-cost bus is the cheapest. Traditional buses are consistently 50% more expensive than the low-cost ones. Trains are from 2.4 to 3.3 times more expensive, while planes are from 6.4 to 8.0 times relatively more costly.

Figure 37 - Modes of transport comparison for the 13 analyzed Flixbus routes

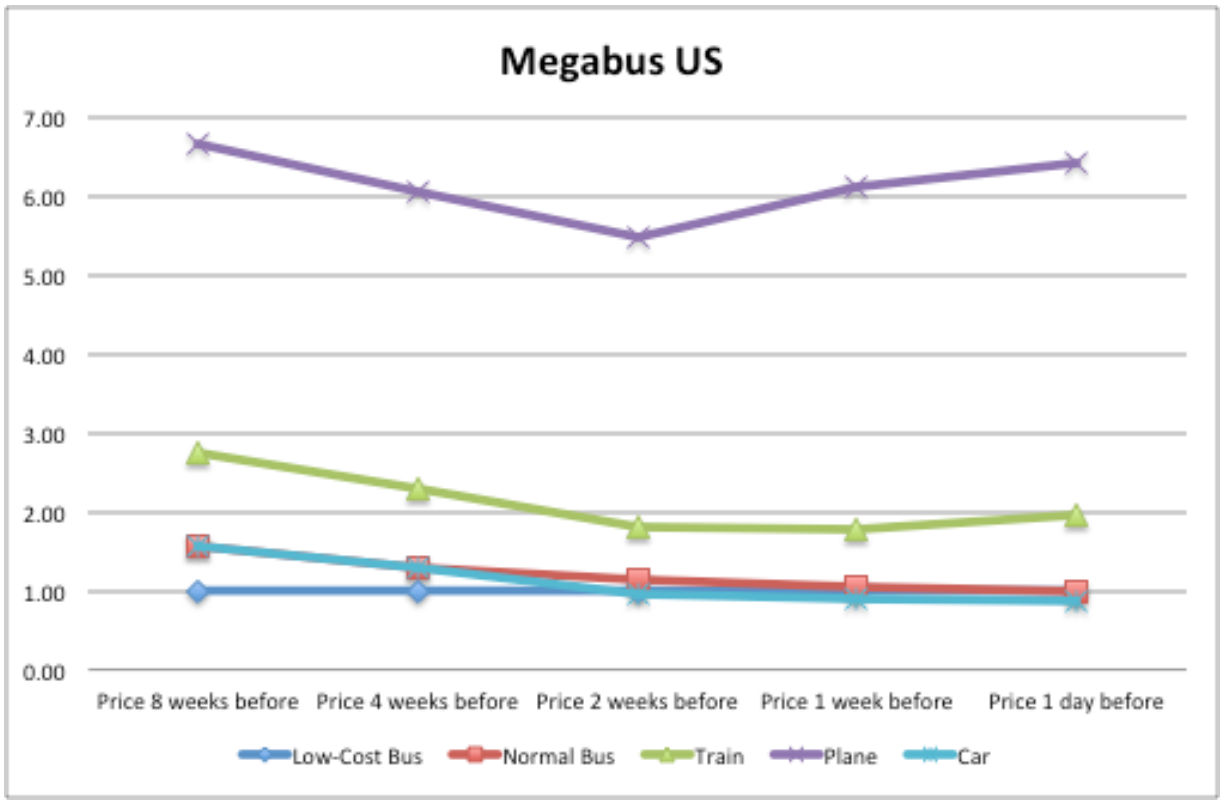


Source: author

As of the 7 routes analyzed for Megabus, a different perspective was found. Firstly, no information was found on car sharing opportunities. However, the main point to be noticed is the fact that cars become cheaper, relatively to low-cost buses, starting 2 weeks before departure. The day before, traveling by car is on average 13% cheaper than buying a low-cost bus ticket. Still the day before, traditional buses and low-cost buses cost the same. Trains, when

applicable, are from 70% to 170% more expensive, and planes may cost on average from 5.4 to 6.6 times the low-cost bus prices.

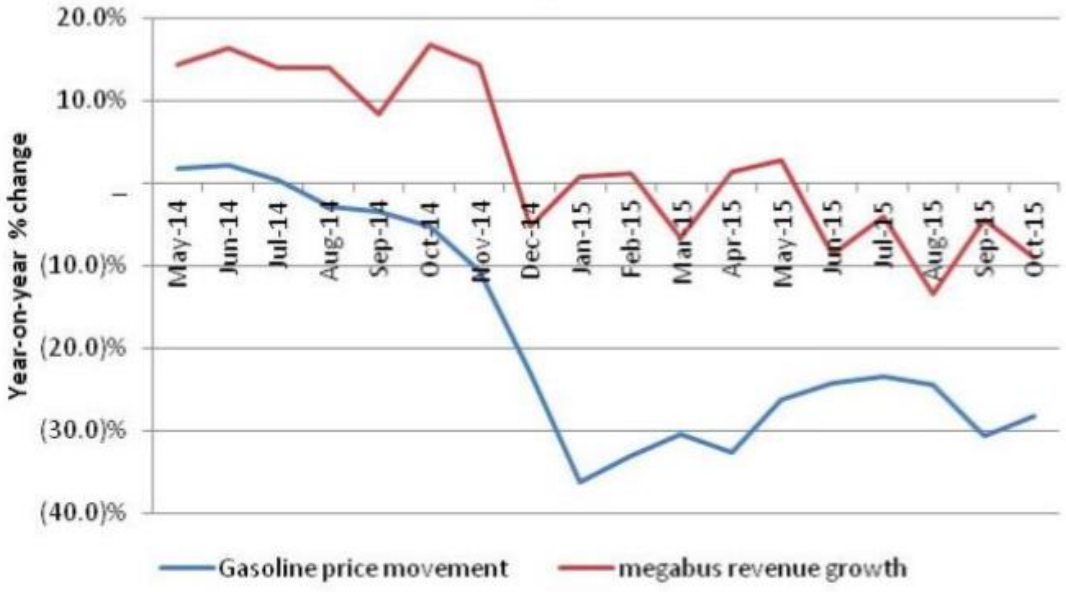
Figure 38 - Modes of transport comparison for the 7 analyzed Megabus US routes



Source: author

The fact that cars turn out to be the cheapest mode of transport starting from two weeks to the trip is strictly related to two points: the American culture and the recent drop on the gasoline prices in the US. The American citizen usually prefers traveling by car and right now it's even cheaper to do so. In its 2015 report, Megabus US showed the **Figure 39** chart, in order to explain how the drop on gas prices is affecting the company's growth.

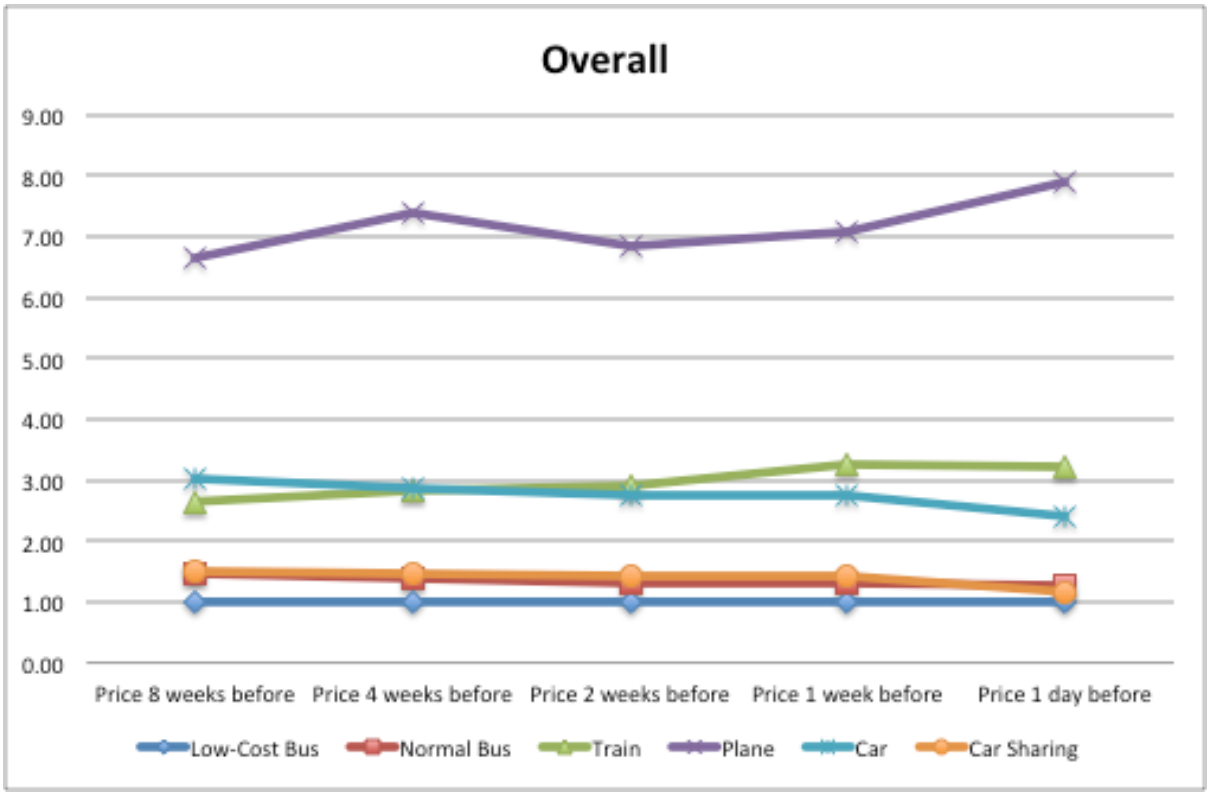
Figure 39 - Gasoline price versus Megabus US revenue growth



Source: Stagecoach Group (2015)

Finally, since the three companies had similar results for most of the transportation methods, the same analysis was made considering all 28 routes. Normal buses usually are 30% more expensive than low-cost buses. Cars varied from 2.4 to 3.0 times the low-cost bus price, while car sharing range was from 17% to 50% of surplus. Trains, when applicable, are from 2.6 to 3.2 times more expensive, and planes may cost on average from 6.6 to 7.9 times the low-cost bus prices.

Figure 40 - Modes of transport comparison considering all 28 analyzed routes



Source: author

4.6 Costing and pricing in Brazil

This part of the research will be divided in two parts. Both of them are related to pricing techniques for the Brazilian market: the first one through comparison with competitors and the second one through a cost plus method. The results will be compared in order to check the viability of a low-cost bus business in Brazil.

4.6.1 Pricing through comparison with competitors

In Brazil, the market is basically composed by traditional bus carriers, cars and airplanes. An analysis was made on these transportation methods, gathering the same price parameters previously mentioned. In order to do the comparison with competitors and substitutes, it was used a benchmark from European and American modes of transport, as

showed in the previous results. Finally, a target price for the low-cost bus business was found. All the prices collected for the Brazilian modes of transport and the estimated values for each low-cost route can be seen in the appendix section. The values are in Brazilian Reais, and as of October 12, 2016, one Real equals to 0.28 Euro.

The data collected in Brazil showed that, even though bus companies are free to set their prices (having a maximum limit), there is no variation of tariffs through time. Also, for the Brazilian bus market it's possible to access the number of tickets sold for each specific route. Usually, there are many buses a day for the same route and they run with only a few passengers. However, during weekends the demand is higher and buses increase their occupation. Dividing the prices by the relationship coefficients from the benchmark analysis, it was possible to estimate the low-cost bus prices compared to traditional buses, as shown in Table 15. All prices are in Brazilian Reais.

Table 15 - Low-cost bus prices estimated based on traditional bus prices

	Low-Cost Bus				
	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before
Rio de Janeiro - Volta Redonda	35,02	33,86	34,21	32,17	30,02
Rio de Janeiro - São José dos Campos	46,92	45,37	45,84	43,10	40,22
Rio de Janeiro - São Paulo	72,00	69,61	70,34	66,13	61,71
Volta Redonda - São José dos Campos	39,70	38,39	38,79	36,47	34,03
Volta Redonda - São Paulo	53,65	51,88	52,42	49,28	45,99
São José dos Campos - São Paulo	22,15	21,42	21,64	20,35	18,99
Belo Horizonte - Varginha	80,63	77,95	78,77	74,06	69,11
Belo Horizonte - Pouso Alegre	100,41	97,08	98,10	92,23	86,06
Belo Horizonte - São Paulo	91,82	88,78	89,71	84,34	78,70
Varginha - Pouso Alegre	18,82	18,19	18,38	17,28	16,13
Varginha - São Paulo	47,73	46,15	46,63	43,84	40,91
Pouso Alegre - São Paulo	32,24	31,17	31,49	29,61	27,63

	Normal Bus				
	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before
Rio de Janeiro - Volta Redonda	44,26	44,26	44,26	44,26	44,26
Rio de Janeiro - São José dos Campos	59,30	59,30	59,30	59,30	59,30
Rio de Janeiro - São Paulo	90,99	90,99	90,99	90,99	90,99
Volta Redonda - São José dos Campos	50,18	50,18	50,18	50,18	50,18
Volta Redonda - São Paulo	67,81	67,81	67,81	67,81	67,81
São José dos Campos - São Paulo	28,00	28,00	28,00	28,00	28,00
Belo Horizonte - Varginha	101,90	101,90	101,90	101,90	101,90
Belo Horizonte - Pouso Alegre	126,90	126,90	126,90	126,90	126,90
Belo Horizonte - São Paulo	116,05	116,05	116,05	116,05	116,05
Varginha - Pouso Alegre	23,78	23,78	23,78	23,78	23,78
Varginha - São Paulo	60,32	60,32	60,32	60,32	60,32
Pouso Alegre - São Paulo	40,74	40,74	40,74	40,74	40,74

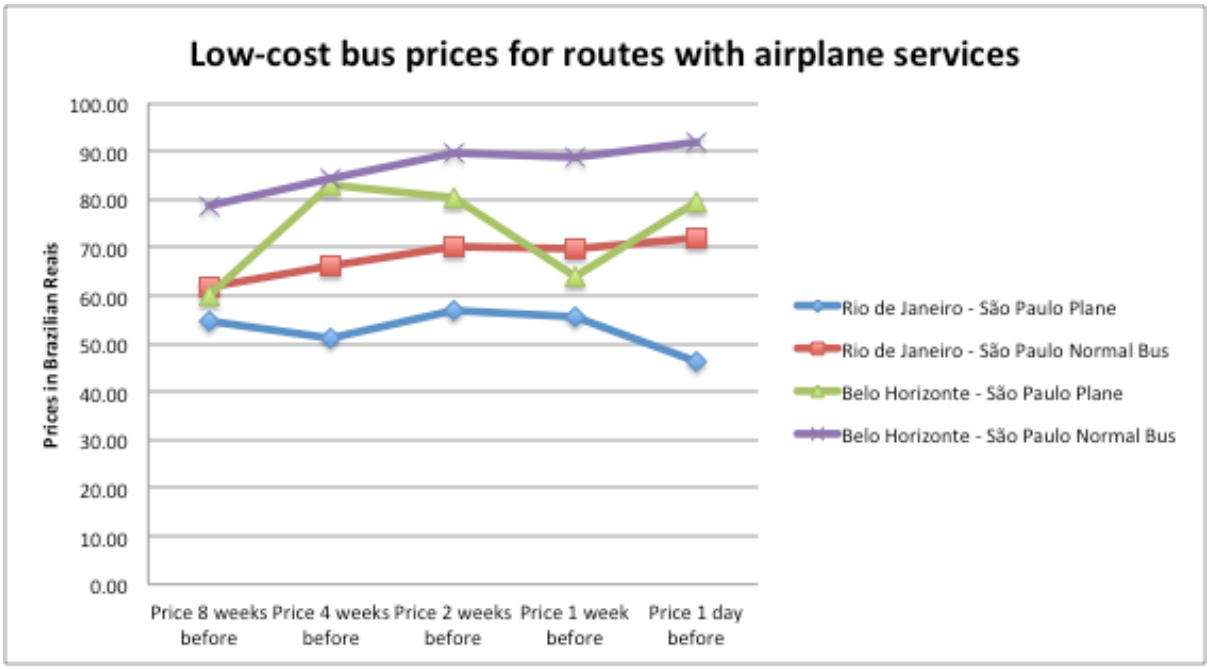
Relationship Coefficient	1,26	1,31	1,29	1,38	1,47

Source: author

The same analysis was made for cars and lower values for prices were found. On average, low-cost buses prices when compared to cars should be 28% lower than when compared to traditional buses. That fact can be explained by the average coefficient used, from all routes in Europe and in the United States. If only data from the US routes was used, the same analysis would show low-cost buses prices 98% higher when compared to cars than when compared to traditional buses.

For airplanes, only two Brazilian routes are linked: Rio de Janeiro (RJ) – São Paulo (SP) and Belo Horizonte (MG) – São Paulo (SP). Because of that, the coefficients were recalculated considering only the cities where corridors begin and end. The results showed that, on average, low-cost buses prices when compared to planes should be 25% lower than when compared to traditional buses, as illustrates Figure 41.

