



# Restructuring air passenger transport in Santa Catarina: from regional aviation to the hub system

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# Restructuring air passenger transport in Santa Catarina: from regional aviation to the hub system

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## Abstract

When analyzing the air traffic flow in the Brazilian state of Santa Catarina, it may be observed that there has been a change in its typology, especially between 2000 and 2005. This signifies that, in addition to the movement, regional routes with multiple stopovers were gradually replaced by longer routes, connected to the operational centers of the companies, which are located in important nodes of the urban network. Cities with less regional influence have stopped operating flights and the offer has become increasingly concentrated. There has also been an improvement in the variables that involve occupancy rates and available seats, amongst others, within the scope of corporate logistics. There has also been a notable effect from State logistics in transport planning via regulatory pacts (norms and taxes) and investments focused on restructuring aviation. Thus, the present work aims to understand how the process of territorial reconfiguration of commercial passenger aviation has taken place in Brazil through analyzing what has taken place in the state of Santa Catarina.

**Keywords:** Regional aviation. Air passenger transport. Territorial strategies. Commercial aviation. Territorial configuration.

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## Reestruturação do transporte aéreo de passageiros em Santa Catarina: da aviação regional para o sistema de *hub*

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### Resumo

Ao analisar os fluxos aéreos no estado de Santa Catarina, observamos uma mudança na sua tipologia, principalmente entre 2000 e 2005. Isso quer dizer que, além da movimentação, as rotas regionais com múltiplas escalas foram sendo substituídas aos poucos pelas mais longas, conectadas aos centros operacionais

das companhias, localizados em importantes nós da rede urbana. Cidades com menor influência regional deixaram de operar voos, e a oferta passou a ser cada vez mais concentrada. Há também o melhoramento de variáveis que envolvem taxas de ocupação e oferta de assentos, entre outras, no âmbito da logística corporativa. Destacam-se ainda o efeito da logística de Estado no planejamento de transportes via pactos normativos (normas e tributos) e os investimentos concentrados na reestruturação da aviação. Nesse sentido, este trabalho visa compreender o processo de reconfiguração territorial da aviação comercial de passageiros no Brasil por meio do que aconteceu em Santa Catarina.

**Palavras-chave:** Aviação regional. Transporte aéreo de passageiros. Estratégias territoriais. Aviação comercial. Configuração territorial.

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## Reestructuración del transporte aéreo de pasajeros en Santa Catarina: de la aviación regional al sistema hub

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### Resumen

Analizando los flujos del tráfico aéreo del estado de Santa Catarina, observamos que hay un cambio en su tipología. Esto significa que, además del movimiento, las rutas regionales con escalas múltiples fueron reemplazadas gradualmente por las más largas, conectadas a los centros operativos de las empresas, que se encuentran en nodos importantes de la red urbana. Las ciudades con menos influencia regional han dejado de operar vuelos y la oferta se ha concentrado cada vez más. También hay una mejora en las variables que involucran tasas de ocupación, disponibilidad de asientos, entre otros, dentro del alcance de la logística corporativa. También es destacable el papel de la logística del Estado en la planificación del transporte mediante pactos normativos (normas e impuestos) e inversiones concentradas en la reestructuración de la aviación. En este sentido, este trabajo tiene como objetivo comprender cómo se llevó a cabo el proceso de reconfiguración territorial de la aviación comercial de pasajeros en Brasil, concentrando los análisis en la escala espacial del estado de Santa Catarina como punto culminante en el análisis.

**Palabras clave:** Aviación regional. Transporte aéreo de pasajeros. Estrategias territoriales. Aviación comercial. Configuración territorial.

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## Introduction

Friedrich Ratzel (1914), one of the greatest precursors of modern geography and one of the first to deal with the problematic involving transportation (also considered as being responsible for the origin of circulation geography), emphasized that the relationship between the geographical environment and society through transport is of cause and effect. La Blache (1954), on the other hand, writing on the subject, affirmed that since the beginning, society has always demonstrated an interest and concern in solving the problem that involves circulation.

Transport has always played a fundamental role in the development of society, and its importance has been recognized by the establishing of networks and territorial integration in different parts of the planet. For Silva (1949, p. 69), “Circulation, - or the achievement of transport itself, - is the movement of economic masses through a set of ways (paths, roads, rivers, channels, etc.), using the various appropriate means (animals, vehicles, systems)”<sup>1</sup>. Indeed, circulation is configured as a substance of technical networks and flows, which therefore integrate systems of objects (spatial forms) and actions (social content) that generate quantitative and qualitative changes in societies.

Circulation has to be understood as a category that does not depend on the mode of production or the capacity of human abstraction, because, in the interaction between man and nature, this situation is ultimately achieved within society itself and, consequently, produces and reproduces geographic space. Therefore, any human action, including the production and configuration of space, is only possible with circulation and its essential attributes, i.e., transport, storage and logistics (Silveira, 2019). Space is a social totality full of complex determinations, intermediated by social and spatial interactions. According to Marx (1982, p. 7), “production is always appropriation of nature by an individual within and with the help of a definite social organisation”.<sup>2</sup>

Transport is a fundamental component of social construction, because when interacting, man is only able to do this in space, which dialectically transforms and is continuously transformed (Silveira, 2019). Men only produce their existence and, with that, space, through transportation (workforce, means of production, raw materials and products) and logistics.<sup>3</sup> Thus, transport and storage systems are general conditions of production necessary for human existence.<sup>4</sup>

However, at this moment, both corporate and State logistics are highlighted for our analysis, since this article addresses the territorial reorganization of the commercial air transport of passengers in the state of Santa Catarina. This is specifically because we understand that its spatial organization is the result of economic restructuring from within a global scope, which,

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1 This and all non-English citations hereafter have been translated by the authors.

2 N.B. - For direct citations, the English version was used of MARX, K. *A Contribution to the Critique of Political Economy*. On-Line Version: Marx.org 1993 (Preface, 1993), Marxists.org 1999. Available at: [https://www.marxists.org/archive/marx/works/download/Marx\\_Contribution\\_to\\_the\\_Critique\\_of\\_Political\\_Economy.pdf](https://www.marxists.org/archive/marx/works/download/Marx_Contribution_to_the_Critique_of_Political_Economy.pdf). Viewed on: November 5, 2020.

3 Our starting point is the idea that there are three basic types of logistics: (1) logistics as a category (broad and unrestricted when it comes to strategy, the planning and management of transport, storage and communications), (2) corporate logistics, which, to a large extent, is considered by companies and (3) State logistics, which is used as planning and territorial management (Silveira, 2019).

4 As production is a collective necessity, we address two of its important archetypes, namely, the transportation (to take, to go from one place to another) of people, goods and information and logistics as the strategy, planning and management of transport and storage (Silveira, 2019).

consequently, reached Brazil and passed through several filters of our national and regional socio-spatial formation (economic, public, business policies, etc.), in which the roles of the State and of corporations are included, both of which are active in territorial reconfiguration, and whose basic elements are integrated with fluidity and competitiveness.