Figure 41 - Low-cost bus prices estimated for routes with airplane services



Source: author

Since the bus market is huge in Brazil, counting with over 48 million passengers in 2015, the competition with traditional buses is expected to be the main focus in the implementation of a low-cost company. People who travel by car in Brazil don't usually take buses, despite of prices. The air market has been showing a consistent increase of demand

during last years and is an important substitute to be aware, since the relative prices for low-cost buses are higher when compared to planes than when compared to traditional buses.

4.6.2 Cost plus pricing

In order to check if the prices found through comparison with competitors are plausible and doable in the Brazilian market, the cost plus method will be used. In the cost analysis, it will be identified direct costs (fixed and variable) and indirect costs. Fixed costs are those that don't vary depending on the company level of activity or the utilization of buses. Variable costs are those that vary according to the utilization of vehicles, which means that they relate to the distance covered by the bus during the period.

After that, a markup percentage will be added, based on a profit margin that covers all opportunity costs in Brazil. Finally, the new price will be crosschecked with the one previous found through comparison with competitors and substitutes.

Since the main goal of this research is to create a comparison between the prices found, and not focusing specifically on calculating the costs, the gathering of values for the whole costing process was based on the analysis presented by Silva (2010, 2012), in which the author made the strategic management of costs for a bus company in Brazil. The methodology used by Silva was checked and some modifications were made in this work in order to access some different situations.

Starting by the direct costs from the fleet, they can be divided in fixed and variable. The following list presents and comments every direct fixed cost:

- Driver: salary paid for normal hours of work, estimated extra hours, work charges (INSS and FGTS), provision of vacation, provision of 13th salary, apparel, alimentation, health insurance, and commissions.
- Licensing, taxes and security: value paid for licensing, taxes, mandatory security, and not mandatory security.
- Depreciation: loss of value through time due to utilization of the vehicle. It was calculated with the linear method. For this calculation, it was considered the vehicle value of acquisition minus the residual value expected at the end of its

lifetime. The result is divided by the number of years of the vehicle's lifetime, reaching the annual depreciation, which is divided by 12 months in order to find the mensal depreciation.

The following list presents and comments every direct variable cost:

- Diesel: costs with fuel for the vehicles. Companies usually are supplied directly from the diesel distributor in their garages. When there's need for refueling outside garages, they do it in regular gas stations. The average travel distance per liter of diesel is 2.83km/L.
- Motor oil and other lubricants: usually bought from the distributors, motor oil averages 1,250.00km/L, receptor box oil averages 13,333.33km/L, and axle oil averages 9,230.77km/L.
- Tires: are bought new and, after wear, it's tooled to be reutilized for some extra time. Because of that, a tire averages 285.000 kilometers before discarded.
- Parts and accessories: costs related to mechanical parts, electrical parts, air conditioning, bus body, and other accessories. Usually, a preventive maintenance is done every 12,000 kilometers.

The two routes being analyzed are Rio de Janeiro (RJ) – São Paulo (SP), which has a total of 448 kilometers, and Belo Horizonte (MG) – São Paulo (SP), with 636 kilometers. Considering that the road quality is good for those routes and based on the time destined by low-cost companies in Europe and in the US when accounting for partial stops, it's expected a total of 7 hours for the first route and 9 hours for the second one. With that said, let's assume that each route runs two ways every day and also that the demand for both ways are equal. For each route, two drivers will be needed per day. Also, the partial routes were not considered for this analysis, since many of the costs would be wrongly duplicated. Given those assumptions, the following Table 16 shows the values of each direct fixed cost parameter and Table 17 presents the direct variable costs, according to the research of Silva (2010, 2012).

Table 16 - Monthly direct fixed costs

Direct Fixed Costs		Cost per km for route Rio de Janeiro - São Paulo	Cost per km for route Belo Horizonte - São Paulo
Drivers	R$ 5.531,00	R$ 0,21	R$ 0,14
Licencing/taxes/security	R$ 568,57	R$ 0,02	R$ 0,01
Depreciation	R$ 5.842,22	R$ 0,22	R$ 0,15
Total of Fixed Costs	**R$ 11.941,79**	**R$ 0,44**	**R$ 0,31**

Source: adapted from Silva (2010)

Table 17 - Monthly direct variable costs

Direct Variable Costs per km	
Diesel	R$ 0,6207
Oil	R$ 0,0046
Tires	R$ 0,0608
Parts/accessories	R$ 0,0120
Total of Variable Costs	**R$ 0,6981**

Source: adapted from Silva (2010)

The second part of this analysis will take into consideration the indirect costs and expenses of a bus company. The following list presents and comments every indirect cost and expense:

- Personnel: salary paid for normal hours of work, estimated extra hours, works charges (INSS and FGTS), provision of vacation, provision of 13th salary, apparel, alimentation, health insurance, and commissions.
- Depreciation: loss of value through time due to utilization of maintenance equipment and other equipment related to operational and corporate activities.
- Electric energy: energy consumed during maintenance and in the offices.
- Advertising: expenses with ads on TV or newspapers, material made to clients, such as pens, calendars etc.
- Financial expenses: results of financial expenses with bank fees, conceded discounts and others.
- Rent: value paid to the agencies of passenger terminals, which are mandatory for passengers' transportation in Brazil.
- Phone: expenses with phone service.
- Water: water consumed in the garage and offices.

- Computers and communication: value paid to systems of selling tickets and equipment used in the company's activities.
- Office material: pen, paper, envelopes and other materials of daily use.
- Securities: hire of securities for garages.
- Third parties involved: value destined to third parties and material for sanitation of vehicles.
- Taxes: payment of taxes.
- Trips and hotels: for employees while in service for the company.
- Meals: for employees while in service for the company.
- Other expenses: legal assistance, indemnities, training and other not listed.

For the analysis of the indirect costs and expenses, it was used the Activity Based Costing (ABC), in which each one of the listed indirect costs and expenses was related to activities of a passenger bus company, based on the time spent by workers in each activity. Each activity has a director, and the results are given in unit cost of this activity director. The results are based on the research developed by Silva (2010, 2012), and are shown in Table 18.

All the calculation was based on one bus operating the route, running two ways every day. Again, the partial routes were not considered for this analysis, since many of the costs would be wrongly duplicated.

Table 18 - Allocation of indirect costs ad expenses to activities

Activities		Activity Director	Unit Cost of Director	Activity cost for route Rio de Janeiro - São Paulo	Activity cost for route Belo Horizonte - São Paulo
Maintenance	Controlling fleet	Number of vehicles	R$ 74,88	R$ 74,88	R$ 74,88
	Inspectioning vehicles	Number of trips	R$ 20,11	R$ 1.206,84	R$ 1.206,84
	Fixing vehicles	Number of km	R$ 0,11	R$ 2.964,86	R$ 4.209,05
	Changing lubricants	Number of km	R$ 0,01	R$ 398,63	R$ 565,91
	Changing tires	Number of km	R$ 0,03	R$ 804,25	R$ 1.141,75
	Refueling	Number of km	R$ 0,20	R$ 5.506,74	R$ 7.817,60
	Moving stock	Number of km	R$ 0,04	R$ 1.208,52	R$ 1.715,67
	Buying material	Number of km	R$ 0,01	R$ 248,91	R$ 353,36
Operat.	Controlling operations	Number of trips	R$ 62,73	R$ 3.763,58	R$ 3.763,58
	Sanitizing vehicles	Number of trips	R$ 30,68	R$ 1.841,07	R$ 1.841,07
	Gathering statistics	Number of trips	R$ 5,49	R$ 329,63	R$ 329,63
Com.	Comercializing tickets	Number of passengers	R$ 4,58		
	Receiving clients	Number of passengers	R$ 0,15		
Administrative	Controlling financial	Number of km	R$ 0,04	R$ 977,89	R$ 1.388,26
	Auditing	Number of km	R$ 0,01	R$ 286,00	R$ 406,02
	Controllership	Number of km	R$ 0,02	R$ 611,79	R$ 868,52
	Managing comunication	Number of km	R$ 0,02	R$ 495,40	R$ 703,29
	Managing personnel	Number of km	R$ 0,02	R$ 641,36	R$ 910,50
	Managing company	Number of km	R$ 0,01	R$ 258,32	R$ 366,72
	Managing legal	Number of km	R$ 0,01	R$ 207,51	R$ 294,60
Total of Indirect Costs and Expenses			-	**R$ 21.826,19**	**R$ 27.957,25**

Source: adapted from Silva (2010)

As it's possible to see, activities related to vehicles were directed by the number of vehicles in the fleet; maintenance activities by the number of kilometers run; operation activities by the number of trips done; sales were related to the number of passengers; and finally administrative activities were also directed by the number of kilometers run.

Also, as shown in Table 18, the values for the activities that were directed by the number of passengers were not presented, since it isn't known the number of passengers who will travel with the low-cost bus service for the listed routes. The potential number of passengers is given by the number of seats (50 seats) multiplied by the number of trips a month (60 trips). Taking this potential number (3000) and multiplying by the unit cost directors related to the number of passengers (R$4.58 + R$0.15), it can be reached a value of R$14,188.17 extra costs. However, one important multiplier is the average occupation that the trips will have. This value will impact directly the monthly costs of the business, as it's possible to see in Table 19.

Table 19 - Breakdown of costs

	Rio de Janeiro - São Paulo	Belo Horizonte - São Paulo
Direct Fixed Cost	R$ 11.941,79	R$ 11.941,79
Direct Variable Cost	R$ 18.765,47	R$ 26.640,26
Indirect Costs and Expenses	R$ 21.826,19	R$ 27.957,25
Partial Costs	**R$ 52.533,44**	**R$ 66.539,30**
Costs Depending on Number of Passengers	R$ 14188,17 * Occupation	R$ 14188,17 * Occupation

Source: adapted from Silva (2010)

Varying the occupation rate will modify the total number of passengers, making the costs vary as well. Table 20 shows the cost per passenger will be varying accordingly.

Table 20 - Total costs and costs per passengers depending on the occupation rate

Occupation	Total Costs Rio de Janeiro - São Paulo	Total Costs Belo Horizonte - São Paulo	Cost per Passenger Rio de Janeiro - São Paulo	Cost per Passenger Belo Horizonte - São Paulo
0,1	R$ 53.952,26	R$ 67.958,11	R$ 179,84	R$ 226,53
0,2	R$ 55.371,08	R$ 69.376,93	R$ 92,29	R$ 115,63
0,3	R$ 56.789,89	R$ 70.795,75	R$ 63,10	R$ 78,66
0,4	R$ 58.208,71	R$ 72.214,56	R$ 48,51	R$ 60,18
0,5	R$ 59.627,53	R$ 73.633,38	R$ 39,75	R$ 49,09
0,6	R$ 61.046,34	R$ 75.052,20	R$ 33,91	R$ 41,70
0,7	R$ 62.465,16	R$ 76.471,01	R$ 29,75	R$ 36,41
0,8	R$ 63.883,98	R$ 77.889,83	R$ 26,62	R$ 32,45
0,9	R$ 65.302,79	R$ 79.308,65	R$ 24,19	R$ 29,37
1	R$ 66.721,61	R$ 80.727,47	R$ 22,24	R$ 26,91

Source: adapted from Silva (2010)

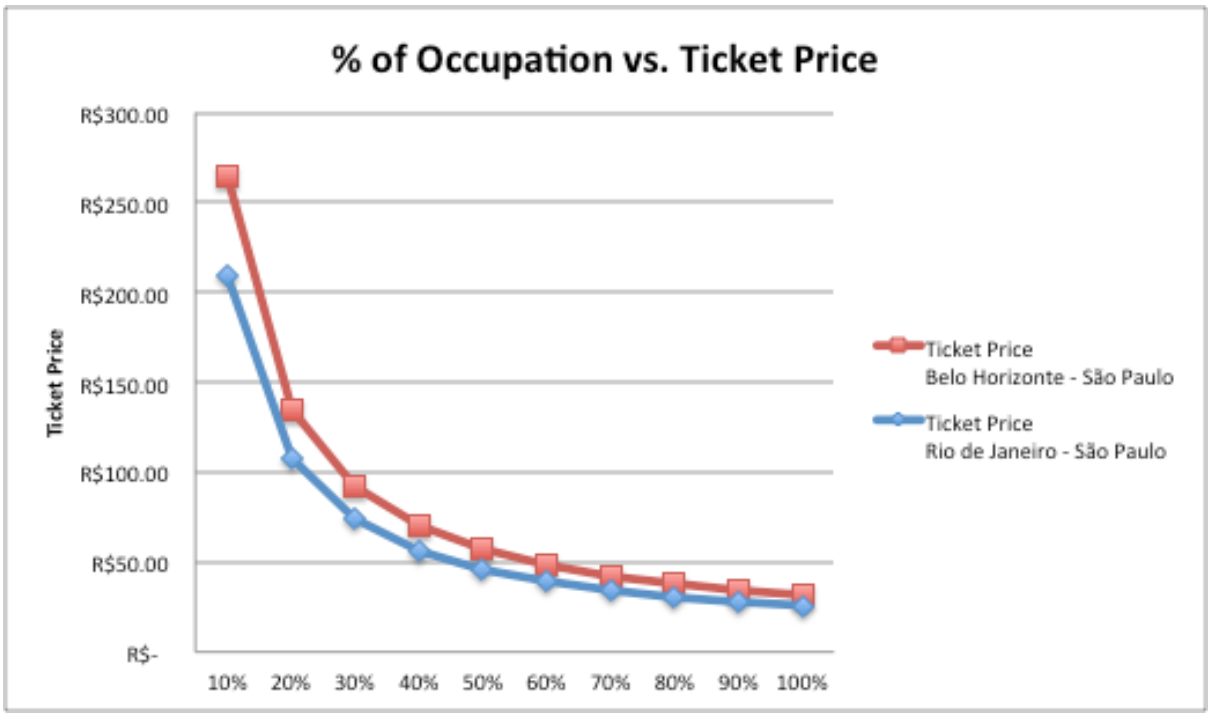
As explained in the beginning of this section, the main goal was to identify prices for the routes in order to crosscheck with the ones found through comparison with competitors. Based on the costs found, a markup will be added in order to reach the price, which will then be compared.

In Brazil, the Central Bank interest rate for investing in government titles is 14.25%. So, the margin profit reached must be at least the same 14.25%, in order to cover risk-free opportunities. Since the margin and the markup correlate according to Equation 2, the markup added was of 16.62%.

$$margin = \frac{markup}{1 + markup} \qquad (2)$$

Based on that information, it's possible to identify a relationship between prices and the occupation of buses, as shown in Figure 42.

Figure 42 - Ticket prices based on percentage of occupation



Source: author

4.6.3 Crosscheck of prices

As previously explained, the cost plus method gave prices that are related to the average occupation of buses. With that in mind, a crosscheck of prices would also depend on the occupation rate. In order to make a good analysis, prices found through comparison with a benchmark of competitors and substitutes in Europe and in the United States will be matched to the occupation rates and those values will be analyzed.

The first analysis will be made for prices obtained through a comparison with traditional buses and occupation rates. As it's possible to see in Table 21, in order to reach the same price through the cost plus method, an occupation of 36% for the route Rio de Janeiro – São Paulo will be needed to cover all periods. As of the route Belo Horizonte – São Paulo, the occupation rate must be 35%.

Table 21 - Pricing through comparison with traditional buses and occupations needed

	Pricing through comparison with Traditional Buses				
	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before
Rio de Janeiro - São Paulo	72,00	69,61	70,34	66,13	61,71
Belo Horizonte - São Paulo	91,82	88,78	89,71	84,34	78,70
	Occupation needed for the same prices through Cost Plus				
Occupation RJ - SP	31%	32%	32%	34%	36%
Occupation BH -SP	30%	31%	31%	33%	35%

Source: author

Also, considering that most of the tickets are sold when the trip is approaching, the occupation needed may even decrease some percentage points, coming to 31-32% for both routes.

Doing the same analysis for prices obtained through comparison with airplanes in Brazil and the occupations needed to reach those prices, it's possible to see the results in Table 22. The occupations needed now are a little bit higher, reaching 50% for the Rio de Janeiro – São Paulo route and 47% for the Belo Horizonte – São Paulo route.

Table 22 - Pricing through comparison with airplanes and occupations needed

	Pricing through comparison with Airplanes				
	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before
Rio de Janeiro - São Paulo	46,31	55,52	56,74	51,07	54,76
Belo Horizonte - São Paulo	79,55	64,02	80,56	83,01	60,08
	Occupation needed for the same prices through Cost Plus				
Occupation RJ - SP	50%	41%	40%	45%	41%
Occupation BH -SP	35%	44%	34%	33%	47%

Source: author

Based on those analyses, it's possible to conclude that the prices achieved through comparison with a benchmark of competitors and substitutes worldwide are plausible in the Brazilian market. In order to compete with traditional buses, which should be the main objective of a low-cost bus company entering in Brazil, they have to focus on having a bus occupation average of over 35%, which allows the use of the relative proportion of prices analyzed. Even to compete against flight, the relative price proportion can be reached with occupations over 50%.

Another factor important to notice is that the low-cost business models cut costs in many streams, for instance, by only selling tickets online, or even having a fleet standardized. Those kinds of savings were not considered in the cost plus analysis and could generate a need for lower occupations, or even lower prices.

Finally, according to the methodology observed, it's possible to see that, if the two main corridors had results that made the crosscheck of prices very plausible, all the other 10 partial routes will also have plausible crosschecks, since they are a part of the main ones and basically no extra costs would be inferred from them.