Favoring a greater circulation of capital, the corporate environment seeks to improve its technical and organizational systems so as to increase its profitability. Corporate logistics aims to improve planning and management activities for companies. It is a strategy that implies fluidity, at the same time that it shortens the capital cycle and intensifies competitiveness (Silveira, 2011, 2019). Porter (1986, p. 16) indicated that the competitive strategy (here understood as logistic strategy) “is a combination of the ends (goals) for which the firm is striving and the means (policies) by which it is seeking to get there.”<sup>5</sup>

Currently, these are combined actions (or not) between State and corporate logistics that aim at a greater operation in certain locations, expressing spatial tones and greater territorial fluidity through different systems of objects and spatial interactions. The territory becomes more competitive and begins to participate in a war between places, between territories, and between local, regional, national and supranational scales (such as the European Union) and is, so to speak, attentive to models of neolocalism (Vainer, 2007) and neoterritorialism (Silveira, 2020). Thus, the intensification of the circulation of capital in certain spaces expresses a territorial competition that is at the mercy of selective variables of capital.

It was observed that, during the 2000s, the development of the airline industry in Santa Catarina underwent significant changes in its territorial configuration. A rupture occurred in the regional aviation of the state, in which the airline industry was reconfigured. In other words, there were actions derived from different logistical strategies, thereby providing the most recent organization: the centralization of flights, mainly towards the state of São Paulo, and a reduction of internal flight operations in Santa Catarina (Rodrigues, 2020).

Hence, our objective is to understand the change that has taken place in territorial strategies based on regional flights in order to consolidate the hub system, by analyzing its territorial impacts, particularly in Santa Catarina, between 2000 and 2019. However, it is of importance to be clear that the Brazilian State and the state of Santa Catarina have not been passive elements. In fact, they have operated through a series of economic and public policies (systems of norms, taxation and regulation) within the organization of fluidity and competitiveness between territories.

Thus, the aim of the article is to (1) address the preliminary elements of a transition from the regional aviation model to the hub and spoke system, during which we briefly discuss the processes involved in the deregulation of the industry as being a key point, and in the reconfiguration of the air traffic flows, and (2) take up the impact of this transition in Santa Catarina, i.e., the manner in which a territorial organization of air traffic flows was constituted between 2000 and 2019.

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5 N.B. - For direct citations, the English version was used of PORTER, M.E. *Competitive strategy: techniques for analyzing industries and competitors: with a new introduction*. New York: The Free Press, 1998, p. xxiv.

## Preliminary notes on the transition process from regional aviation to the hub system

Our notion began with the idea that the history of Brazilian aviation had eight cycles (Rodrigues, 2020): (1) pioneering commercial aviation, (2) the DC-3 era, (3) restructuring regional aviation, (4) the first oligopoly, (5) reinventing the regional market, (6) a rupture in regional aviation, (7) the second oligopoly and (8) the internationalization of the industry (the current cycle).

The first three moments were marked by strong State regulation, which intervened in the sector in different manners, adopting different strategies through normative pacts to encourage aviation within the country. At this moment of protectionist practices (such as the severe restrictions on operations by foreign companies in Brazil), a number of entities were created: (1) Department of Civil Aviation (DAC)<sup>6</sup>, (2) Brazilian Aerospace Company (Embraer), with the aim of restructuring regional aviation with the Bandeirante (E-110) airplane to replace the DC-3, (3) National Integration Network (RIN), (4) Regional Air Transport Integration System (Sitar), with subsidized flights, fares, government-controlled routes, and (5) Brazilian Airport Infrastructure Company (Infraero).

In the 1980s, during the emergence of neoliberalism, the global airline industry underwent a strong liberalization process, when corporate planning in the airline industry advanced more than that of the State, and when the low-cost low-fare concept appeared. The model appeared in the US during the 1970s with Southwest Airlines, and reached the European market in the 1990s, after a major flexibilization process in the sector. For Catharino Ferreira (2018, p. 60), it was North American neoliberalism that triggered the deregulation process of the US airline industry and, shortly after 1978, companies were “completely free to set their own airfares, which promoted unrelenting competition that led, after the 1990s, to the disappearance of iconic companies such as Pan Am, Eastern and TWA”.

In Brazil, the flexibilization process in civil aviation began with Ordinance No. 318/SLP/1989, when an airfare band system was implemented. Over the following years, especially during the governments of Fernando Collor and Fernando Henrique Cardoso, whose policies weakened the role of the State, the Federal Deregulation Program was created (Brazil, 1990). At that time, public sector services suffered constant attacks and were depreciated, and the government began adopting a policy of cutbacks within the public sector, such as, for example, privatizing the airline Vasp (Viação Aérea de São Paulo) and reducing investments in Infraero.

Within this scenario, with a devalued exchange rate, a reduction in investments and less State intervention, free competition began to intensify, one of the key points of the sector's flexibilization, with the “free market” as its justification; hence, the deregulation process was gradually being implemented in aviation. In 1991, the 5<sup>th</sup> National Civil Aviation Conference (Conac) recommended the adoption of measures such as bilateral agreements for international flights and incentives to expand the networks of national companies, amongst other actions.

Oliveira (2011) divided deregulation into three rounds, from 1992 to 1997, from 1998 to 2000 and from 2001 and 2006. Each of these periods was marked by severe measures that

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<sup>6</sup> The acronyms used throughout refer to the Portuguese terms.



affected commercial aviation. In the first, pricing policy became more flexible, in addition to closing the market reserve for maintaining regional aviation, as well as subsidies for Sitar, which led to the shutdown of several regional companies across the country.

After the second round, there was a relative drop in the price of airline tickets, a more intense use of promotional fares, and an expansion of codeshares and alliances between Brazilian and international airlines (Barat, 2012). Gradually, airlines ceased to be regional, and started to incorporate larger aircraft and follow longer routes.

Tam Airlines, which was previously a regional company of Sitar, began to acquire the airbus, increasing its offer of seats and the scale of its territorial operation, at the same time that Vasp was scrapped and privatized by the government and Transbrasil Airlines began its expansion onto the international market. Varig Airline, which previously had several federal government benefits, began to suffer the impact of new market models. Adverse scenarios implied a significant change in the sector. If companies were failing, others were growing and structuring themselves for a new segment.

In 2000, there were still a few routes connecting regional centers and state capitals, provided by the regional subsidiaries of the major operating airlines such as Interbrasil Star (Transbrasil), Rio Sul (Varig) and TAM Regional (TAM), which, for years, were responsible for maintaining the regional integration of the interior of Santa Catarina. Interbrasil made the connections between the main regional cities of the southern interior and provided the main routes (mainly between capitals) of Transbrasil; Rio Sul, from the time of its creation (via Sitar), took over the integration of the south and southeastern regions of the country; and TAM, in turn, operated between smaller centers in the interior with small aircraft, while promoting its more direct connections in the coastal strip with the southeast, using larger aircraft. One example of this would be the city of Florianópolis, which became more competitive in air transport in Santa Catarina, a situation that has remained until today. Also worthy of note in this context are the cities of Navegantes, Chapecó and Joinville, serving as stopovers for flights from the state of Rio Grande do Sul and even Florianópolis, which were generally going to São Paulo, Guarulhos, and, in a few cases, Curitiba or Rio de Janeiro.

At that time, many regional companies, some that were previously air taxis or even ran charter flights, began to operate regularly in passenger transport, such as Transportes Aéreos do Interior Paulista (Trip), Passaredo Linhas Aéreas, Total Linhas Aéreas, Oceanair, Brasil Rodo Aéreo (BRA), Meta Transportes Aéreos, Penta Transportes Aéreos, Abaeté Linhas Aéreas, Pantanal Linhas Aéreas, Presidente Transportes Aéreos, Puma Air, Air Minas, Team Transportes Aéreos and Gol Linhas Aéreas.