The variation of price through time could follow the proportion found, or even be related to the demand by period of time, which will not be analyzed in the research. The next chapters will bring possibilities of implementation for the low-cost bus service in Brazil.

4.7 Implementation in Brazil

The implementation of a low-cost business model is based on three pillars: the website, the advertising and the fleet. When starting a low-cost bus company, all of them must be equally considered in order to make it successful.

The website must be robust, trustable and client friendly. Robust in order to support many simultaneous accesses, not crash and work without any error; trustable because it will be responsible for the sales of tickets, so it must have a reliable platform of sales; and client friendly in a way to allow the customer to have the best experience, making the search for routes dynamic and the process of payment as easy as possible.

Advertising is the second pillar of the low-cost business, because it's how the customers get to know it. As previously analyzed, high occupation rates are really important in order to allow low-cost tickets, especially in the beginning of the business, when risks are higher. A common way to attract clients is by setting ticket prices starting at very low rates (one dollar, one euro, one pound) for the first customers to buy tickets for a route. Another important factor is branding, in a way to create an identity that reminds the customers what the company has to offer.

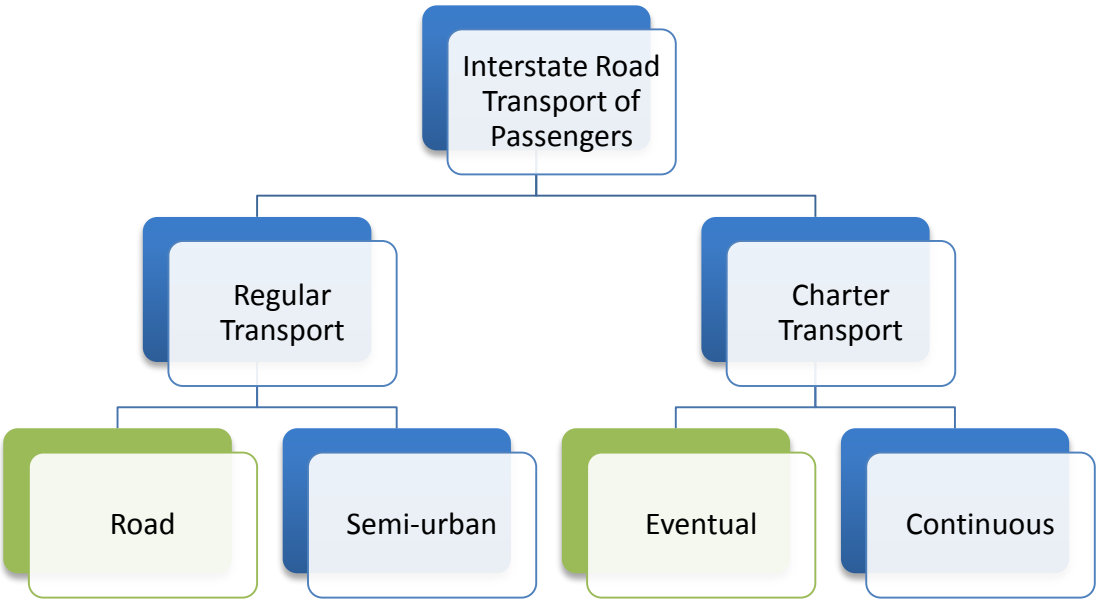
Finally, another important factor is the fleet. The first point about the fleet, as observed in the literature review section, is that it can be operated by the low-cost company itself, as happens in most of the cases, or it can be operated by other partners, such as it's done by Flixbus, which doesn't have any bus. The option for operating itself the fleet requires a high initial investment, since a regular 50-seat bus in Brazil costs R$420.640 (Silva, 2010, 2012), or around €110.000,00, and double-decker buses, as used by Megabus, would have even higher costs. On the other hand, Flixbus provides an opportunity with lower initial investments, where the company does all the scheduling, network planning, bus branding, marketing, communications, sales, IT, ticketing, and all the service towards the customer, while local partners own the buses and employ the drivers.

An approach similar to the one used by Flixbus could be possible in Brazil. The company started focusing in small charter and school bus companies and then attracted them to run regular city-to-city buses under the Flixbus brand as subcontractors. A similar business

model could be done in Brazil, since the number of charter companies is high and most of those companies count with a lot of bus idle time.

So far in this research, the analysis focused on the regular interstate road transport of passengers, excluding semi-urban routes. Now, an analysis will be made for eventual charter transport of passengers, which includes eventual or touristic trips, transfer between terminals, and transport of groups or workers. A diagram with the areas of study in the transportation of passengers can be seen in Figure 43.

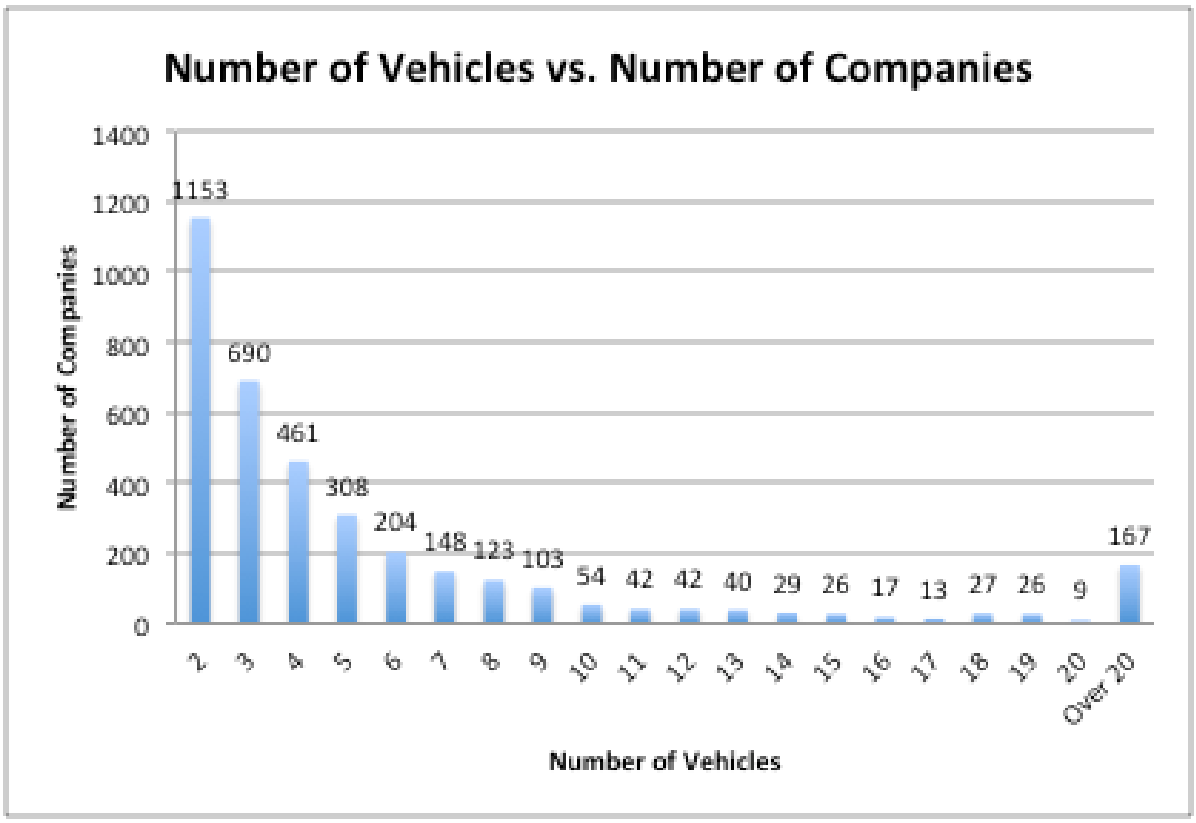
Figure 43 - Classification of transport of passengers' services



Source: ANTT (2015)

In December 31st, 2014, the Brazilian fleet of charter buses was of 25.205 vehicles (ANTT, 2015), in which most of the companies own only two vehicles. Considering that the fleet is an indicator of the size of the companies, it's possible to infer that the sector is mostly represented by small companies. More than 70% of the companies (2.639) have at most 5 vehicles, and together they control over 30% of the fleet (7.787 vehicles), as illustrated by **Figure 44**.

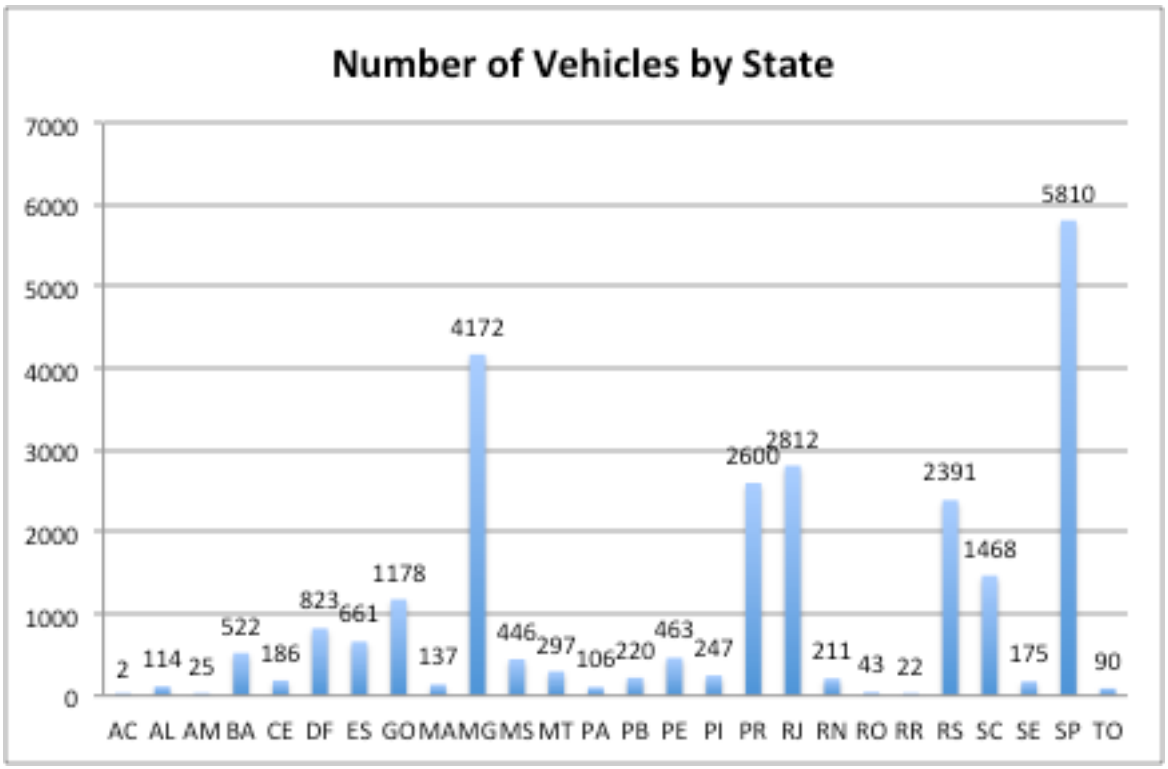
Figure 44 - Companies related to the number of charter buses they own



Source: ANTT (2015)

Another important point to notice is that most of the charter vehicles are located in the Brazilian states where the potential low-cost routes were selected. As shown in **Figure 45**, São Paulo (SP) has 5.810 charter vehicles, Minas Gerais (MG) has 4.172 and Rio de Janeiro (RJ) has 2.812, being the three states with the largest number of charter buses. They are followed by states of the South region: Paraná (PR), Rio Grande do Sul (RS) and Santa Catarina (SC).

Figure 45 - Number of charter vehicles by state



Source: ANTT (2015)

One last observation is about the charter bus routes: accordingly to the 2014 ANTT Report, the routes with the most number of passengers (238.765) and third most number of passengers (137.471) are, respectively, São Paulo – Rio de Janeiro and São Paulo – Belo Horizonte. Those are exactly the routes that were analyzed during this whole research.

Finally, putting all those factors together, the resemblance to the Flixbus model is remarkable. There is the presence of many small charter bus companies and most of them are already in the Brazilian states where the potential routes were identified, including running some of them. It's up to the low-cost company to contact those small charter bus carriers and present the opportunities of running a regular route, since nowadays entering the market only requires an authorization, which is easy to get if the company has the quality and safety needed.

The low-cost company would share revenues with their subcontractors on a route-by-route basis, giving the subcontractors a vested interest in providing good service and providing feedback to the main company. Saving the effort of needing to hire new drivers and buy buses, the company will be able to scale faster and with less capital than they would've needed to do

with their own buses and drivers. After some time, even small regular carriers could agree on operating in that model, contributing for the spread of the low-cost business company in Brazil.

4.7.1 The Canvas model

With the objective of better presenting a possible business model to be implemented in Brazil, the business model Canvas will be utilized. As explained in the methodology section, it's a strategic management and entrepreneurial template for developing new or documenting existing business models. Each one of the nine Canvas elements will be analyzed. They describe the company's value proposition, infrastructure, customers and finances. At last, the Canvas chart will be presented.

i) Key partners: the first point that must be considered for this factor is the buyer-supplier relationship. The low-cost company would depend on good prices for fuel, motor oil and other lubricants, tires, additional parts, and accessories. One way to reach those prices is by negotiating directly with distributors and buying big amounts of resources. Other crucial partners could be the small charter bus companies, if a business model similar to Flixbus (franchising model) is to be applied. Those small companies would be responsible to run their own buses and hire their own drivers, being of extreme importance for the quality of the business model. Finally, other key partner is the company responsible for the online payment platform. It must be a very reliable firm that manages customers' data safely and insures a 24/7 operation.

ii) Key activities: there are many key activities that are responsible for the success of a low-cost company. They start from scheduling, network planning, bus branding, marketing, communications, sales, IT, ticketing, and all the service towards the customer. Finally, the operational part of driving the buses is as important as the previously mentioned activities, and it can be run either by the low-cost company itself, or by subcontractors.

iii) Key resources: the key resources vary between physical, financial, intellectual and human. Among the physical ones, there are all the resources related to suppliers, the bus fleet, the garages; financial resources involve the initial investment and a working capital; intellectual resources are related to brand

patents; human resources include everyone that works in the company, from the drivers, to the people who study the market constant changes and create the best routes and fair prices, to the CEO.

iv) Value proposition: the main problem that a low-cost business model would solve in Brazil is the transportation of people who don't have enough money to travel using the traditional ways. It could expand the transport market and push up other sectors of the economy. The value proposition is related to cost reduction, price reduction, accessibility and convenience.

v) Customer relationships: the relationship with customers happens in three different times: when selling the tickets, while driving the clients and after the trip. In the process of selling, it's really important to make the information clear about routes, times, prices and conditions that apply. Most of the relationship will happen through automated systems, but a personal assistance must exist and can be either online or through the telephone. The trip itself is when the customer meets employees of the company, specifically the bus driver. All the interaction, which includes checking tickets, packing luggage, giving information and driving must be trained in order to offer the best service. Finally, an online follow on of clients is suggested, sending them special offers and getting feedback on previous experiences.

vi) Channels: the channels used for the creation of awareness about the company are mainly through market campaigns and bus branding; the purchase is mainly online, but also through the phone, in order to cut costs that come from counters in bus stations and offices; after sales channels are again online and through phone, in order to offer post-purchase customer support and also generate feedbacks (online only).