Because the companies that had control of national aviation were beginning to focus on their international expansion (TAM, Varig, Transbrasil and Vasp), the regional market was left unattended, which brought about a strong demand, and was provided for by the abovementioned airlines. Most of these companies remained in the sectorized regional aviation; others went beyond, such as Trip and Passaredo.

In 2001, aviation suffered major impacts. Gol Airlines realized that new markets were demanding the implementation of the low-cost low-fare model.<sup>7</sup> At the same time, crises started to take hold in other companies of the period. Indeed, Transbrasil terminated its operations; VASP, increasingly becoming more and more run down, began to dismantle its own aircraft in order to replace parts of those that were still in operation; Varig, with increasingly fewer government subsidies, was unable to maintain the market to fund its luxury services. In these crises, companies such as Oceanair, BRA and Webjet took advantage of the pent-up demand and expanded to specific markets.

With the Lula da Silva government (2003-2009), Brazil returned to economic growth and the market stabilized with the application of economic and social development policies. To such an extent that amongst the greatest milestones of this government were the Growth Acceleration Program (PAC) and the PPPs (public-private partnerships), which, therefore, increased investments. It was an economic policy model that extended investments made by both the Dilma Rousseff government (majorities) and private initiative (of a lesser magnitude), particularly with respect to airports. The National Civil Aviation Agency (Anac), for example, the authority which regulates civil aviation, replacing DAC, planned under the Fernando Henrique Cardoso government, acted to increase competition in the airline industry. However, Anac's performance was linked to the incentive brought by opening the airline market to international companies and to increasing foreign participation in Brazilian airlines.<sup>8</sup> This episode led the Dilma Rousseff government to create the Civil Aviation Secretariat of the Presidency of the Republic (SAC/PR), through Provisional Measure<sup>9</sup> No. 527, on March 18, 2011, with the objective of curbing Anac's neoliberalizing ideals.

Under the government of Michel Temer, after the 2016 coup, Provisional Measure No. 863, was created on December 13, 2018, which raised the limit of foreign participation in airlines from 20% to 100% and amended Law No. 7,565, of December 19, 1986 (Brazilian Aeronautical Code). The provisional measure approved by the Bolsonaro government (current Law no. 13,842, of June 17, 2019) once again demonstrated the process of opening national capital to foreigners, in addition to maintaining baggage allowance charges (an article vetoed by the president), with the justification that such action attracts new foreign investments, benefiting international companies. Therefore, actions were applied that, instead of restructuring regional aviation and encouraging the creation of new national companies, allowed capital and national control over the sector's activities to become weakened.

It is important to highlight the role of the regulatory agencies, which should mediate the issue of providing services to society. Undoubtedly, the airline industry is extremely dynamic and requires more and more regulatory improvements. So much so that Article 8 of the law that created Anac emphasizes that it falls upon the entity:

7 Although Gol Airlines initially attempted to implement this model, the Brazilian airline that came closest was Webjet Airlines, which was acquired by Gol in 2012. It should be noted that Brazilian companies implemented the hybrid model, i.e., a mix of low cost with full service (Ferreira, 2018).

8 Charter flights: These are temporary flights, generally brought in as extra operations according to demand or high season charters.

9 A provisional measure (*medida provisória* in Portuguese) is a legal act in Brazil through which the President may enact laws effective for a maximum of 60 days (it may be renewed only once for the same period), without approval by the National Congress.



[...] to adopt the necessary measures to serve the public interest and to develop and promote the country's civil aviation, aeronautical and airport infrastructure, acting independently, legally, impersonally and publicly (Brasil, 2005).

However, it has been observed that the public machine has been equipped in favor of private interests. This is a direct reflection of the policies implemented by Fernando Henrique Cardoso to squeeze the state and shield private initiative, by which the major companies of the sector have come to benefit, even forming oligopolies, from the "actions" of the autarchies. On the other hand, instead of a balanced environment, there has been a lack of harmony between the services provided to the population and the regulatory normative pacts consistent with the sector's reality.

Nevertheless, Anac's omission is explicit when the practices are observed of predatory competition in the airline industry. Hitherto, users could count on services from several different companies. When capital is centralized, access to a differentiated service becomes increasingly difficult. Meanwhile, barriers were set up to prevent new companies from operating. Amongst such actions, dumping may be highlighted, practiced by those active on the market. This is without taking into account the negligence of the Administrative Council for Economic Defense (Cade), which enabled certain actions to occur, such as mergers, acquisitions and associations, through which it favored a greater concentration of business capital in the Brazilian airline industry and especially the insertion of foreign capital into the country.

The harmony of the airline industry in Brazil depends on greater State intervention through regulation of the sector (via normative pacts), which will effectively benefit both the companies and society. The practice of flexibilization within the sector, instead of attracting new investments, has brought greater a concentration, largely because it privileges foreign capital to the detriment of incentives for national capital, which could be promoted by the National Development and Social Bank (BNDES).

Despite these losses, it may be observed that the growth curve of passenger traffic in Brazil has had two major peaks: between 2003 and 2005 and between 2009 and 2011 (Graph 1). These were linked both to the country's economic strengthening during this period and to the adoption of differentiated logistical strategies by the State and the airline companies.

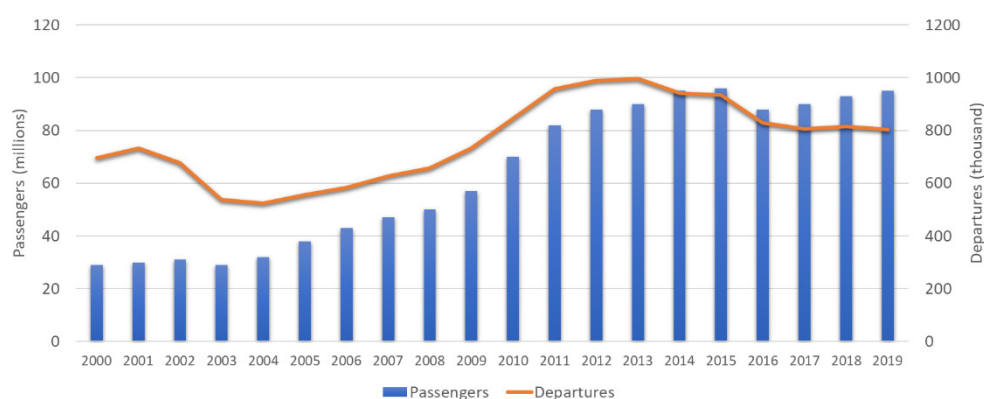
The number of departures suffered a reduction, while passenger traffic increased. The huge variation in the Brazilian commercial fleet was the increase in the number of aircraft and the capacity per flight. In view of the operational limitations of Brazil's airports (the reality of regional infrastructures), aircraft with a capacity close to 50 passengers (mainly turboprop) were widely accepted within the market due to their cost-benefit ratio, as well as operating in critical locations. Regional jets, on the other hand, received a tremendous boost on the global market with Embraer E-Jets, mainly because they are medium-range aircraft, capable of operating on restricted runways and in medium-density markets.

Of the standard aircraft of commercial aviation, the Airbus A320 family and the Boeing 737 were the most prominent. Although they had been operating in Brazil through other variations, as of 2005, there was an increase the new models of the industry. The change that took place during this year demonstrates the insertion of new companies, such as Webjet,

into high density markets (mainly between capitals) and Trip, into the regional segment. The distribution of aircraft according to the number of seats reveals that, over the years, more passengers were carried on fewer flights, which displays an improvement in logistical strategies, including the technical improvement of aircraft and ASK variables (available seat kilometers) and RPK (revenue passenger kilometers).