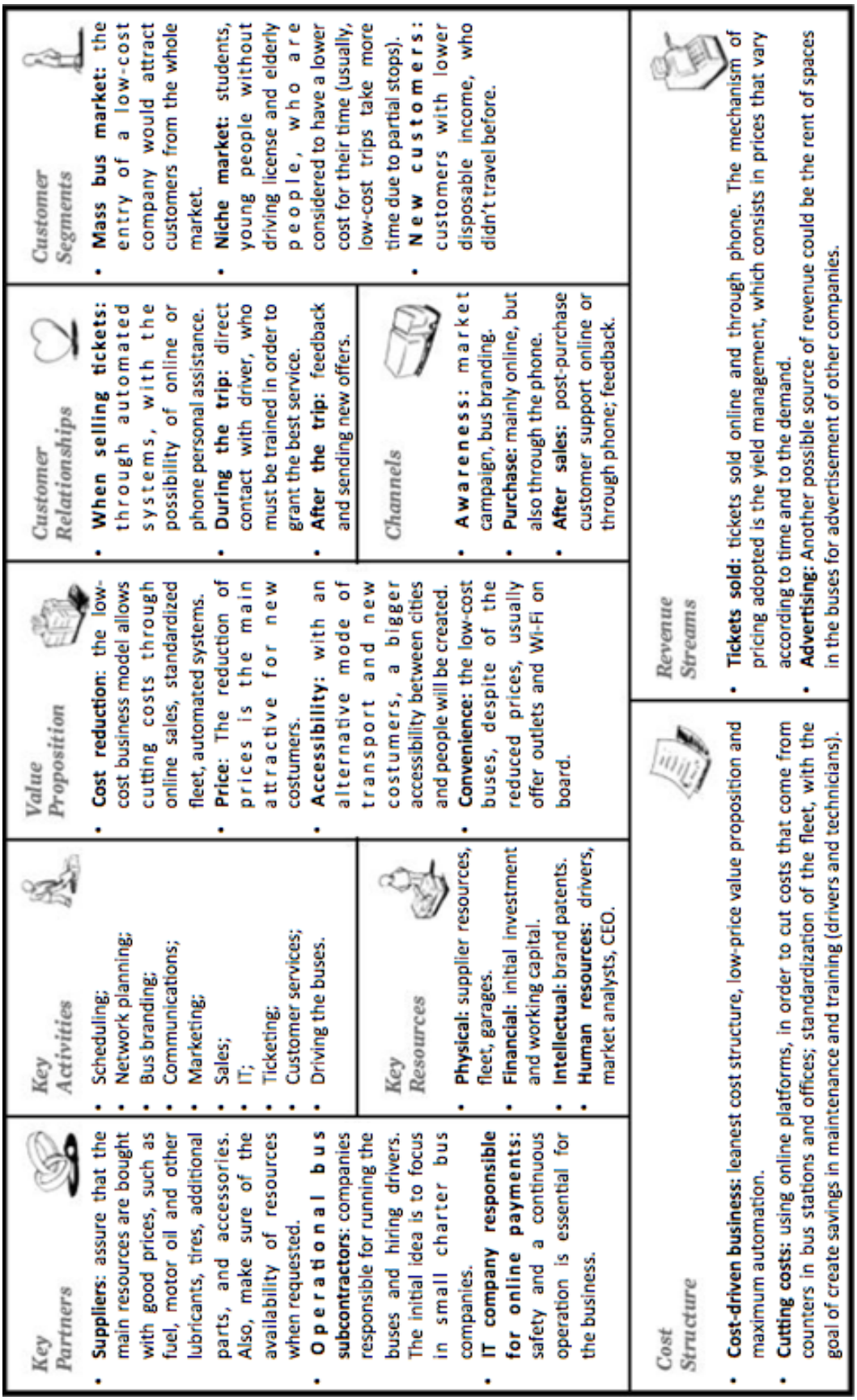
vii) Customer segments: firstly, in a country like Brazil, which is deeply based on the bus market, it's possible to say that the entry of a low-cost company would attract customers from the whole market. Secondly, as observed in the literature review, some niches were identified as potential clients: students, young people without driving license and elderly people (WHITE; ROBBINS, 2012), who are considered to have a lower cost for their time, since usually low-cost trips take more time due to partial stops. Finally, potential new customers would include people with lower disposable income, who didn't travel before.

viii) Cost structure: as explained during this whole research, the focus of a low-cost company is to create a cost-driven business, with the leanest cost structure, low-price value proposition and maximum automation. One chapter of the analysis was dedicated to understand the cost structure of a bus company in Brazil. The low-cost idea would cut costs that come from counters in bus stations and offices, trying to use automated systems and online sales; also, a standardized fleet would create savings in maintenance and training, both for drivers and technicians.

ix) Revenue streams: the revenue streams are basically the tickets sold online and through phone. The mechanism of pricing adopted is the yield management, which consists in prices that vary according to time and according to the demand. Another possible source of revenue could be the rent of spaces in the buses for advertisement of other companies.

After analyzing all the nine elements of the business model Canvas, the final chart is presented in Figure 46.

Figure 46 - Low-cost bus business model Canvas to be applied in Brazil



Source: author

4.8 Other considerations

This part of this research will focus in some additional issues that were not fully analyzed yet. Some important subjects regarding low-cost business models, such as bus stations, occupation rates, number of buses per route, bus size, marketing, technology, the environment, the economy and the society will be presented and an overview about each one of them will be made.

4.8.1 Bus stations

Most of the low-cost bus companies around the world don't operate in central bus stations, in order to cut higher fees and government taxation. Their stops are usually in bus stations that are far from the city center or even in the streets. However, the regulation in Brazil says that a regular interstate route must use bus stations to board and drop passengers.

Because of that, all stops of a possible low-cost company must meet this requirement and, possibly, new bus terminals could be built specifically for that purpose. Especially if a city works as a hub, as São Paulo was designated for most of the presented routes in this research, the use of a private terminal could save some money. At the same time, the low-cost company must be constantly aware of the regulation perspectives and a possibly deregulation in Brazil.

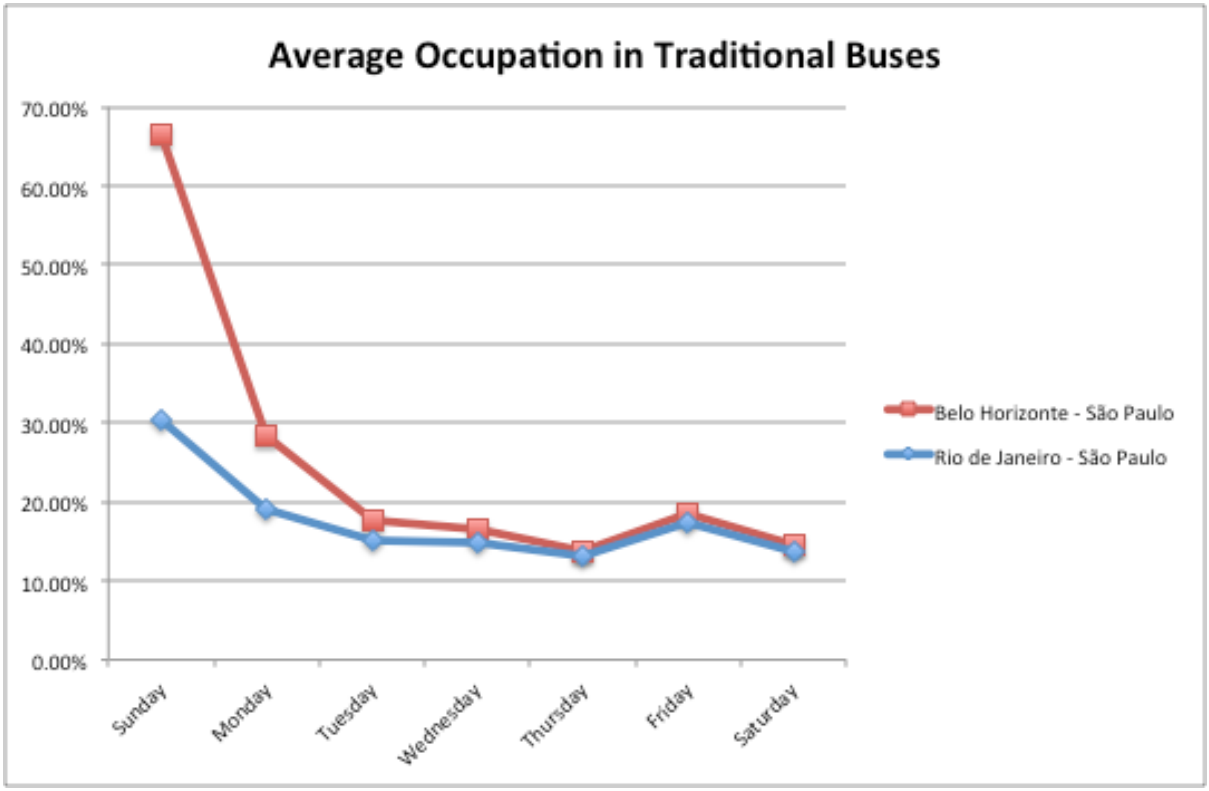
4.8.2 Occupation rates and number of buses per route

The bus market in Brazil is still the reflection of a deep regulated system, even though regulation is now aiming for an open market. Each route counts with a large number of buses that run most of the time with very few passengers. That situation generates high costs, which are transferred to the customer through the ticket price.

As said in this work during the collection of data about competitors' prices in Brazil, it's possible to check the demand of each route, because companies show the number of seats that are still available. Based on that, an analysis was made about the average occupation in traditional buses for the routes Rio de Janeiro – São Paulo and Belo Horizonte – São Paulo, according to the days of the week. In order to make this analysis, data was collected everyday

during one week, always checking the number of free seats in the routes of the day. However, actual occupations may be a little higher, since companies sell tickets in the bus station counters until the time of departure.

Figure 47 - Average occupation in traditional buses by the day of the week



Source: author

As it's possible to see in Figure 47, both routes have high occupations only on Sundays, but during the weekdays, buses usually travel empty, with occupations under 20%. That happens due to the high number of buses operating in each route. For the Belo Horizonte – São Paulo route, a single company offers 10 regular buses a day, with fixed prices. For the route Rio de Janeiro – São Paulo, 4 companies offer together over 60 routes each day, all of them working with very low occupation.

A possible solution to cut costs and offer better ticket prices is the reduction of the number of routes for each day, which may be compensated by higher occupation rates. Another option, as deeply discussed in this research, is inserting partial stops in order to attract an additional demand.

4.8.3 Bus size

Most of the companies worldwide work with a reduced number of buses for each route to keep their occupations high. The higher the occupation, the more profitable a line will be. Another alternative to maximize profits is to reduce the space between seats in order to fit more people inside the bus. It's, however, a tradeoff between comfort and the number of seats. Finally, as done by Megabus both in Europe and in the United States, the low-cost company may opt for using double-deckers. Initial investments are higher and also costs with maintenance and fuel, but a Megabus vehicle can transport up to 87 people at the same time.

4.8.4 Marketing

Many people think that low-cost bus companies are the ones that offer tickets for one euro, one dollar, or one pound. However, that's only marketing strategies to attract new customers. As explained before, companies use the yield management pricing, making prices vary according to time and demand, and maximizing their utilization and profits.

Another important factor is branding, in a way to create an identity that reminds the customers what the company has to offer. Companies in Europe and in the US frequently run marketing campaigns, offering many tickets for very low prices, even for free. Low-cost companies want to be the first thing that customers think when they start planning a trip.

4.8.5 Technology

Even though low-cost companies are known by their no-frills business, most of the companies offer power outlets for each seat and Wi-Fi Internet on board. In Brazil, most of the traditional bus companies still don't have this kind of services and that would be a differential for the low-cost carriers. The idea of supplying these technological services is to grant the best experience for the customers, especially for young people and students, who were identified in the literature review as one of the main niches of customers.

4.8.6 Environment

The low-cost model suggested in this research would also have good impacts for the environment. As suggested, the low-cost company would work with a low number of buses for each route, transporting more passengers at a time and being more environmentally friendly. Also, traveling with those companies is up to 14 times more fuel efficient than the same single person trip by car (STAGECOACH GROUP, 2015).

The way bus routes are run in Brazil nowadays showed not to be environmentally friendly, with many trips a day and very low occupations.

4.8.7 Economy and society

Finally, the economical and social gains that low-cost buses bring are huge. The Stagecoach Group (2015) listed some social contributions that arise from the low-cost bus business:

- Reducing cost of travel;
- Increasing the mobility for lower income groups;
- Generating employment;
- Boosting tourism;
- Improving connectivity between regions;
- Increasing the quality of public transport;
- Supporting the supply chain through investment;
- Environmental efficiency.

Based on that list, it's possible to infer many economical gains from the business: with more people employed, more money will be spent in every single sector of the economy; the increase of tourism may boost local economies; the improvement of connectivity between regions can facilitate many economical activities; and, finally, the whole transport sector, including its whole supply chain, would be beneficiated by the entrance of a low-cost carrier. Overall, the low-cost bus business can benefit the whole economy and the society.

4.8.8 The incumbent's advantage

Nowadays, competitors have a high concentration of the bus market in the analyzed routes. Due to the fact that those companies don't need subcontractors, since they own their buses and are responsible for the operations, the low-cost bus business model can be easily replicable.

Those companies can quickly act, reducing their frequency in order to increase occupability and reduce prices. Also, with the new regulation, they could rearrange their buses to new routes and expand their network. That creates a strategic entry deterrence, which discourages potential entrants from entering into competition in the bus market. Anyway, that situation would shift the market into the low-cost approach and support the economical and social gains previously mentioned.

That point is more comparable to the low-cost bus system in the United States, where huge companies controlled the market before the entrance of Megabus, in 2006. Still, it proved to be a successful business model. On the other hand, in Europe, the transport culture was totally focused on trains before the deregulation of the bus market. That contributed to many new entrants in the years following the deregulation.

4.9 Flixbus acquisition of Megabus Europe

Flixbus has proven to have a robust business model, as the company recently acquired Megabus retailing business in Europe. The transaction was signed on June 28, 2016, and was completed in July 2016.

Flixbus will integrate the Megabus network in Germany, Italy, France, Netherlands, Belgium and Spain, as well as the cross-channel service to the UK. Megabus will operate these services as a Flixbus contractor. Through this acquisition and further expansions, Flixbus will further strengthen its leading position in the European market, now reaching 100,000 daily connections in 19 countries.

The operation is the best example that, in order to be Europe's leading provider of long-distance coaches, Flixbus still doesn't have to own any buses. This case can be compared to other examples worldwide: Uber is the biggest transportation network in the world and still

doesn’t own any vehicles; Airbnb is the largest hospitality-related company in the world, but it doesn’t own any of the properties. These technology-driven firms are working with the company of sharing economy and that is allowing them, just like Flixbus, to scale faster and with less capital.

Yet, the low-cost bus market in Europe still has many competitors and the dynamics of the routes and prices should be analyzed after the conclusion of Megabus acquisition.

5 DISCUSSION

This chapter is devoted to comparing results and findings of the previous section with the initial relevant statements of the literature review. Each aspect will be evaluated in order to check the applicability of a low-cost bus business model in Brazil. The discussion will be made in a logical order to better understand the results and findings.

The subject of low-cost bus is still not widely studied and very few scientific articles about it were developed. Also, those articles in which the topic is presented usually are not focused specifically in the low-cost bus business models, but only in setting demand comparisons against traditional competitors. Most of those studies bring the example of Megabus, which was the pioneer in this kind of business, starting in 2003, in the United Kingdom.

One important point brought by the literature review is about the relationship between the deregulation of transports and the appearance of the low-cost bus companies. Megabus started in the United Kingdom because the bus deregulation had already happened in 1980. In 2006, the company extended its business to the United States, which also had its deregulation in the 1980s. Finally, the low-cost bus only spread throughout Europe in the recent years, with the deregulation of some major countries. Overall, the importance of the deregulation is mainly related to two factors: bus companies couldn't choose their routes before, especially because of the presence of State-owned trains; and, when operating some predetermined routes, companies should follow specific schedules and a table of prices. With that being said, the Brazilian deregulation would be a key aspect for the implementation of a low-cost business model.

Based on that, one of the first analyses made were focused in the current regulation in Brazil, and the results were favorable: even though the bus market is not totally deregulated, since June 29, 2015, the new regulation started to allow many carriers to ask authorizations for running lines that previously worked only through concessions. For that, maximum prices must be obeyed, but there wouldn't be fares, letting the companies to set their own ticket prices. This new regulation is opening the market to a free competition and the timing to apply a low-cost bus business is perfect.

Before leading to a more specific analysis about the bus market in Brazil, some general information about the country's economy and politics were gathered. The results were not very

encouraging, since Brazil is facing one of the worst crises of its history, with a huge recession, a lot of instability and bad results in almost every economic sector. Also, the recent impeachment of its president contributed to show the lack of credibility and ability of the government to deal with the situation that the country is going through. A recovery is only expected to late 2017.

In order to better understand the market in which a low-cost bus would be inserted in Brazil, a whole demand analysis was made. Cars, buses and airplanes basically run the passenger transportation in the country, with no presence of trains. The focus of the study was in the public transportation – buses and airplanes –, which accounts for almost 150 million passengers transported in 2015. It was possible to notice that the overall market of passengers decreased in the last couple of years, possibly because of the economical crisis. Especially, the bus market shrunk 15.5% in two years, coming to 48 million passengers being transported in 2015.

Focusing specifically in the bus market, the main corridors of demand were analyzed. The analysis of the transportation flow was realized in two different ways: through methods that aim the measurement of the absolute density of the connection between two states (or regions), considering departures and arrivals for both of them (WANG; JIN, 2007); and by identifying the number of passengers in departure or arrival by each state (or regions) (FIPE, 2010). The first approach identified the main corridors between regions and states, and their variation in a 3-year interval. The second method identified the regions and states with the most passengers departing and arriving. Both techniques showed that the Southeast region is the one with the greatest market, representing more than half of the passengers transported in Brazil.

Based on that analysis, five routes were selected: three in the Southeast region, one linking the Southeast region to the South region, and one in the Northeast, which was the only region with a considerable number of passengers to face a growth of customers in recent years. Apart from the demand, analyses on the population, quality of roads and presence of students corroborated to the selection of these five specific routes.

The next step of the research tried to see how plausible those routes would be for a low-cost bus business. In order to do so, similar routes from the companies identified in the literature were analyzed. The literature review found many bus companies with a low-cost approach around the world. They are present in Europe, in the North America and in Southeast Asia. The

carriers in Southeast Asia were discarded for further analysis, due to the lack of safety and quality in their services. Among the European and American companies, three of them were selected to be compared to the Brazilian routes: Megabus Europe, Flixbus and Megabus US. The comparison showed that some of the routes in Brazil were too long when compared to the ones in Europe. However, very similar long routes were found in the United States. The most common routes found in all the three companies were the ones linking two big cities not so far from each other (400 km to 700 km), always having some partial stops, in order to maximize the demand of passengers.

Based on that, the two most common Brazilian routes were selected: Rio de Janeiro – São Paulo and Belo Horizonte – São Paulo. Each one of those routes had already been compared qualitatively to other three routes: one from Megabus Europe, one from Flixbus and one from Megabus US. The next analysis tried to better understand how the pricing of those routes work. The literature review explained that low-cost companies constantly use the yield management pricing, a variable pricing strategy, based on understanding, anticipating and influencing consumer behavior in order to maximize revenue or profits. It was possible to identify the price variation accordingly to the demand and the time, and this point was very relevant to the next steps of this work.

The next part of the research focused in finding a plausible price for the selected Brazilian routes. A low-price is mandatory for the applicability of the model, especially in comparison with the traditional buses in Brazil. In order to make this analysis, the price of those routes was calculated in two different ways: by comparison with competitors and using the cost-plus method.

For the first price analysis, a benchmark was created through the comparison of prices between low-cost bus companies and their competitors and substitutes: traditional buses, trains, airplanes, cars and car-sharing services. In Europe and in the US, 28 routes from 6 corridors were analyzed, and a proportion of prices was found. Based on that benchmark and in the prices of competitors and substitutes for the Brazilian routes, the prices of the low-cost buses were estimated. However, the only way to check if those prices were plausible was through a cost-plus analysis. That method was used and the prices found depended on the average occupation of the buses, leading to the conclusion that the proportion of prices between low-cost carriers and their competitors and substitutes could be kept, as long as those companies manage to run routes with high occupation percentages. Only 35% of a 50-seat bus occupation is enough to

allow a pricing proportion as found in the benchmark to traditional buses. Half of the occupation would be needed to keep the relative price against airplanes.

Finally, in what relates to the implementation of low-cost buses in Brazil, business models identified in the literature review were consulted and a similar approach was taken. Specifically, the Flixbus method was more explored, since the company runs without having any bus and only being responsible for the strategy and administration of routes and clients. The great idea of the company was to focus in small charter and school bus companies and then attract them to run regular city-to-city buses under the Flixbus brand as subcontractors. In that way, local partners own the buses and employ the drivers, being responsible for all the operational tasks. Based on that, a whole analysis on eventual charter buses was made and it identified a great presence of those companies in the locations of the selected Brazilian routes. Also, most of these companies are considered small, what was identified in the literature review as a potential target for the Flixbus franchising approach.

Table 23 summarizes the positive and negative points for the implementation of a low-cost bus system in Brazil.

Table 23 - Positive and negative points in implementing a low-cost bus system in Brazil

Implementation of a low-cost bus system in Brazil	
Positive points	**Negative points**
Many identified low-cost bus systems are successful around the world	Economical and political crisis
Favorable regulation, which aims to a free market	General passenger market has shrunk in the last couple of years
Huge demand of passengers	Bus passenger market has shrunk in the last couple of years
Similarity of routes in comparison to low-cost business models in Europe and in the US	Competitors with high concentration of the market in the analyzed routes
Possibility of maintaining the price proportion found through benchmarking competitors and substitutes	
Presence of many well located charter buses, which could potentially be responsible for the operational part of a low-cost bus business	

Source: author

6 CONCLUSIONS

This study aimed at assessing the applicability of a low-bus business model in Brazil, by following a sequence of actions and analyses identified in the literature review as relevant.

As analyzed in this report and discussed in the previous section, there is a great potential in the Brazilian passenger market for the entrance of low-cost bus companies. The only question is just when it is the right time to enter that market. Most of the negative points presented for the implementation of a low-cost company are related to the current economical and political crisis in Brazil. It was identified as a potential cause for the overall decrease of the passengers market in recent years, and specifically of the bus passengers market. However, the comeback of the economy is expected to begin in 2017.

Other negative points are strictly related to the previous market model in Brazil. The partial liberalization of the airplane market in Brazil, in 2003, granted many advantages to air carriers, while bus companies were stagnated in an antique concession-based model. That situation was also responsible for building big players in the transport market. Only in 2015 the bus market started to head for a free competition. Also, starting a low-cost bus company from scratch could be risky, because of the high concentration of the current companies in the bus market. Those companies could replicate the low-cost business model, and, if they react quickly, it's possible that new low-cost companies wouldn't find space to grow.

But then, many positive points were identified in the literature review and in the analyses made, which showed a great potential for the low-cost applicability in Brazil. Low-cost companies have successfully faced huge monopolistic companies around the world, bringing a whole new dynamic to the market. Megabus in the United Kingdom became a great competitor to National Express; in the United States, the gigantic Greyhound was forced to open a low-cost branch in order to retain market share.

The recent regulation changes, the high demand for passengers and even the similarity of possible routes in Brazil to the ones in Europe and in the US make Brazil a fertile soil for the development of that kind of business. A similar price mechanism to the ones applied worldwide was also identified as doable in Brazil.

Additionally to that, the two biggest low-cost bus business models worldwide – Megabus and Flixbus – were considered plausible of being implemented in Brazil. The first one

requires a higher initial investment, while the second one is more strategic and needs the presence of third party operators, which are present in Brazil.

Future analyses should focus in better understanding how the Brazilian market is working after the new of regulation, since, one year after its change, the pricing strategies and route scheduling seem to be working in the same way, with very few new competitors in the market. Especially when Brazil starts to grow again, this subject must be reanalyzed to understand the new dynamic of the passenger bus market.

The exploration and comparison of new routes in Brazil is suggested as a follow-on study. With more routes being analyzed in Brazil and around the world, better conclusions could be inferred and a more accurate benchmark of low-cost companies, its competitors and its substitutes could be done.

Finally, the recent acquisition by Flixbus of Megabus retailing business in mainland Europe requires further analysis. The transaction, which is expected to be completed in July 2016, made Flixbus even bigger, and changes in the low-cost bus market may be observed.

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8 APPENDIX

Passenger flow between states for the bus market in 2013

2013	AC	AP	AM	PA	RO	RR	TO	AL	BA	CE
AC	0	0	0	0	43.070	0	0	0	0	0
AP	0	0	0	0	0	0	0	0	0	0
AM	0	0	4.047	0	36.244	60.785	0	0	0	0
PA	0	0	0	37.140	0	0	90.514	1.167	1.224	19.284
RO	33.937	0	41.936	0	113.393	0	0	0	56	0
RR	0	0	55.763	0	0	0	0	0	0	0
TO	0	0	0	88.567	0	0	101.619	927	3.412	2.661
AL	0	0	0	652	0	0	2.286	15.998	126.773	8.546
BA	0	0	0	1.527	44	0	6.775	121.988	524.937	24.854
CE	0	0	0	21.553	0	0	2.939	7.959	24.472	68.995
MA	0	0	0	272.710	0	0	85.265	580	2.400	79.290
PB	0	0	0	3.955	0	0	0	8.307	7.659	93.079
PE	0	0	0	11.379	0	0	6.526	244.109	132.558	183.262
PI	0	0	0	40.640	0	0	6.178	2.455	47.844	199.170
RN	0	0	0	2.399	0	0	0	10.734	7.649	99.287
SE	0	0	0	259	0	0	2.569	68.788	201.258	4.805
DF	0	0	0	6.484	1.439	0	56.490	204	171.933	31.541
GO	60	0	0	59.330	8.520	0	170.199	1.792	165.021	13.355
MT	1.356	0	0	33.517	96.943	0	21.639	982	1.313	310
MS	365	0	0	4.374	6.734	0	489	0	0	0
ES	0	0	0	0	2.871	0	0	2.176	320.670	377
MG	151	0	0	2.903	9.168	0	7.202	8.132	325.420	7.556
RJ	0	0	0	2.589	0	0	3.059	5.515	83.294	17.238
SP	532	0	0	5.848	9.480	0	14.045	27.389	366.487	32.834
PR	184	0	0	2.705	13.911	0	4.186	335	11.140	210
RS	0	0	0	738	219	0	2.455	0	1.358	109
SC	0	0	0	649	874	0	833	0	329	208
	36.585	0	101.746	599.918	342.910	60.785	585.268	529.537	2.527.207	886.971

2013	MA	PB	PE	PI	RN	SE	DF	GO	MT	MS
AC	0	0	0	0	0	0	0	51	1.926	429
AP	0	0	0	0	0	0	0	0	0	0
AM	0	0	0	0	0	0	0	0	0	0
PA	261.205	3.179	9.829	44.981	2.381	155	6.133	56.148	36.191	2.284
RO	0	0	0	0	0	0	913	11.422	96.814	6.409
RR	0	0	0	0	0	0	0	0	0	0
TO	85.637	0	2.852	6.633	0	400	55.549	177.566	23.210	518
AL	562	8.762	245.352	2.879	11.190	69.351	179	1.743	819	0
BA	1.954	7.736	133.122	36.532	6.972	197.634	133.240	191.102	882	0
CE	74.398	86.200	190.554	200.909	96.188	5.190	30.597	8.186	73	0
MA	145.059	7.577	15.534	209.015	5.130	0	13.129	31.006	1.768	0
PB	6.243	33.329	155.049	20.473	120.490	8.397	9.176	1.130	0	0
PE	20.502	155.071	195.063	36.643	101.616	22.491	16.414	7.938	278	0
PI	202.811	23.076	38.523	46.293	1.394	0	67.461	25.122	317	0
RN	4.593	122.974	99.104	1.941	1.780	5.824	10.604	3.408	0	0
SE	0	8.865	28.886	0	5.093	9.169	835	994	542	0
DF	12.803	10.527	13.683	72.780	8.113	1.304	34.450	1.417.704	21.784	4.391
GO	52.263	7.600	13.746	18.583	5.149	1.085	1.370.038	536.084	225.818	38.677
MT	2.483	0	565	303	0	615	23.040	227.586	7.674	139.822
MS	0	0	0	0	0	0	5.483	40.112	138.744	82.160
ES	0	353	300	724	0	2.686	0	0	110	0
MG	3.467	1.772	13.169	2.386	2.067	7.192	369.140	391.427	21.918	20.066
RJ	2.771	17.185	19.967	5.918	3.185	5.957	32.880	14.081	1.012	7.320
SP	4.694	27.753	54.352	20.406	10.035	24.182	117.689	138.014	76.037	514.839
PR	0	0	881	0	0	672	10.007	19.944	55.901	169.867
RS	0	0	0	0	0	0	2.625	6.206	10.697	8.178
SC	0	0	0	0	0	0	1.696	3.275	7.036	12.640
	881.445	521.959	1.230.531	727.399	380.783	362.304	2.311.278	3.310.249	729.551	1.007.600

2013	ES	MG	RJ	SP	PR	RS	SC	
AC	0	120	0	485	541	0	0	46.622
AP	0	0	0	0	0	0	0	0
AM	0	0	0	0	0	0	0	101.076
PA	0	3.246	2.512	6.272	2.425	585	329	587.184
RO	3.535	9.546	0	9.865	14.068	498	1.546	343.938
RR	0	0	0	0	0	0	0	55.763
TO	0	6.521	2.474	14.166	3.152	1.443	445	577.752
AL	2.283	7.722	5.731	30.432	378	0	0	541.638
BA	328.923	337.703	83.499	394.699	10.826	1.320	363	2.546.632
CE	737	8.114	16.728	32.792	153	93	156	876.986
MA	0	3.695	2.136	3.766	0	0	0	878.060
PB	365	1.758	15.331	25.832	0	0	0	510.573
PE	1.052	11.731	23.090	55.296	932	0	0	1.225.951
PI	593	1.561	6.870	19.299	0	0	0	729.607
RN	0	2.094	3.292	10.297	0	0	0	385.980
SE	2.715	6.814	5.874	24.065	567	0	0	372.098
DF	0	447.699	31.321	121.566	13.599	2.447	2.313	2.484.575
GO	0	394.450	14.653	115.117	18.077	5.759	3.767	3.239.143
MT	65	22.443	1.132	79.023	50.588	10.468	6.845	728.712
MS	0	21.469	7.320	523.449	170.307	7.290	12.103	1.020.399
ES	445.992	848.993	423.159	66.559	1.192	0	0	2.116.162
MG	859.162	2.114.980	1.912.342	3.533.056	39.707	954	2.148	9.655.485
RJ	414.870	1.944.044	1.308.972	1.918.267	69.406	8.794	10.192	5.896.516
SP	64.176	3.426.498	1.933.430	2.800.368	1.911.566	61.795	309.910	11.952.359
PR	1.223	41.042	71.211	1.975.672	1.046.566	259.912	1.391.936	5.077.505
RS	0	1.216	9.999	63.067	254.738	331.930	883.339	1.576.874
SC	0	2.461	11.252	325.871	1.390.686	885.959	967.835	3.611.604
	2.125.691	9.665.920	5.892.328	12.149.281	4.999.474	1.579.247	3.593.227	57.139.194

Source: ANTT (2016)

Passenger flow between states for the bus market in 2014

2014	AC	AP	AM	PA	RO	RR	TO	AL	BA	CE	MA	PB	PE	PI	RN	SE	DF	GO	MT	MS	ES	MG	RJ	SP	PR	RS	SC	
AC	0	0	0	0	36.974	0	0	0	0	0	0	0	0	0	0	0	0	557	2.512	420	0	508	0	2.348	569	0	0	43.888
AP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AM	0	0	5.926	0	35.963	62.219	0	0	0	0	1.980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	106.088
PA	0	0	0	21.846	0	0	102.821	1.247	917	14.036	199.568	2.778	9.124	55.833	1.982	100	4.556	55.443	48.825	1.149	0	2.499	1.911	4.662	2.157	598	426	532.478
RO	29.049	0	44.523	0	122.888	0	0	0	0	0	0	0	0	0	0	0	1.347	14.719	130.349	8.128	2.751	14.092	0	35.500	17.484	1.054	1.947	423.831
RR	0	0	59.807	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59.807
TO	0	0	0	103.050	0	0	86.677	1.513	2.550	3.383	71.956	0	2.965	5.508	0	420	51.592	180.397	34.822	724	0	7.978	2.393	10.326	5.474	1.185	447	573.360
AL	0	0	0	1.162	0	0	4.095	16.623	115.590	7.736	567	10.609	234.427	2.414	11.495	61.578	998	1.717	1.040	0	2.609	8.044	5.521	30.071	397	0	0	516.693
BA	0	0	0	905	0	0	6.741	120.378	538.978	23.082	1.368	8.283	110.377	46.906	8.193	179.523	137.443	201.125	1.071	0	326.550	342.898	82.776	389.285	10.164	1.578	441	2.538.065
CE	0	0	0	15.660	0	0	3.485	7.431	23.737	41.334	92.526	82.431	180.284	170.924	69.888	5.476	28.843	13.074	578	0	548	7.605	13.725	27.652	132	82	158	785.573
MA	0	0	2.458	206.527	0	0	73.337	537	1.943	92.665	124.082	5.855	19.972	192.551	5.398	0	7.863	52.816	9.663	0	0	2.833	1.598	3.151	0	0	0	803.249
PB	0	0	0	3.510	0	0	0	9.551	8.474	96.944	6.011	25.130	172.645	17.822	110.778	7.634	9.276	2.050	0	0	265	1.729	11.413	22.803	0	0	0	506.035
PE	0	0	0	10.604	0	0	5.212	238.252	109.466	177.984	21.120	172.668	209.191	38.119	100.212	25.209	17.464	10.553	302	0	934	11.276	18.882	47.312	806	0	0	1.215.566
PI	0	0	0	50.140	0	0	5.190	2.392	56.277	170.180	187.766	21.925	39.953	26.208	1.546	0	63.081	20.952	1.973	0	844	1.544	5.446	14.817	0	0	0	670.234
RN	0	0	0	2.070	0	0	0	11.920	8.450	74.179	5.456	111.884	97.664	1.597	1.013	6.066	8.395	3.384	0	0	0	1.970	3.907	9.629	0	0	0	347.584
SE	0	0	0	111	0	0	2.522	60.097	182.460	5.083	0	8.605	29.267	0	5.618	2.310	943	807	576	0	1.935	6.995	4.814	23.819	547	0	0	336.509
DF	0	0	0	4.668	1.592	0	51.800	939	157.345	28.852	7.775	9.428	16.271	65.877	7.271	1.030	35.907	835.785	23.931	6.350	0	387.889	20.679	104.746	15.413	2.292	2.115	1.787.955
GO	587	0	0	56.874	13.150	0	170.720	1.581	182.242	15.505	58.905	3.394	13.424	18.874	3.055	900	745.165	493.605	259.951	44.369	0	476.975	13.791	241.107	30.289	4.397	2.690	2.851.550
MT	2.287	0	0	52.783	128.851	0	36.433	1.413	1.602	714	10.175	0	641	1.797	0	621	23.056	264.401	8.383	124.742	106	31.501	1.302	94.578	45.221	6.420	5.540	842.567
MS	384	0	0	2.827	8.034	0	596	0	0	0	0	0	0	0	0	0	7.206	43.979	123.150	90.964	0	21.223	7.640	487.253	164.943	6.206	13.431	977.836
ES	0	0	0	0	2.960	0	0	2.533	322.805	273	0	290	176	858	0	1.955	0	0	128	0	451.265	835.863	394.708	56.373	1.447	0	0	2.071.634
MG	569	0	0	2.566	14.479	0	5.942	8.132	339.066	6.913	2.696	2.047	11.801	2.258	2.094	7.551	336.563	432.556	26.050	19.411	849.500	1.911.571	1.749.177	3.261.102	48.205	870	2.474	9.043.593
RJ	0	0	0	1.928	0	0	2.392	5.578	81.509	14.531	1.995	10.964	17.860	3.778	3.626	4.737	21.256	12.842	1.049	7.546	387.588	1.751.797	940.640	1.850.537	57.035	8.771	9.588	5.197.547
SP	2.361	0	0	4.980	30.861	0	10.485	27.753	363.449	26.297	3.162	24.000	43.119	13.224	10.186	23.999	109.063	210.817	88.215	491.820	54.886	3.186.940	1.839.542	2.415.319	1.824.444	53.557	280.828	11.139.307
PR	222	0	0	2.045	15.415	0	5.768	268	10.129	130	0	0	778	0	0	688	19.414	24.894	47.719	165.321	1.296	49.831	56.100	1.875.625	930.698	218.130	1.168.724	4.593.195
RS	0	0	0	718	252	0	1.775	0	1.585	100	0	0	0	0	0	0	2.447	5.256	6.145	6.893	0	1.077	9.552	54.066	227.337	250.862	773.614	1.341.679
SC	0	0	0	484	1.148	0	577	0	355	186	0	0	0	0	0	0	1.729	2.857	4.908	13.707	0	2.693	11.340	288.205	1.161.590	784.018	815.549	3.089.346
	35.459	0	112.714	545.458	412.567	62.219	576.568	518.138	2.508.929	800.107	797.108	500.291	1.209.939	664.548	342.355	329.797	1.633.607	2.884.586	821.340	981.544	2.081.077	9.067.331	5.196.857	11.350.286	4.544.352	1.340.020	3.077.972	52.395.169