In addition to expanding the offer of seats, aircraft were able to rely on more computerized, precise systems, especially with the technological advancement of airworthiness. The inclusion of onboard services such as live television, internet and digital platforms became a “mandatory practice”, stimulating and intensifying competition between companies as a differential.

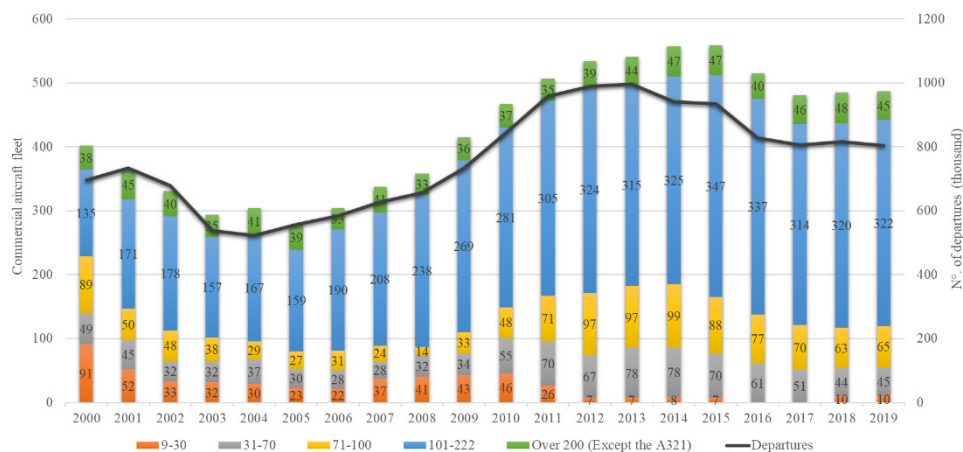
**Graph 1 – Passenger traffic and domestic departures in Brazil (2000-2019)**



Source: Anac (2020).

Produced by the authors (2020).

**Graph 2 – Commercial aircraft fleet by offer of seats and departures in Brazil (2000-2019)**



Source: Anac (2020).

Produced by the authors (2020).

The hub system consists of centralizing operations at a given airport. Since there is a wide range of flights directed towards one place, from there, the connections that facilitate the movement to other destinations in the network are expanded in less time. Generally, these are airports with appropriate infrastructure to receive operations of different types, including

the possibility of connections with international flights. In Brazil, the following airports may be highlighted, which have adopted this hub practice: Campinas/SP, Guarulhos/SP, Rio de Janeiro (Galeão)/RJ, São Paulo/SP, Recife/PE, Fortaleza/CE and Brasília/DF.

Analyzing the hub structures in Brazil is essential in order to understand the rupture process that took place in regional aviation. Before the effective implementation of the hub system, the characterization of regional flights was based on a route model with multiple stopovers. In other words, an aircraft left one airport in the interior, made one or two stopovers (or even more), and then went on to a larger airport. This worked on a system of “airlines” based on stopovers at the various national airports, a model, in fact, similar to that adopted in interstate road passenger transport.

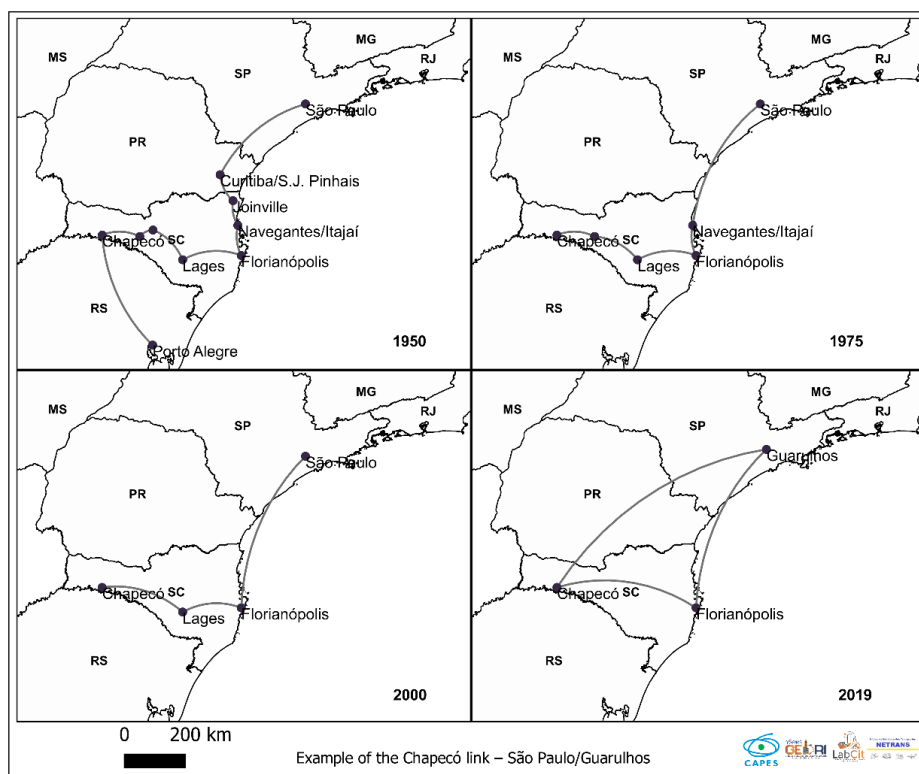
In certain regions, the multiple stopover system connected two low-density locations and then proceeded to the destination, generating a considerable number of empty seats on the intermediate legs. Therefore, there was a higher cost between the origin and the first stopover, an element that was improved with logistical strategies. The act of reducing the offer of multiple stopovers and concentrating the flights meant that the aircraft could offer the same number of seats, but on direct, non-stop flights. As the occupancy rate increased, the fares decreased, thereby attracting new markets.

It may be observed in Figure 1 how these logistical techniques were developed and how this led to a territorial reconfiguration in aviation. The newer the aircraft, the better the performance over a longer distance, considering the five stages of the flight (take-off-climb-cruise-descent-landing). With the development of road traffic and the strengthening of the regional centrality of some cities in nodes of the urban network, there was a greater concentration of flights.

The example in Figure 1 illustrates some periods in the airline industry in Chapecó/SC. In addition to demonstrating the transition, it also highlights a greater connection between Santa Catarina and the country’s productive and financial center, resulting from the formation of the socio-spatial process. The multiple-stopover routes served the interconnections between the regional centers with short flights, which was necessary given the poor conditions of the roads and the circulation of information/cargo/people amongst these centers and the connection with the capital cities. It is similarly necessary to take into account the issue of equipment, i.e., the operational capacity of the aircraft and the reality of the airport infrastructure at that time. This advance, in approximately 20 years, clarified the cycles of the airline industry and also the insertion of new logistical strategies in Brazilian aviation, for example: (1) in 1955, the era of the DC-3, (2) in 1975, the Bandeirantes aircraft promoted by Sitar, (3) in 1995, the dismantling of regional aviation and the massive arrival of jets and, (4) from 2005, the implementation of the hub system and the greater centralization of corporate capital.

The removal of a stopover provides a company with a gain of at least 40 minutes, considering the time the aircraft climbs and descends, plus the period it has to stay on the ground. Thus, after adjusting the networks, the aircraft could take on more flights and reduce downtime on the ground. Figure 2 demonstrates the improvement of this action when comparing the route performed in a single day by a regional aircraft (according to the current period), as well as the number of passengers transported per flight, the multiple stopover model and the adoption of the hub system.

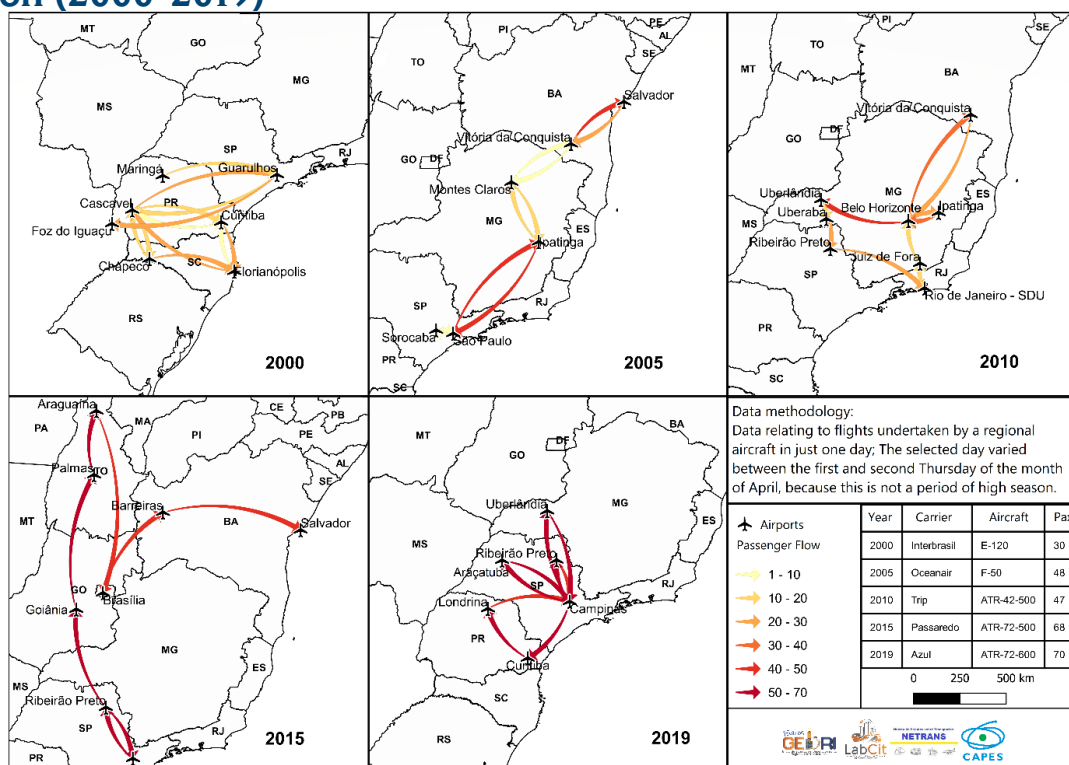
**Figure 1 – The transition from multiple stopover routes to hub and spoke routes**



Source: Rodrigues (2020).

Produced by the authors (2020).

**Figure 2 – Evolution of the typology of aircraft flows in regional aviation (2000-2019)**



Source: Anac (2020).

Produced by the authors (2020).

Improvement in the ASK and the RPK indicates a reduction in empty seats, thereby bringing about a considerable gain in the occupancy rate (Table 1). One of the justifications was the adoption of the hub system, which ultimately reduced the multiple stopover routes and afterwards the connection between the regional centers with a lower demand. The development of the aeronautics industry signified that aircraft were carrying more and had greater autonomy, which affected the cost-benefit of short flights, extinguishing them. On the other hand, the centralization of capital became more evident in the internationalization<sup>10</sup> of companies. This concentration gave rise to the formation of the second oligopoly: Gol acquired Webjet, Tam merged with Lan, Passaredo acquired Map, Trip joined Azul (forming the largest regional in South America) and, recently, Azul acquired Two Flex.

**Table 1 – Data relating to the basic stage of an aircraft on a business day<sup>11</sup>**

Year	Carrier	Model	Km flown	Passengers carried	Flights	Seats offered	Occupancy rate	ASK
2000	Interbrasil	E-120	5,986	214	13	390	45.12%	0.035
2005	Oceanair	F-50	3,566	211	10	480	43.96%	0.59
2010	Trip	ATR-42-500	3,750	293	11	517	56.67%	0.078
2015	Passaredo	ATR-72-500	4,780	473	9	612	77.29%	0.098
2019	Azul	ATR-72-600	3,249	501	9	630	91.90%	0.154

Source: Anac (2020).

Produced by the authors (2020).

When there is a threat of an entrant in the market, the company with the largest capital tends to eliminate it through barriers. Porter (1986) indicated that there are several ways to retaliate against a competitor, such as product differentiation, the need for capital and scale of action. A few examples prove the point: (1) Webjet, with the low-cost model, began competing directly with Gol, (2) Trip and Azul vied for the same (regional) market, (3) Two Flex had a type of unique regional operation in Brazil, which expanded Azul's scale of operations, and (4) when acquiring Map, Passaredo not only sought the allocation of slots at the São Paulo airport, but also an expansion of the regional network.

It is thus that Santa Catarina emerges as a case for investigation, since, in the early 2000s, cities such as Videira, Joaçaba and Concórdia had regular flights and, with the process of logistical improvement of the airline industry through new competitive strategies, ceased having flights, at the same time that centrality took place in the air traffic flows of the state. It should be remembered that until a certain moment the concentration of investments by the state government in consolidated airports occurred, including the construction and operation of new airport infrastructures, such as Jaguaruna and Correia Pinto. The distinguishable regional

<sup>10</sup> Not only the insertion of foreign capital, but also the adoption of methods of territorial actions that already existed in other international companies, in addition to the participation of Brazilian companies in global alliances and codeshares (shared flights), supplying the offer of destinations.

<sup>11</sup> The date chosen to illustrate these data varies between the first and second Thursday of April of the respective year. We emphasize that the referred month is not considered a high season period. In addition, account was taken of the absence of holidays, which would require a greater offer of flights.



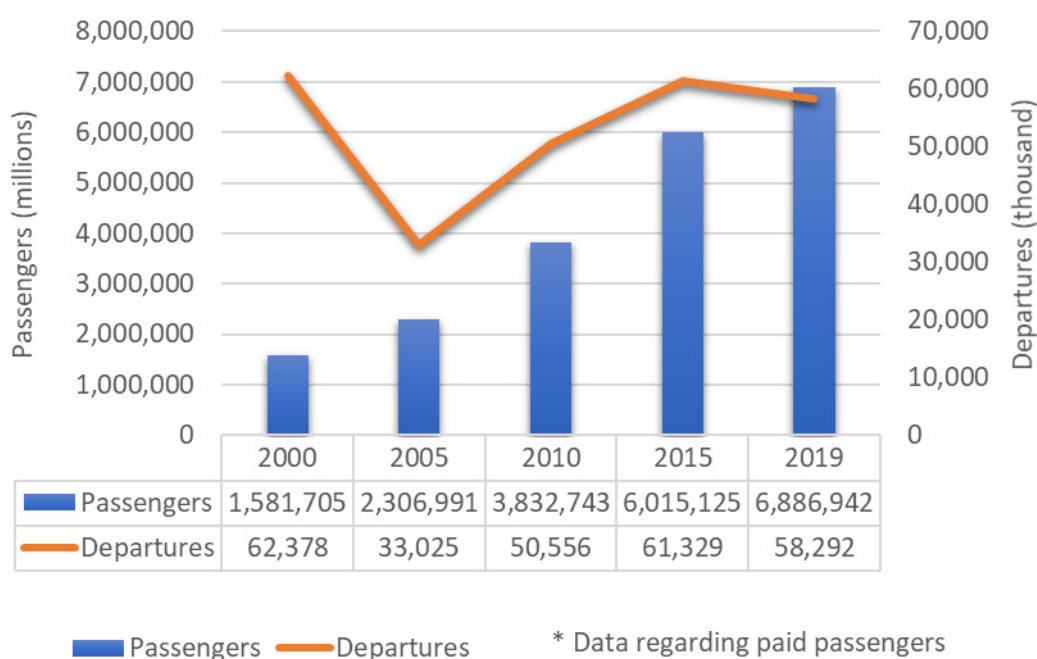
differentiations in the state contributed to a territorial reconfiguration of the urban network, intensified by the regional centralities of some of the nodes in the network, attracting new services, including air services.