Source: ANTT (2016)

Passenger flow between states for the bus market in 2015

2015	AC	AP	AM	PA	RO	RR	TO	AL	BA	CE	MA	PB	PE	PI	RN	SE	DF	GO	MT	MS	ES	MG	RJ	SP	PR	RS	SC	
AC	0	0	0	0	47.434	0	0	0	0	0	0	0	0	0	0	0	0	22	2.228	567	0	48	0	223	613	0	0	51.135
AP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AM	0	0	8.981	0	42.996	106.762	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	158.739
PA	0	0	0	28.292	0	0	91.328	964	0	10.553	193.900	1.449	6.641	51.632	2.202	0	1.672	24.816	50.963	630	0	1.504	1.331	3.182	1.742	748	298	473.847
RO	37.015	0	57.300	0	120.841	0	0	0	0	0	0	0	0	0	0	0	1.628	16.992	137.777	9.117	3.075	8.904	0	11.964	17.120	634	2.458	424.825
RR	0	0	104.115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	104.115
TO	0	0	0	91.603	0	0	61.729	928	9.576	2.025	39.478	0	2.878	1.390	0	704	48.978	164.381	46.574	420	0	5.187	1.121	8.542	7.489	969	480	494.452
AL	0	0	0	830	0	0	1.939	13.309	105.748	5.819	499	8.972	156.595	2.904	8.881	63.125	1.771	1.503	1.008	0	2.328	6.924	4.293	22.001	79	0	0	408.528
BA	0	0	0	0	0	0	12.926	105.560	479.156	20.575	0	5.886	699.806	22.299	5.246	224.126	134.489	208.806	1.042	0	321.075	318.682	68.641	358.038	8.976	1.000	278	2.996.607
CE	0	0	0	10.009	0	0	1.962	5.863	19.161	20.470	68.849	65.519	159.607	130.063	72.680	5.166	13.793	6.888	518	0	0	5.339	5.591	15.789	93	72	120	607.552
MA	0	0	0	203.875	0	0	41.669	464	0	68.904	77.011	4.112	19.976	140.929	4.365	0	6.979	47.311	8.629	0	0	1.113	705	222	248	252	12	626.776
PB	0	0	0	1.388	0	0	0	8.622	5.756	75.512	4.573	20.287	195.325	14.559	95.370	6.498	9.744	2.217	0	0	0	1.160	3.121	16.135	0	0	0	460.267
PE	0	0	0	7.297	0	0	5.044	151.958	701.281	160.022	19.837	198.926	176.574	34.989	78.151	21.346	8.534	3.608	358	0	0	8.136	12.901	22.822	588	0	0	1.612.372
PI	0	0	0	45.607	0	0	1.129	2.938	25.018	123.089	138.815	17.112	38.367	23.141	1.391	0	43.236	4.883	1.473	0	0	1.023	0	0	0	0	0	467.222
RN	0	0	0	2.262	0	0	0	10.140	5.518	78.886	4.982	97.059	75.132	1.570	557	4.354	9.024	2.010	0	0	0	1.226	3.002	6.285	0	0	0	302.007
SE	0	0	0	0	0	0	2.345	62.442	229.787	5.055	0	7.266	21.867	0	4.222	2.663	374	260	395	0	0	5.956	861	16.976	378	0	0	360.847
DF	0	0	0	1.841	1.775	0	43.173	1.383	152.873	13.842	3.931	10.844	8.892	37.363	9.163	369	33.985	831.633	23.186	5.045	0	359.190	19.817	103.271	11.901	1.782	1.488	1.676.747
GO	25	0	0	24.923	18.007	0	154.266	1.642	204.076	6.302	50.456	2.279	3.625	4.994	1.864	381	830.252	460.193	316.117	37.196	0	316.816	15.203	76.918	10.484	3.840	2.933	2.542.792
MT	1.496	0	0	48.222	139.311	0	46.996	1.268	1.386	472	10.541	0	655	1.717	0	434	22.218	311.362	9.796	118.290	68	17.708	621	68.283	41.376	5.391	5.105	852.716
MS	493	0	0	479	9.400	0	384	0	0	0	0	0	0	0	0	0	5.345	37.978	114.409	79.729	0	17.750	5.655	447.797	160.873	5.454	14.388	900.134
ES	0	0	0	0	3.121	0	0	2.142	320.898	0	0	0	0	0	0	0	0	0	170	0	407.202	745.229	350.947	49.709	982	0	0	1.880.400
MG	32	0	0	1.828	9.253	0	3.504	7.085	315.399	5.616	1.194	1.442	9.345	1.152	1.270	6.359	335.612	301.602	16.614	16.792	759.826	1.792.122	1.735.154	2.770.948	26.740	568	2.191	8.121.648
RJ	0	0	0	1.191	0	0	1.195	4.248	65.625	6.179	791	2.635	11.686	0	2.926	1.028	20.910	15.408	622	5.447	349.442	1.733.175	913.723	1.727.262	47.564	6.928	7.901	4.925.886
SP	243	0	0	4.022	7.670	0	9.649	21.812	336.669	15.552	218	15.373	23.447	0	6.750	18.013	106.407	77.375	66.336	457.761	46.137	2.635.637	1.769.534	1.657.545	1.593.741	43.886	268.529	9.182.306
PR	242	0	0	1.830	15.735	0	7.645	97	8.242	94	369	0	613	0	0	427	10.705	10.492	46.334	162.228	1.108	26.682	48.050	1.626.539	703.271	192.717	1.278.401	4.141.821
RS	0	0	0	1.166	248	0	1.367	0	856	78	200	0	0	0	0	0	1.918	4.385	5.708	5.330	0	597	7.466	43.813	192.622	204.142	790.324	1.260.220
SC	0	0	0	421	1.412	0	686	0	298	136	24	0	0	0	0	0	1.271	2.827	5.584	14.201	0	2.185	8.949	283.401	1.273.461	790.833	867.365	3.253.054
	39.546	0	170.396	477.086	417.203	106.762	488.936	402.865	2.987.323	619.181	615.668	459.161	1.611.031	468.702	295.038	354.993	1.648.845	2.536.952	855.841	912.753	1.890.261	8.012.293	4.976.686	9.337.665	4.100.341	1.259.216	3.242.271	48.287.015

Source: ANTT (2016)

Passenger flow between states for the airplane market in 2013

2013	AC	AP	AM	PA	RO	RR	TO	AL	BA	CE	MA	PB	PE	PI	RN	SE	DF	GO	MT	MS	ES	MG	RJ	SP	PR	RS	SC	
AC	37.524	0	19.289	2.776	28.534	0	3	0	0	2.001	0	0	0	0	0	0	112.652	0	1.256	0	0	5.007	0	2.024	0	0	0	211.066
AP	0	0	0	253.202	0	0	68	0	437	8.243	0	0	1.182	0	0	0	53.540	10	0	0	0	0	10.554	557	0	0	5	327.798
AM	19.024	0	365.824	214.926	113.205	113.739	0	0	12.637	117.570	14.710	0	13.935	0	513	451	212.514	0	8.635	1.653	0	22.220	136.811	324.867	2.585	3.203	0	1.699.022
PA	2.273	241.076	227.650	740.021	6.182	0	6.764	0	10.921	158.761	70.680	0	40.547	0	1.001	1.442	337.928	1.643	4	0	0	111.664	132.170	284.841	4.754	2.963	23	2.383.308
RO	29.475	0	110.045	8.634	13.942	0	0	0	0	4.142	367	0	0	179	0	0	170.399	1.446	139.951	7.623	0	21.208	377	29.018	8.001	1.510	0	546.317
RR	0	0	101.113	0	0	0	0	0	0	0	0	0	0	0	0	0	54.009	124	0	0	0	0	0	22.412	0	0	0	177.658
TO	0	89	0	6.534	0	0	10.579	0	0	0	0	0	0	0	0	0	204.803	58.130	622	0	0	3.577	0	25.803	0	0	0	310.137
AL	0	0	0	0	0	0	0	0	141.381	3.887	0	2.058	28.620	0	4.247	6.818	215.931	0	850	0	0	33.702	127.802	376.294	790	4.532	0	946.912
BA	0	412	9.569	10.926	0	0	0	147.452	512.486	194.822	3.832	72.703	401.231	2.986	40.753	141.728	422.687	6.040	151	0	62.697	578.901	711.395	1.980.583	24.290	38.453	1.699	5.365.796
CE	2.415	11.876	120.034	152.475	4.426	4	0	3.379	185.819	120.346	131.360	8.339	309.334	120.560	101.332	9.847	375.299	14	520	0	151	52.976	328.013	965.259	11.674	11.187	0	3.026.639
MA	0	94	19.569	70.726	223	0	0	0	3.845	121.297	136.205	0	35.704	17.344	816	1.521	307.310	0	0	0	0	57.985	113.443	146.787	0	0	0	1.032.869
PB	0	0	0	0	0	0	0	2.109	72.221	8.571	0	97	19.654	0	0	0	182.857	0	0	0	0	2.303	183.208	212.864	0	3	22	683.909
PE	0	1.259	11.668	39.106	0	0	0	28.483	407.102	313.267	39.668	17.441	382.705	24.314	76.773	61.210	319.481	12.215	0	0	7.452	126.245	476.874	1.178.369	18.678	24.863	214	3.567.387
PI	0	42	0	0	198	0	11	0	3.803	117.123	17.077	0	23.397	0	0	0	207.017	337	0	0	0	10.105	1	146.436	254	0	0	525.801
RN	0	0	446	1.007	0	0	0	3.578	46.679	94.669	500	0	79.844	0	74	3.177	208.864	2.830	0	0	10	32.893	278.550	412.829	1.443	0	0	1.167.393
SE	0	0	399	1.585	0	0	0	12.299	136.347	9.961	1.651	0	62.226	0	3.086	0	71.583	5	0	0	0	12.053	134.484	201.489	0	0	0	647.168
DF	110.611	54.275	220.233	354.649	167.453	48.753	206.111	210.384	409.725	376.255	301.096	177.039	333.898	208.169	203.046	71.774	338	244.116	260.958	116.916	73.537	617.785	975.605	2.076.537	230.874	210.495	99.895	8.360.527
GO	0	12	0	1.790	1.200	0	56.419	0	6.033	27	0	0	7.406	277	3.477	0	261.670	2.830	60.711	3.986	2.262	117.950	49.347	916.844	1.071	2.932	1.831	1.498.075
MT	1.297	0	8.242	0	137.525	0	739	844	247	598	343	0	0	333	0	282	264.106	60.159	239.372	82.194	975	15.422	35.632	640.716	104.884	7.656	0	1.601.566
MS	0	0	1.479	0	6.506	0	0	0	0	0	0	0	0	0	0	0	111.634	3.886	83.151	29.963	0	364	43.339	529.333	44.778	4.938	0	859.371
ES	0	0	0	0	0	0	0	0	63.736	244	0	0	8.244	0	0	0	70.100	2.665	1.258	0	0	253.706	642.200	614.071	4	317	0	1.656.545
MG	3.757	0	23.789	108.267	24.744	0	2.549	28.202	590.071	68.528	58.921	2.694	121.937	10.541	31.345	20.712	607.236	119.106	14.073	97	253.208	994.328	789.152	2.269.359	126.366	68.906	10.706	6.348.594
RJ	0	11.703	132.661	123.534	231	0	0	127.720	719.038	332.073	111.871	185.253	479.363	0	271.833	116.818	963.427	49.175	27.294	43.074	646.170	778.778	76.704	4.398.952	583.979	636.543	284.343	11.100.537
SP	2.153	5.423	317.281	252.909	31.481	18.342	24.343	390.411	1.956.609	960.176	142.546	211.209	1.180.866	141.761	422.126	203.671	2.095.186	920.261	641.362	521.992	601.524	2.292.861	4.354.296	2.108.719	2.567.555	2.089.823	1.851.585	26.306.471
PR	32	0	1.897	3.854	6.484	0	0	861	28.150	8.829	0	0	14.746	229	1.091	0	229.484	930	98.658	41.136	17	124.346	590.017	2.567.186	1.012.787	383.989	15.187	5.129.910
RS	0	0	3.424	2.873	1.454	0	0	5.271	47.358	10.372	0	9	12.384	0	0	0	221.869	2.806	8.448	6.516	0	73.105	612.803	2.102.074	382.041	68.167	322.612	3.883.586
SC	0	18	0	46	0	0	0	0	355	0	0	10	0	0	0	0	102.276	2.043	0	0	0	10.423	299.211	1.846.461	13.696	316.082	230.228	2.820.849
	208.561	326.279	1.694.612	2.349.840	543.788	180.838	307.586	960.993	5.355.000	3.031.762	1.030.827	676.852	3.557.223	526.693	1.161.513	639.451	8.384.200	1.490.771	1.587.274	855.150	1.648.003	6.349.907	11.101.988	26.380.684	5.140.504	3.876.562	2.818.350	92.185.211

Source: ANAC (2016)

Passenger flow between states for the airplane market in 2014

2014	AC	AP	AM	PA	RO	RR	TO	AL	BA	CE	MA	PB	PE	PI	RN	SE	DF	GO	MT	MS	ES	MG	RJ	SP	PR	RS	SC	
AC	40.533	0	15.709	2.293	39.893	0	0	0	0	2.116	0	0	0	0	0	0	106.334	166	7.050	0	0	0	0	5.853	0	0	0	219.947
AP	0	112	0	288.948	0	38	19	0	447	10.206	0	0	1.773	0	0	0	53.689	4	0	0	0	33	8.809	5.789	0	0	0	369.867
AM	16.278	6	382.868	271.064	121.551	125.920	0	0	12.671	122.414	15.834	0	13.843	0	3.843	487	216.012	1	6.314	1.299	115	19.631	142.789	329.371	2.256	2.453	0	1.807.020
PA	1.943	280.210	286.646	771.657	3.955	171	5.258	0	11.747	196.541	79.399	0	47.811	45	5.136	1.539	388.037	2.073	0	0	0	114.815	127.923	273.242	4.401	1.992	0	2.604.541
RO	37.002	0	117.725	6.172	47	0	0	0	0	3.119	36	0	0	0	0	0	163.309	2	149.874	5.126	0	9.324	0	23.610	7.231	1.325	0	523.902
RR	34	0	111.023	0	0	0	0	0	0	0	0	0	0	0	0	0	49.781	0	0	0	0	552	1	22.006	0	0	0	183.397
TO	0	54	0	4.929	0	0	23.753	0	0	0	53	0	0	0	0	0	218.033	67.287	128	0	0	5.954	0	25.334	0	0	0	345.525
AL	0	0	0	0	0	0	0	0	149.636	169	0	38	21.846	0	3.684	4.729	202.866	597	199	0	0	18.503	99.278	431.298	856	678	0	934.377
BA	0	560	12.295	12.815	0	2	0	157.070	633.182	219.852	7.803	68.080	405.811	1.574	44.886	134.573	448.527	5.846	771	118	66.990	644.081	751.580	2.099.430	27.205	42.130	1.954	5.787.135
CE	2.725	14.305	123.121	190.077	3.211	27	0	221	202.275	115.353	143.643	14.768	328.333	130.008	120.899	8.369	406.310	997	280	0	251	67.265	331.935	1.066.917	10.698	13.113	0	3.295.101
MA	0	56	19.014	84.663	0	0	93	0	8.001	134.548	136.259	0	40.064	27.703	2.771	953	287.269	50	128	0	0	73.871	111.468	143.818	0	0	0	1.070.729
PB	0	0	0	0	0	0	0	0	72.482	14.607	33	163	1.631	0	0	0	185.787	99	0	0	100	14.184	238.966	213.188	0	98	118	741.456
PE	0	1.899	12.191	46.503	0	0	0	23.949	417.930	325.117	46.824	1.534	436.552	28.112	74.407	66.480	342.753	11.333	417	0	9.360	149.170	478.333	1.211.427	13.841	22.363	0	3.720.495
PI	0	0	0	19	0	0	0	20	2.023	123.929	26.836	0	28.364	4.636	63	0	216.033	1	322	0	0	7.144	24	157.075	0	0	0	566.489
RN	0	0	3.822	5.177	0	0	0	3.496	47.404	104.735	2.696	139	72.709	13	0	429	189.836	7.663	0	0	119	34.645	280.292	446.059	114	231	0	1.199.579
SE	0	0	571	1.659	0	0	0	6.740	150.096	10.451	1.169	0	65.647	0	410	0	60.910	65	262	0	0	2.586	131.638	232.722	0	0	0	664.926
DF	103.894	56.323	226.837	389.279	156.184	43.291	220.876	197.777	416.893	403.407	284.899	187.334	346.907	214.472	188.838	71.913	235	242.691	281.303	140.847	80.602	625.591	1.118.447	2.245.435	256.363	238.537	102.869	8.842.044
GO	0	0	0	2.113	0	0	65.841	915	6.637	1.231	78	0	4.370	0	6.878	0	281.811	0	65.108	0	2.699	133.692	76.421	1.037.253	3.876	3.200	2.883	1.695.006
MT	8.291	0	4.872	0	143.237	0	124	259	1.093	501	114	0	335	0	0	0	281.185	68.507	288.881	87.993	224	30.376	50.624	724.390	78.091	5.469	2	1.774.568
MS	0	0	1.220	0	8.165	0	0	0	233	0	0	0	0	0	0	0	134.275	126	87.088	38.666	0	0	12.830	628.712	28.752	4.991	0	945.058
ES	0	0	54	0	0	0	0	0	66.188	359	0	0	10.419	0	109	32	77.250	2.848	142	40	0	263.324	602.804	657.990	522	1.818	0	1.683.899
MG	0	0	20.999	111.261	11.612	379	5.014	18.800	638.418	78.850	78.828	18.374	140.612	7.715	31.634	3.321	610.015	133.998	27.458	0	254.535	970.649	792.791	2.461.228	111.078	70.473	5.720	6.603.762
RJ	0	8.643	138.773	130.357	104	2	0	94.620	743.700	347.978	107.761	243.137	475.916	9	272.330	129.700	1.110.615	76.625	42.481	11.197	614.055	777.729	100.628	4.649.987	642.136	621.700	248.401	11.588.584
SP	5.822	6.873	322.254	248.859	21.863	16.550	24.147	432.660	2.110.139	1.064.957	132.597	215.157	1.234.811	160.347	440.238	235.282	2.258.783	1.062.802	732.397	621.969	639.767	2.452.259	4.617.629	2.061.763	2.795.553	2.270.934	1.959.499	28.145.911
PR	1	0	1.881	3.848	7.185	0	0	1.234	30.049	11.362	0	0	11.953	0	107	0	240.972	3.421	67.893	27.995	594	110.312	645.918	2.805.549	1.201.483	388.959	8.683	5.569.399
RS	0	0	2.224	2.749	1.368	0	0	790	52.663	12.459	0	105	8.307	0	265	0	244.483	2.747	3.708	6.339	1.978	75.875	595.167	2.264.728	384.863	164.365	286.621	4.111.804
SC	0	0	0	0	0	0	0	0	797	0	0	106	0	0	0	0	99.513	2.727	0	44	0	9.240	257.882	1.972.450	6.957	272.688	231.015	2.853.419
	216.523	369.041	1.804.099	2.574.442	518.375	186.380	345.125	938.551	5.774.704	3.304.261	1.064.862	748.935	3.698.014	574.634	1.196.498	657.807	8.874.623	1.692.676	1.762.204	941.633	1.671.389	6.610.805	11.574.177	28.196.624	5.576.276	4.127.517	2.847.765	97.847.940

Source: ANAC (2016)

Passenger flow between states for the airplane market in 2015

2015	AC	AP	AM	PA	RO	RR	TO	AL	BA	CE	MA	PB	PE	PI	RN	SE	DF	GO	MT	MS	ES	MG	RJ	SP	PR	RS	SC	
AC	45.414	0	17.972	2.778	35.345	0	0	0	0	2.547	0	0	0	0	0	0	108.096	0	10.191	0	0	0	0	2.857	0	0	0	225.200
AP	0	0	0	227.119	0	0	161	0	728	15.876	0	0	2.444	0	0	0	65.841	0	0	0	0	3.571	6.362	5.336	0	0	0	327.438
AM	18.076	0	327.970	261.425	123.986	88.413	0	0	3.138	117.291	7.616	0	6.382	0	3.706	72	258.963	0	6.099	1.673	0	22.694	123.824	353.806	1.355	522	0	1.727.011
PA	2.579	231.954	276.407	769.207	6.196	0	4.606	0	8.219	156.930	65.773	0	29.182	3.621	9.692	178	457.185	816	0	0	0	139.269	119.093	303.918	3.565	233	0	2.588.623
RO	36.453	0	121.768	8.715	0	0	0	0	0	1.699	0	0	0	0	0	0	153.717	108	159.639	3.708	0	7.756	45	40.510	7.575	1.228	4	542.925
RR	0	0	82.987	0	0	0	0	0	0	0	0	0	0	0	0	0	70.906	0	0	0	0	3.013	5.282	7.726	0	0	0	169.914
TO	0	0	0	4.768	0	0	24.542	0	57	0	1.354	0	0	0	0	0	204.746	68.373	0	0	0	9.981	40	45.184	0	0	101	359.146
AL	0	0	0	0	0	0	0	0	141.061	1.469	0	1.835	32.625	118	2.429	3.694	211.099	2.227	579	0	0	25.647	97.302	446.891	2.119	3.333	0	972.428
BA	0	448	3.750	7.198	0	0	0	138.786	560.390	228.503	6.234	42.650	420.559	1.751	48.635	115.266	553.508	11.733	0	567	45.287	652.988	725.988	2.038.071	19.466	31.411	3.078	5.656.267
CE	3.064	15.351	115.979	171.652	1.657	0	0	1.611	219.861	116.910	146.210	15.398	307.711	136.618	99.707	8.124	409.897	2.550	1.083	0	332	74.877	344.872	1.037.957	5.954	3.438	0	3.240.813
MA	0	0	9.677	60.830	0	0	1.337	0	6.804	136.546	82.075	0	42.491	27.949	3.918	127	312.889	580	105	0	157	97.517	85.533	139.821	0	0	0	1.008.356
PB	0	0	0	0	0	0	0	1.716	47.594	15.164	0	715	81	395	0	0	201.683	0	0	0	0	665	273.251	235.599	0	0	0	776.863
PE	0	2.060	7.273	27.798	0	0	0	33.273	429.827	323.101	48.316	172	429.352	30.868	99.236	51.314	364.706	9.711	163	0	9.998	178.089	425.109	1.198.861	17.685	20.866	0	3.707.778
PI	0	0	0	4.208	0	0	0	134	1.960	134.749	28.039	391	31.672	3.731	109	0	220.387	0	0	0	0	15.188	94	153.781	0	0	0	594.443
RN	0	0	2.721	8.308	0	0	0	2.242	47.141	102.087	4.091	19	89.206	71	0	994	241.188	3.036	0	0	32	35.901	267.743	447.401	133	614	0	1.252.928
SE	0	0	125	187	0	0	0	5.716	125.122	7.702	160	0	52.984	0	1.012	0	93.419	0	0	0	0	1.584	120.119	216.207	0	0	0	624.337
DF	104.269	64.507	264.664	453.098	144.092	65.116	204.215	213.560	541.193	435.515	292.894	203.213	362.253	219.322	245.600	104.907	0	275.313	335.309	132.391	110.194	571.799	1.050.719	2.339.080	290.513	250.018	152.198	9.425.952
GO	0	0	0	675	0	0	68.295	1.965	11.690	2.392	633	0	6.832	0	4.594	0	315.716	0	63.762	0	2.313	136.709	64.302	995.422	4.667	2.929	1.279	1.684.175
MT	9.926	0	5.477	0	153.618	0	0	465	0	1.047	0	0	326	0	0	0	328.272	68.380	274.695	95.738	99	41.755	41.836	720.126	80.112	10.928	2	1.832.802
MS	0	0	1.873	0	4.560	0	0	0	453	0	0	0	0	0	0	0	129.860	21	93.636	19.695	0	6.575	15.382	582.998	42.975	7.613	17	905.658
ES	0	0	0	0	0	0	0	0	46.672	185	297	0	8.877	0	0	0	109.426	0	0	0	0	295.309	578.496	672.262	0	3.734	63	1.715.321
MG	0	3.979	21.945	137.971	10.840	3.553	9.297	25.881	633.388	76.770	102.598	1.348	179.033	16.208	32.804	878	570.133	135.315	36.955	6.063	284.254	909.924	766.571	2.426.582	114.533	103.534	1.600	6.611.957
RJ	37	6.387	117.750	118.289	92	6.503	0	96.379	732.312	323.872	82.287	282.089	435.300	111	263.086	111.121	1.032.062	66.433	34.936	14.758	590.399	740.315	67.112	4.571.395	645.186	604.290	265.156	11.207.657
SP	3.857	6.281	350.026	294.300	44.293	6.704	42.038	449.040	2.053.483	1.033.228	141.035	234.770	1.202.947	155.951	433.068	223.867	2.334.513	1.028.115	717.348	577.281	657.049	2.443.338	4.512.583	1.876.384	2.901.546	2.321.164	2.097.190	28.141.399
PR	0	0	1.052	3.936	8.013	0	0	1.617	17.671	5.698	151	0	11.977	0	399	0	286.293	2.380	75.972	41.589	0	101.645	650.517	2.914.579	1.103.701	381.972	2.426	5.611.588
RS	0	0	1.148	647	707	0	0	3.318	35.503	2.860	0	0	14.231	0	610	0	247.669	3.802	10.419	6.951	4.106	103.590	591.260	2.347.831	367.420	99.923	253.266	4.095.261
SC	0	0	0	0	0	0	132	0	976	0	0	0	0	0	0	0	149.720	1.592	8	0	0	1.753	276.136	2.081.511	2.238	248.988	237.943	3.000.997
	223.675	330.967	1.730.564	2.563.109	533.399	170.289	354.623	975.703	5.665.243	3.242.141	1.009.763	782.600	3.666.465	596.714	1.248.605	620.542	9.431.894	1.680.485	1.820.899	900.414	1.704.220	6.621.452	11.209.571	28.202.096	5.610.743	4.096.738	3.014.323	98.007.237

Source: ANAC (2016)

Low-cost bus price averages and standard deviations

	Low-Cost Bus										
	Price 1 day before	SD	Price 1 week before	SD	Price 2 weeks before	SD	Price 4 weeks before	SD	Price 8 weeks before	SD	Routes per day
London - Paris	27,29	7,94	25,35	6,54	24,50	5,60	26,50	7,48	24,25	5,03	2
London - Lille	26,14	7,49	25,14	6,30	24,50	5,60	26,00	6,77	23,31	4,15	2
Lille - Paris	7,86	4,22	5,57	1,22	5,29	0,73	5,00	1,36	5,00	1,36	2
Zurich - Basel	No route for legal reasons										
Zurich - Mulhouse	15,33	7,37	7,00	0,00	8,29	2,20	7,00	0,00	7,00	0,00	1
Zurich - Belfort	9,00	0,00	9,64	1,70	9,64	1,70	9,00	0,00	9,00	0,00	1
Zurich - Paris	37,71	6,58	30,17	3,50	32,33	4,55	32,83	6,64	29,00	0,00	1
Basel - Mulhouse	5,00	0,00	5,25	0,71	5,25	0,71	5,00	0,00	5,00	0,00	1
Basel - Belfort	7,00	0,00	7,36	0,94	7,36	0,94	7,00	0,00	7,00	0,00	1
Basel - Paris	36,00	8,41	27,39	5,27	29,07	5,94	26,04	3,88	25,00	0,00	1
Mulhouse - Belfort	No route for legal reasons										
Mulhouse - Paris	26,94	5,99	22,39	1,47	24,29	4,00	22,00	0,00	22,00	0,00	1
Belfort - Paris	24,50	5,92	19,39	1,47	21,29	4,00	19,00	0,00	19,00	0,00	1
Washington - Baltimore*	15,00	0,00	15,00	0,00	15,00	0,00	15,00	0,00	11,00	6,56	17
Washington - New York*	24,86	5,57	23,43	8,22	20,10	7,69	17,57	9,28	15,14	10,90	17
Baltimore - New York*	24,86	5,57	23,43	8,22	20,10	7,69	17,57	9,28	15,14	10,90	17

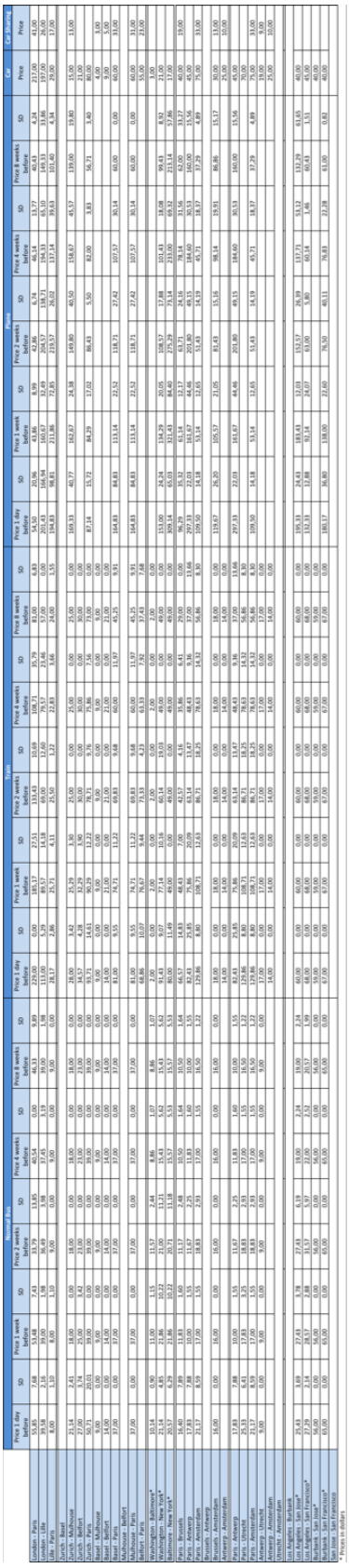
* Prices in dollars

	Low-Cost Bus										
	Price 1 day before	SD	Price 1 week before	SD	Price 2 weeks before	SD	Price 4 weeks before	SD	Price 8 weeks before	SD	Routes per day
Paris - Brussels	10,86	2,90	8,86	3,32	8,71	3,17	8,71	3,17	8,71	3,17	2
Paris - Antwerp	16,54	0,95	16,00	0,00	16,00	0,00	16,00	0,00	16,00	0,00	2
Paris - Amsterdam	17,50	2,20	16,57	1,45	16,64	1,28	16,43	1,09	16,43	1,09	2
Brussels - Antwerp	No route for legal reasons										
Brussels - Amsterdam	9,81	2,37	7,86	1,91	7,43	1,79	6,57	2,62	6,43	2,71	2
Antwerp - Amsterdam	16,50	1,20	16,18	0,73	16,00	0,00	16,00	0,00	16,00	0,00	2
Paris - Antwerp	16,14	1,88	16,14	1,88	16,14	1,88	16,14	1,88	16,14	1,88	2
Paris - Utrecht	23,78	5,73	20,71	2,81	20,71	2,81	21,14	2,98	20,71	2,81	2
Paris - Amsterdam	23,78	5,73	20,71	2,81	20,71	2,81	21,14	2,98	20,71	2,81	2
Antwerp - Utrecht	9,71	3,27	7,86	1,51	7,86	1,51	8,29	1,86	7,86	1,51	2
Antwerp - Amsterdam	10,69	2,83	9,64	1,63	9,64	1,63	10,29	2,11	9,64	1,63	2
Utrecht - Amsterdam	No route for legal reasons										
Los Angeles - Burbank	No route										
Los Angeles - San Jose*	37,88	7,53	37,32	6,80	35,60	9,91	24,58	13,52	20,11	16,52	3
Los Angeles - San Francisco*	37,88	7,53	37,32	6,80	35,60	9,91	24,58	13,52	20,11	16,52	3
Burbank - San Jose*	37,88	7,53	37,32	6,80	35,60	9,91	24,58	13,52	20,11	16,52	3
Burbank - San Francisco*	37,88	7,53	37,32	6,80	35,60	9,91	24,58	13,52	20,11	16,52	3
San Jose - San Francisco	No route										