### Territorial impacts in regional aviation in Santa Catarina

There was significant backing for the adoption of different logistical strategies between the corporate environment and the State for a considerable change in the typology of passenger flows in Santa Catarina. Therefore, why have airports stopped operating scheduled passenger flights? Why have flights become increasingly more centralized?

At first glance, there was a clear growth in passenger traffic in Santa Catarina (Graph 3). However, there was a notable reduction in the number of departures. The variation, which in 2000 was approximately 25 passengers per flight, in 2005 changed to 70; in 2010 to 76; in 2015 to 98; and in 2019 to 118. This corroborates not only what is illustrated in Graph 2 (an increase in the offer of seats per flight), but also the regional centrality that some cities in Santa Catarina acquired with the deconcentration of companies, especially the industrial cities, in addition to others elements of the state's socio-spatial formation.

**Graph 3 – Passenger traffic in Santa Catarina (2000-2019)**



Source: Anac (2020).

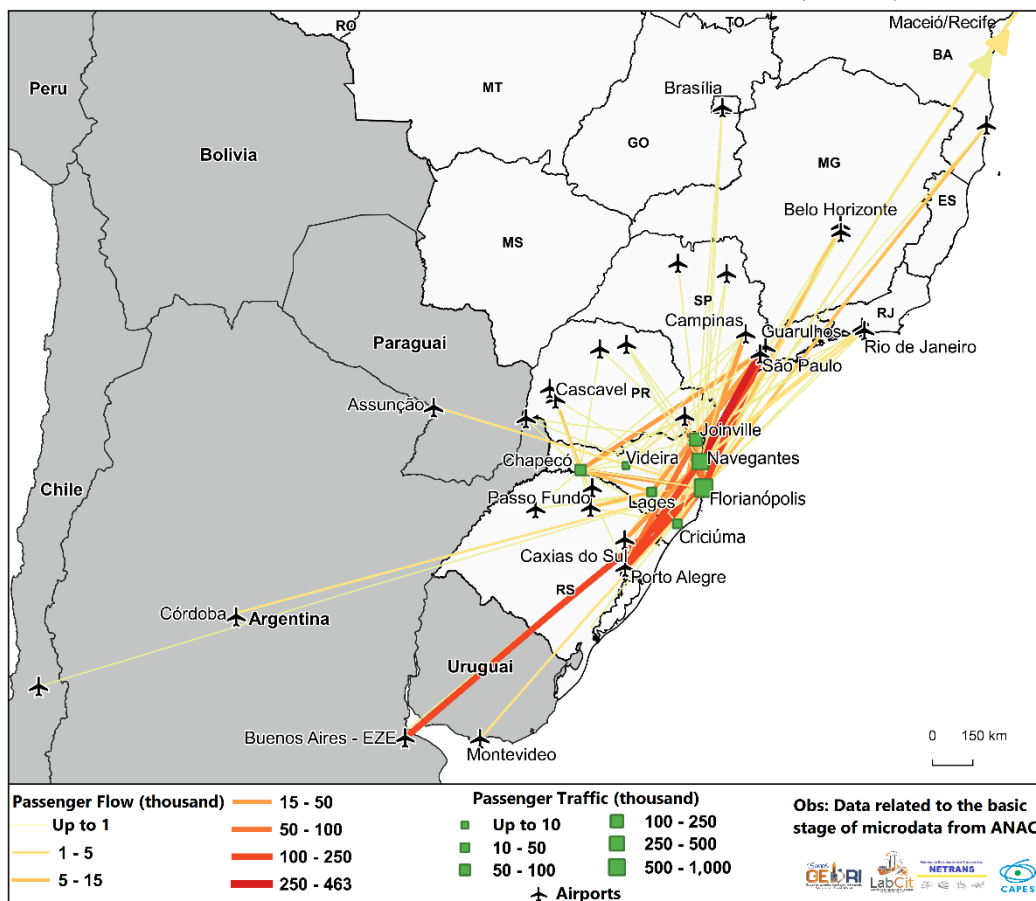
Produced by the authors (2020).

Most of the passenger traffic goes beyond the state's territorial limits. It should be noted that the region of influence of some cities in Santa Catarina, such as Chapecó/SC, goes beyond the limit of the state federative unit and that important cities in Santa Catarina have also become polarized by Porto Alegre/RS, Curitiba/PR and São Paulo/SP (Mamigonian, 2011). However, air flows not only express the regional centrality of some cities, but also a way for airlines to operate.



In 2000, flights were more widely distributed across the state, including the Vale do Rio do Peixe. The flows illustrate that the traffic on most routes in this region was less than 1,000 passengers. Furthermore, the connection is evident between regional cities with flights connecting Chapecó/SC to Passo Fundo/RS, Cascavel/PR, Lages/SC, Pato Branco/PR, Videira/SC, Santo Ângelo/RS and Foz do Iguaçu/PR; Lages/SC to Passo Fundo/RS; Criciúma/SC to Joinville/SC; amongst other connections with a lesser influence. There were many connections between cities within the state itself, which actually consisted in a stopover of a route, and, consecutively, its continuation on to a larger airport, mainly São Paulo/SP and Guarulhos/SP, such as: Chapecó/SC-Florianópolis/SC; Chapecó/SC-Lages/SC; Criciúma/SC-Joinville/SC; Florianópolis/SC-Navegantes/SC; Navegantes/SC-Joinville/SC; Criciúma/SC-Florianópolis/SC; Chapecó/SC-Cascavel/PR; Passo Fundo/RS-Lages/RS; Caxias do Sul/RS-Navegantes/SC; and even Florianópolis/SC-Curitiba/PR.

**Figure 3 – Airline connections from Santa Catarina (2000)**



Source: Anac (2020).

Produced by the authors (2020).

Between 2000 and 2005, there was a decrease of more than 1/3 in the circulation of passengers within the state, as well as the suspension of flights in Lages and a considerable reduction at the airports in Criciúma and Videira. However, there was a greater concentration at other airports and prominent cities within the region, such as Chapecó, Joinville, Navegantes and Florianópolis.

It may be confirmed that there is an *airport void*<sup>12</sup> between the coastal strip and the west of the state, where a greater movement is observed on the Chapecó/SC-Florianópolis/SC route. In this segment alone, the traffic, which in 2000 was 15,499 passengers spread across 852 flights, in 2005 jumped to 59,671 in 703 flights (an increase from 18 to 84 passengers per flight) (Table 2). This is due not only to the extinction of regional and multiple stopover flights, but also to the use of aircraft with greater capacities, as a result of adopting new corporate logistical strategies. However, other airports stopped receiving regular flights because their infrastructure was inadequate to receive this type of aircraft, and also due to a drop in the regional influence of some cities in Santa Catarina.