* Prices in dollars

Source: author

Other transportation methods price averages and standard deviations



Source: author

Reorganized data for every transportation method

	Low-Cost Bus					Normal Bus				
	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before
London - Paris	1,00	1,00	1,00	1,00	1,00	2,05	2,11	1,38	1,53	1,91
London - Lille	1,00	1,00	1,00	1,00	1,00	1,51	1,55	1,49	1,44	1,67
Lille - Paris	1,00	1,00	1,00	1,00	1,00	1,02	1,44	1,70	1,80	1,80
	1,00	1,00	1,00	1,00	1,00	1,53	1,70	1,52	1,59	1,79
Zurich - Mulhouse	1,00	1,00	1,00	1,00	1,00	1,38	2,57	2,17	2,57	2,57
Zurich - Belfort	1,00	1,00	1,00	1,00	1,00	3,00	2,59	2,39	2,56	2,56
Zurich - Paris	1,00	1,00	1,00	1,00	1,00	1,34	1,29	1,21	1,19	1,34
Basel - Mulhouse	1,00	1,00	1,00	1,00	1,00	1,80	1,71	1,71	1,80	1,80
Basel - Belfort	1,00	1,00	1,00	1,00	1,00	2,00	1,90	1,90	2,00	2,00
Basel - Paris	1,00	1,00	1,00	1,00	1,00	1,03	1,35	1,27	1,42	1,48
Mulhouse - Paris	1,00	1,00	1,00	1,00	1,00	1,37	1,65	1,52	1,68	1,68
Belfort - Paris	1,00	1,00	1,00	1,00	1,00					
	1,00	1,00	1,00	1,00	1,00	1,70	1,87	1,74	1,89	1,92
Washington - Baltimore	1,00	1,00	1,00	1,00	1,00	0,68	0,73	0,77	0,59	0,81
Washington - New York	1,00	1,00	1,00	1,00	1,00	0,85	0,93	1,04	0,88	1,02
Baltimore - New York	1,00	1,00	1,00	1,00	1,00	0,83	0,93	1,03	0,89	1,03
	1,00	1,00	1,00	1,00	1,00	0,78	0,87	0,95	0,78	0,95
Paris - Brussels	1,00	1,00	1,00	1,00	1,00	1,51	1,34	1,28	1,20	1,20
Paris - Antwerp	1,00	1,00	1,00	1,00	1,00	1,08	0,63	0,73	0,74	0,63
Paris - Amsterdam	1,00	1,00	1,00	1,00	1,00	1,21	1,03	1,13	1,03	1,00
Brussels - Amsterdam	1,00	1,00	1,00	1,00	1,00	1,63	2,04	2,15	2,43	2,49
Antwerp - Amsterdam	1,00	1,00	1,00	1,00	1,00	0,00	0,00	0,00	0,00	0,00
	1,00	1,00	1,00	1,00	1,00	1,09	1,00	1,06	1,08	1,06
Paris - Antwerp	1,00	1,00	1,00	1,00	1,00	1,10	0,62	0,72	0,73	0,62
Paris - Utrecht	1,00	1,00	1,00	1,00	1,00	1,07	0,86	0,91	0,80	0,80
Paris - Amsterdam	1,00	1,00	1,00	1,00	1,00	0,89	0,82	0,91	0,80	0,80
Antwerp - Utrecht	1,00	1,00	1,00	1,00	1,00	0,93	1,15	1,15	1,09	1,15
Antwerp - Amsterdam	1,00	1,00	1,00	1,00	1,00					
	1,00	1,00	1,00	1,00	1,00	1,00	0,86	0,92	0,86	0,84
Los Angeles - San Jose	1,00	1,00	1,00	1,00	1,00	0,67	0,74	0,77	0,77	0,95
Los Angeles - San Francisco	1,00	1,00	1,00	1,00	1,00	0,72	0,77	0,89	0,90	1,02
Burbank - San Jose	1,00	1,00	1,00	1,00	1,00	1,48	1,50	1,57	2,28	2,79
Burbank - San Francisco	1,00	1,00	1,00	1,00	1,00	1,72	1,74	1,83	2,64	3,23
	1,00	1,00	1,00	1,00	1,00	1,15	1,19	1,26	1,65	2,00

	Train					Plane				
	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before
London - Paris	8,39	7,31	5,45	4,10	3,34	2,00	1,73	1,75	1,74	1,67
London - Lille	4,32	3,56	2,82	3,06	2,45	7,70	6,39	8,35	7,47	6,41
Lille - Paris	3,58	4,62	4,82	4,57	4,80					
	5,43	5,16	4,36	3,91	3,53	4,85	4,06	5,05	4,61	4,04
Zurich - Mulhouse	1,83	3,61	3,02	3,57	3,57	11,04	23,24	18,08	22,67	19,86
Zurich - Belfort	3,84	3,35	3,11	3,33	3,33					
Zurich - Paris	2,48	2,99	2,43	2,31	2,52	2,31	2,79	2,67	2,50	1,96
Basel - Mulhouse	1,80	1,71	1,71	1,80	1,80					
Basel - Belfort	2,00	2,85	2,85	3,00	3,00					
Basel - Paris	2,25	2,73	2,40	2,30	1,81	4,58	4,13	4,08	4,13	2,40
Mulhouse - Paris	3,01	3,34	2,88	2,73	2,06	6,12	5,05	4,89	4,89	2,73
Belfort - Paris	2,81	3,95	3,45	3,33	1,97					
	2,50	3,07	2,73	2,80	2,51	6,01	8,80	7,43	8,55	6,74
Washington - Baltimore	0,13	0,13	0,13	0,13	0,18					
Washington - New York	3,68	3,29	2,99	2,79	3,24	6,16	5,73	5,40	5,77	6,57
Baltimore - New York	3,22	2,09	2,44	2,79	3,24	12,44	13,72	13,70	13,26	14,08
	2,34	1,84	1,85	1,90	2,22	9,30	9,73	9,55	9,52	10,32
Paris - Brussels	6,13	5,47	4,89	4,11	3,33	8,87	6,90	7,31	8,97	7,11
Paris - Antwerp	4,98	4,74	3,95	3,03	2,31	17,98	10,10	12,61	11,54	10,00
Paris - Amsterdam	7,42	6,56	5,21	4,79	3,46	6,26	3,21	3,09	2,78	2,27
Brussels - Amsterdam	1,84	2,29	2,42	2,74	2,80	12,20	13,44	10,96	14,93	13,51
Antwerp - Amsterdam	0,85	0,87	0,88	0,88	0,88					
	4,24	3,99	3,47	3,11	2,56	11,33	8,41	8,49	9,56	8,22
Paris - Antwerp	5,11	4,70	3,91	3,00	2,29	18,42	10,01	12,50	11,44	9,91
Paris - Utrecht	5,46	5,25	4,19	3,72	2,74					
Paris - Amsterdam	5,46	5,25	4,19	3,72	2,74	4,60	2,57	2,48	2,16	1,80
Antwerp - Utrecht	1,75	2,16	2,16	2,05	2,16					
Antwerp - Amsterdam	1,31	1,45	1,45	1,36	1,45					
	3,82	3,76	3,18	2,77	2,28	11,51	6,29	7,49	6,80	5,86
Los Angeles - San Jose	1,58	1,61	1,69	2,44	2,98	5,16	4,92	4,29	5,60	6,58
Los Angeles - San Francisco	1,80	1,82	1,91	2,77	3,38	3,49	2,47	1,77	2,45	3,01
Burbank - San Jose	1,56	1,58	1,66	2,40	2,93					
Burbank - San Francisco	1,77	1,80	1,88	2,73	3,33	4,76	3,70	2,15	3,13	3,03
	1,68	1,70	1,78	2,58	3,16	4,47	3,69	2,73	3,73	4,21

	Car					Car Sharing				
	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before
London - Paris	7,95	8,56	8,86	8,19	8,95	1,50	1,62	1,67	1,55	1,69
London - Lille	7,54	7,84	8,04	7,58	8,45	0,99	1,03	1,06	1,00	1,12
Lille - Paris	3,69	5,21	5,49	5,80	5,80	2,16	3,05	3,22	3,40	3,40
	6,39	7,20	7,46	7,19	7,73	1,55	1,90	1,98	1,98	2,07
Zurich - Mulhouse	0,98	2,14	1,81	2,14	2,14	0,85	1,86	1,57	1,86	1,86
Zurich - Belfort	2,33	2,18	2,18	2,33	2,33					
Zurich - Paris	2,12	2,65	2,47	2,44	2,76					
Basel - Mulhouse	0,80	0,76	0,76	0,80	0,80	0,60	0,57	0,57	0,60	0,60
Basel - Belfort	1,29	1,22	1,22	1,29	1,29	0,71	0,68	0,68	0,71	0,71
Basel - Paris	1,67	2,19	2,06	2,30	2,40	0,92	1,20	1,14	1,27	1,32
Mulhouse - Paris	2,23	2,68	2,47	2,73	2,73	1,15	1,38	1,28	1,41	1,41
Belfort - Paris	2,24	2,84	2,58	2,89	2,89	0,94	1,19	1,08	1,21	1,21
	1,71	2,08	1,95	2,12	2,17	0,86	1,15	1,05	1,18	1,19
Washington - Baltimore	0,20	0,20	0,20	0,20	0,27					
Washington - New York	0,84	0,90	1,04	1,20	1,39					
Baltimore - New York	0,68	0,73	0,85	0,97	1,12					
	0,58	0,61	0,70	0,79	0,93	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Paris - Brussels	3,68	4,52	4,59	4,59	4,59	1,75	2,15	2,18	2,18	2,18
Paris - Antwerp	2,72	2,81	2,81	2,81	2,81					
Paris - Amsterdam	4,29	4,53	4,51	4,57	4,57	1,89	1,99	1,98	2,01	2,01
Brussels - Amsterdam	3,06	3,82	4,04	4,57	4,67	1,33	1,65	1,75	1,98	2,02
Antwerp - Amsterdam	1,52	1,55	1,56	1,56	1,56	0,61	0,62	0,63	0,63	0,63
	3,05	3,44	3,50	3,62	3,64	1,39	1,60	1,63	1,70	1,71
Paris - Antwerp	2,79	2,79	2,79	2,79	2,79					
Paris - Utrecht	2,94	3,38	3,38	3,31	3,38					
Paris - Amsterdam	3,15	3,62	3,62	3,55	3,62	1,39	1,59	1,59	1,56	1,59
Antwerp - Utrecht	1,96	2,42	2,42	2,29	2,42	0,93	1,15	1,15	1,09	1,15
Antwerp - Amsterdam	2,34	2,59	2,59	2,43	2,59	0,94	1,04	1,04	0,97	1,04
	2,64	2,96	2,96	2,87	2,96	1,08	1,26	1,26	1,21	1,26
Los Angeles - San Jose	1,06	1,07	1,12	1,63	1,99					
Los Angeles - San Francisco	1,19	1,21	1,26	1,83	2,24					
Burbank - San Jose	1,06	1,07	1,12	1,63	1,99					
Burbank - San Francisco	1,06	1,07	1,12	1,63	1,99					
	1,09	1,11	1,16	1,68	2,05	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

	Low-Cost Bus					Normal Bus				
	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before
Megabus Europe	1,00	1,00	1,00	1,00	1,00	1,25	1,27	1,23	1,27	1,34
Flixbus	1,00	1,00	1,00	1,00	1,00	1,45	1,50	1,44	1,51	1,53
Megabus US	1,00	1,00	1,00	1,00	1,00	0,99	1,05	1,13	1,28	1,55
Total Average	1,00	1,00	1,00	1,00	1,00	1,26	1,31	1,29	1,38	1,47

	Train					Plane				
	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before
Megabus Europe	4,69	4,43	3,80	3,41	2,92	9,17	6,96	7,35	7,91	6,83
Flixbus	3,01	3,33	2,90	2,79	2,42	7,85	7,97	7,45	7,96	6,44
Megabus US	1,96	1,76	1,81	2,29	2,76	6,40	6,11	5,46	6,04	6,65
Total Average	3,23	3,25	2,89	2,84	2,65	7,89	7,06	6,83	7,38	6,64

	Car					Car Sharing				
	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before
Megabus Europe	4,31	4,85	4,99	4,96	5,17	1,46	1,73	1,78	1,82	1,86
Flixbus	2,06	2,42	2,34	2,41	2,47	0,94	1,18	1,12	1,19	1,21
Megabus US	0,87	0,89	0,96	1,30	1,57					
Total Average	2,41	2,73	2,75	2,86	3,02	1,17	1,42	1,41	1,46	1,50

Source: author

Data collection for modes of transport in Brazil and estimated low-cost prices

	Low-Cost Bus					Normal Bus				
	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before
Rio de Janeiro - Volta Redonda	35,02	33,86	34,21	32,17	30,02	44,26	44,26	44,26	44,26	44,26
Rio de Janeiro - São José dos Campos	46,92	45,37	45,84	43,10	40,22	59,30	59,30	59,30	59,30	59,30
Rio de Janeiro - São Paulo	72,00	69,61	70,34	66,13	61,71	90,99	90,99	90,99	90,99	90,99
Volta Redonda - São José dos Campos	39,70	38,39	38,79	36,47	34,03	50,18	50,18	50,18	50,18	50,18
Volta Redonda - São Paulo	53,65	51,88	52,42	49,28	45,99	67,81	67,81	67,81	67,81	67,81
São José dos Campos - São Paulo	22,15	21,42	21,64	20,35	18,99	28,00	28,00	28,00	28,00	28,00
Belo Horizonte - Varginha	80,63	77,95	78,77	74,06	69,11	101,90	101,90	101,90	101,90	101,90
Belo Horizonte - Pouso Alegre	100,41	97,08	98,10	92,23	86,06	126,90	126,90	126,90	126,90	126,90
Belo Horizonte - São Paulo	91,82	88,78	89,71	84,34	78,70	116,05	116,05	116,05	116,05	116,05
Varginha - Pouso Alegre	18,82	18,19	18,38	17,28	16,13	23,78	23,78	23,78	23,78	23,78
Varginha - São Paulo	47,73	46,15	46,63	43,84	40,91	60,32	60,32	60,32	60,32	60,32
Pouso Alegre - São Paulo	32,24	31,17	31,49	29,61	27,63	40,74	40,74	40,74	40,74	40,74
Relationship Coefficient	1,00	1,00	1,00	1,00	1,00	1,26	1,31	1,29	1,38	1,47

	Low-Cost Bus					Plane				
	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before
Rio de Janeiro - Volta Redonda										
Rio de Janeiro - São José dos Campos										
Rio de Janeiro - São Paulo	46,31	55,52	56,74	51,07	54,76	156,00	147,43	138,86	129,71	141,14
Volta Redonda - São José dos Campos										
Volta Redonda - São Paulo										
São José dos Campos - São Paulo										
Belo Horizonte - Varginha										
Belo Horizonte - Pouso Alegre										
Belo Horizonte - São Paulo	79,55	64,02	80,56	83,01	60,08	268,00	170,00	197,14	210,86	154,86
Varginha - Pouso Alegre										
Varginha - São Paulo										
Pouso Alegre - São Paulo										
Relationship Coefficient	1,00	1,00	1,00	1,00	1,00	3,37	2,66	2,45	2,54	2,58

	Low-Cost Bus					Car				
	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before
Rio de Janeiro - Volta Redonda	19,95	17,56	17,46	16,79	15,90	48,00	48,00	48,00	48,00	48,00
Rio de Janeiro - São José dos Campos	44,89	39,52	39,28	37,79	35,77	108,00	108,00	108,00	108,00	108,00
Rio de Janeiro - São Paulo	49,88	43,91	43,65	41,98	39,75	120,00	120,00	120,00	120,00	120,00
Volta Redonda - São José dos Campos	29,93	26,34	26,19	25,19	23,85	72,00	72,00	72,00	72,00	72,00
Volta Redonda - São Paulo	41,57	36,59	36,37	34,99	33,12	100,00	100,00	100,00	100,00	100,00
São José dos Campos - São Paulo	11,64	10,24	10,18	9,80	9,27	28,00	28,00	28,00	28,00	28,00
Belo Horizonte - Varginha	41,57	36,59	36,37	34,99	33,12	100,00	100,00	100,00	100,00	100,00
Belo Horizonte - Pouso Alegre	49,88	43,91	43,65	41,98	39,75	120,00	120,00	120,00	120,00	120,00
Belo Horizonte - São Paulo	74,82	65,86	65,47	62,98	59,62	180,00	180,00	180,00	180,00	180,00
Varginha - Pouso Alegre	14,96	13,17	13,09	12,60	11,92	36,00	36,00	36,00	36,00	36,00
Varginha - São Paulo	41,57	36,59	36,37	34,99	33,12	100,00	100,00	100,00	100,00	100,00
Pouso Alegre - São Paulo	26,60	23,42	23,28	22,39	21,20	64,00	64,00	64,00	64,00	64,00
Relationship Coefficient	1,00	1,00	1,00	1,00	1,00	2,41	2,73	2,75	2,86	3,02

	Low-Cost Bus					Car Sharing				
	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before	Price 1 day before	Price 1 week before	Price 2 weeks before	Price 4 weeks before	Price 8 weeks before
Rio de Janeiro - Volta Redonda										
Rio de Janeiro - São José dos Campos										
Rio de Janeiro - São Paulo	65,22	53,40	53,86	51,93	50,82	76,00	76,00	76,00	76,00	76,00
Volta Redonda - São José dos Campos										
Volta Redonda - São Paulo										
São José dos Campos - São Paulo										
Belo Horizonte - Varginha										
Belo Horizonte - Pouso Alegre										
Belo Horizonte - São Paulo										
Varginha - Pouso Alegre										
Varginha - São Paulo										
Pouso Alegre - São Paulo										
Relationship Coefficient	1,00	1,00	1,00	1,00	1,00	1,17	1,42	1,41	1,46	1,50

Source: author