The deregulation process in the sector caused large companies to significantly change their operating strategies. Rio Sul, which was previously the operator for most of these regional flights, gradually replaced its regional aircraft with jets, which would already be a limiting factor. Moreover, the crisis experienced by the Varig Group with the flexibilization of the sector caused Rio Sul to become extinct.

**Table 2 – Paying passenger traffic within the state of Santa Catarina**

Year	2000	2005	2010	2015	2019
<b>Passengers</b>	273,178	83,173	235,479	296,527	174,245
<b>Departures</b>	9,431	1,170	3,824	2,703	1,444
<b>Passengers per flight</b>	28.9	71	61.5	109.7	120.6

Source: Anac (2020).

Produced by Lucas Azeredo Rodrigues.

As mentioned above, adopting the hub system enabled a greater concentration of flights at São Paulo and Guarulhos airports. However, the use of Brasília intensified, the infrastructure of what now connects all Brazilian capitals, although the Rio-São Paulo axis has the main international airports of the country.

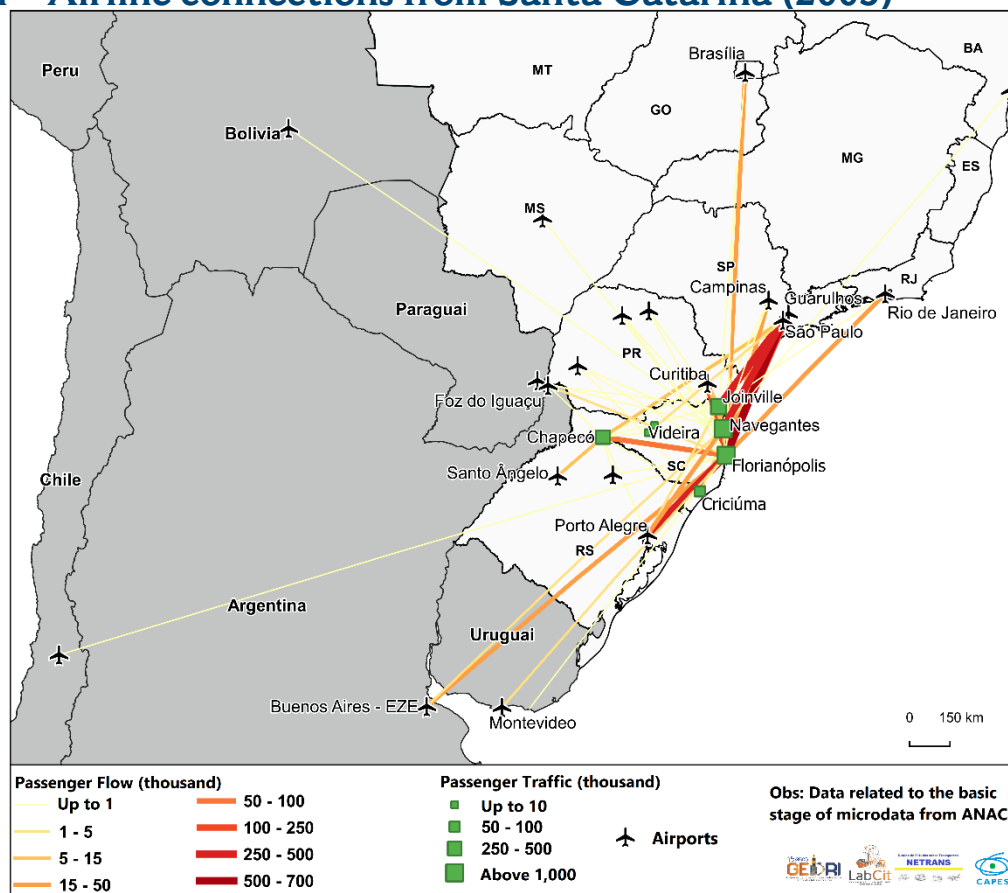
The opening of capital from companies originating from small commercial production in Santa Catarina, especially family businesses, led to intensified relations beyond the state. São Paulo, as the financial center for several companies, began to have a greater flow, especially that of the “hit-and-move on”<sup>13</sup>, a hallmark of Santa Catarina’s airports. In other words, due to having airports with lower overnight rates, many companies preferred to operate flights to Santa Catarina at the end of the night, so that their aircraft would stay overnight in the state and return to the hub early the next morning. This is evident in airports such as Chapecó/SC, Joinville/SC, Navegantes/SC and Criciúma/SC (currently Jaguaruna/SC), as these airports are mostly used by passengers doing business in the region and have a demand for other schedules. However, having a flight with a departure in the early hours of the morning and a return at night enables the user to perform their tasks and return on the same day, thereby reducing costs. In addition, direct connection to the hub provides a greater offer of destinations, in a shorter time scale than flights with multiple stopovers (Figure 4).<sup>14</sup>

12 This is understood herein as a portion of the territory in which there are no airports with scheduled flights that meet the passenger demand through commercial aviation.

13 Similar to a day-return ticket.

14 Florianópolis, for example, from the end of the 1990s, through heavy marketing (under the municipal administration of Ângela Amin), was “sold” as the best capital city in which to live and, with that, began to receive people who moved from São Paulo and Rio de Janeiro. Thus, a greater flow of people was established between Florianópolis-São Paulo and Florianópolis-Rio, later extending to Florianópolis-Campinas, with flights of approximately one hour, i.e., less time than that spent in many of the traffic congestions in the big Brazilian metropolises.

**Figure 4 – Airline connections from Santa Catarina (2005)**



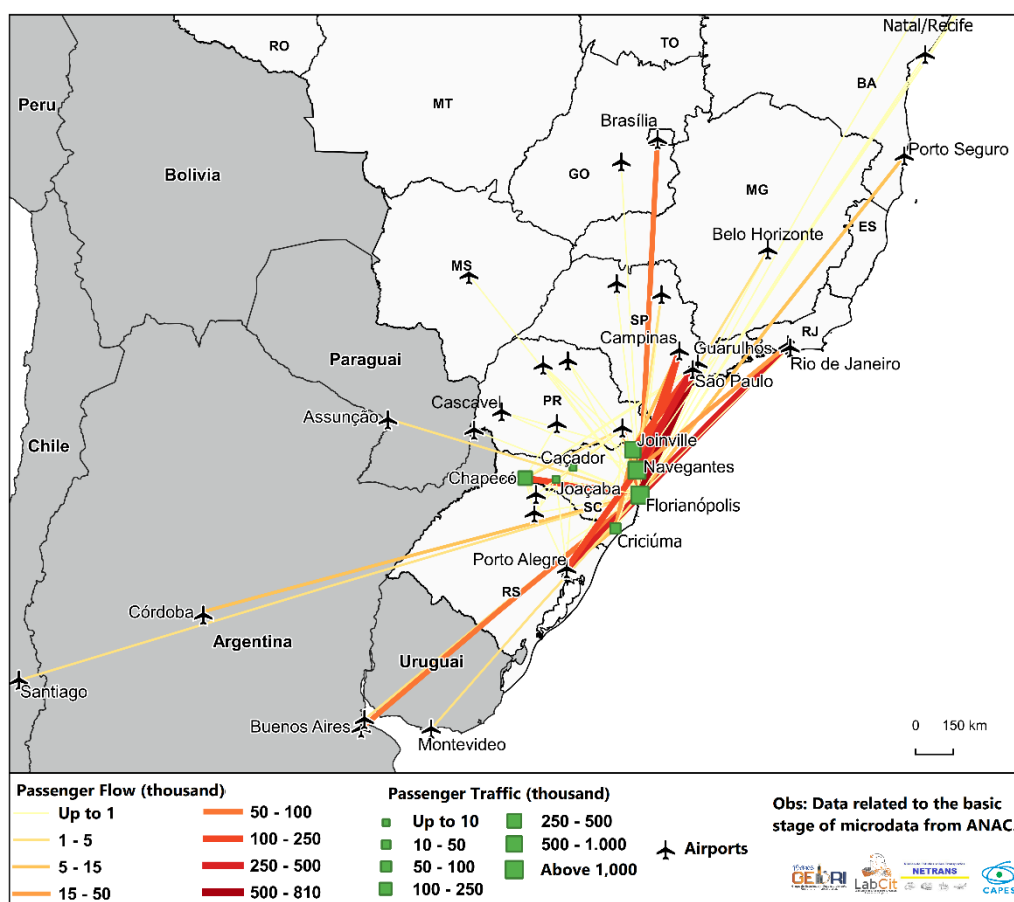
Source: Anac (2020).

Produced by the authors (2020).

In 2010, direct connections between Rio de Janeiro/RJ and airports in the state of São Paulo intensified, especially routes to Campinas/SP. The insertion of Azul Airlines into the Brazilian market proposed a new type of market, taking advantage of the decreased demands, and decongested airports, and including the restructuring of regional aviation connected by the hub system, which was previously conducted through multiple-stopover routes. The saturation of the dense markets (Guarulhos/SP and São Paulo/SP) and the limitations of operations made the companies search for other methods of territorial action.

During this period, Santa Catarina had flights with NHT Airlines. With its headquarters in Rio Grande do Sul, this regional company connected the main interior cities of southern Brazil. Using small aircraft with a capacity for 19 passengers, it was possible to operate in airports restricted to companies operating in the market, such as Joaçaba/SC and Caçador/SC. It should be noted that NHT connected important regional centralities, such as Passo Fundo/RS, Santa Maria/RS, Guarapuava/PR, Chapecó/SC and Francisco Beltrão/PR, amongst others. However, the use of multiple-stopover routes generated a large number of empty seats, with relative increases in operational costs, thereby triggering the suspension of its operations in 2013.

**Figure 5 – Airline connections from Santa Catarina (2010)**



Source: Anac (2020).

Produced by the authors (2020).

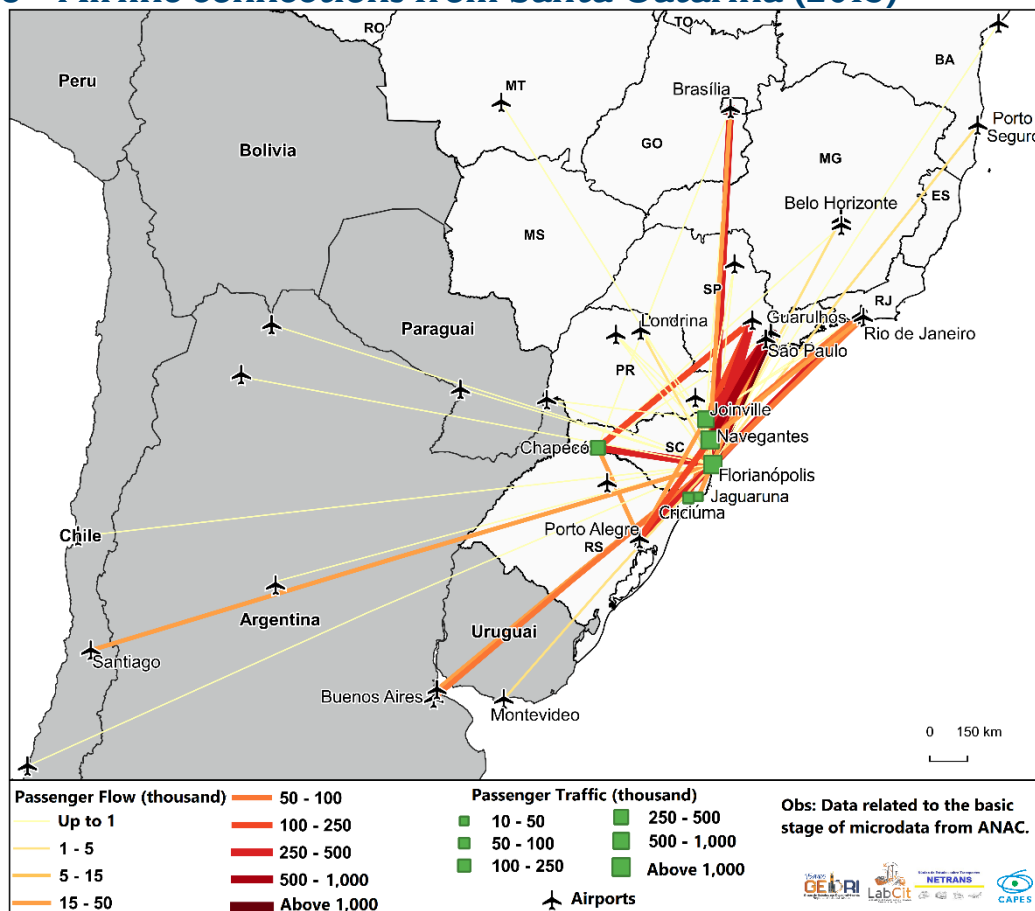
After 2010, national aviation experienced an intense centralization of capital and the formation of a second oligopoly (Rodrigues, 2020). Competitiveness amongst airlines led to a greater concentration in commercial aviation, and, consecutively, in operations.

For the bigger companies, the fact of having a large area of activity and a concentration of activities in certain niche markets increased the need to formalize various types of agreements aimed at expanding their capital. In other words, the fact of having a greater presence at different points provided the company with an economy of scale, with which it was possible to increase its capital reproduction. These were competitive strategies that intensified competition through defensive or offensive actions in order to confront competitive forces and achieve their goals (Porter, 1986). In the airline industry, this was notorious when it came to creating alliances, code-shares, acquisitions and associations, amongst other means in order to extend the performance of business capital.

The creation of new flows came from the more direct connections with the hubs. The decrease in costs and the use of larger aircraft meant that few airports were able to receive new flights, such as Criciúma/SC, whose operations, as of 2016, were transferred to the airport at Jaguaruna/SC, which was able to receive larger aircraft and contemplate the operational possibility for all companies active on the Brazilian market. Another strategy adopted by the State was to construct the Correia Pinto/SC airport, with the aim of replacing the airport in Lages/SC (limited to receiving turboprops for up to 70 passengers).

In the flows of 2015, it is possible to observe a greater concentration of flights towards São Paulo/SP, Rio de Janeiro/RJ and Porto Alegre/RS and a significant decrease in flights within the state, highlighting, however, a greater flow on the connection between Chapecó/SC-Florianópolis/SC.

**Figure 6 – Airline connections from Santa Catarina (2015)**



Source: Anac (2020).

Produced by the authors (2020).

Faced with the oligopoly scenario formed by Azul, Gol and Latam (although Passaredo had a relatively small participation), the airline industry became increasingly concentrated. The practice of dumping and predatory competition increased competition amongst the airlines, which constantly sought new logistical strategies.

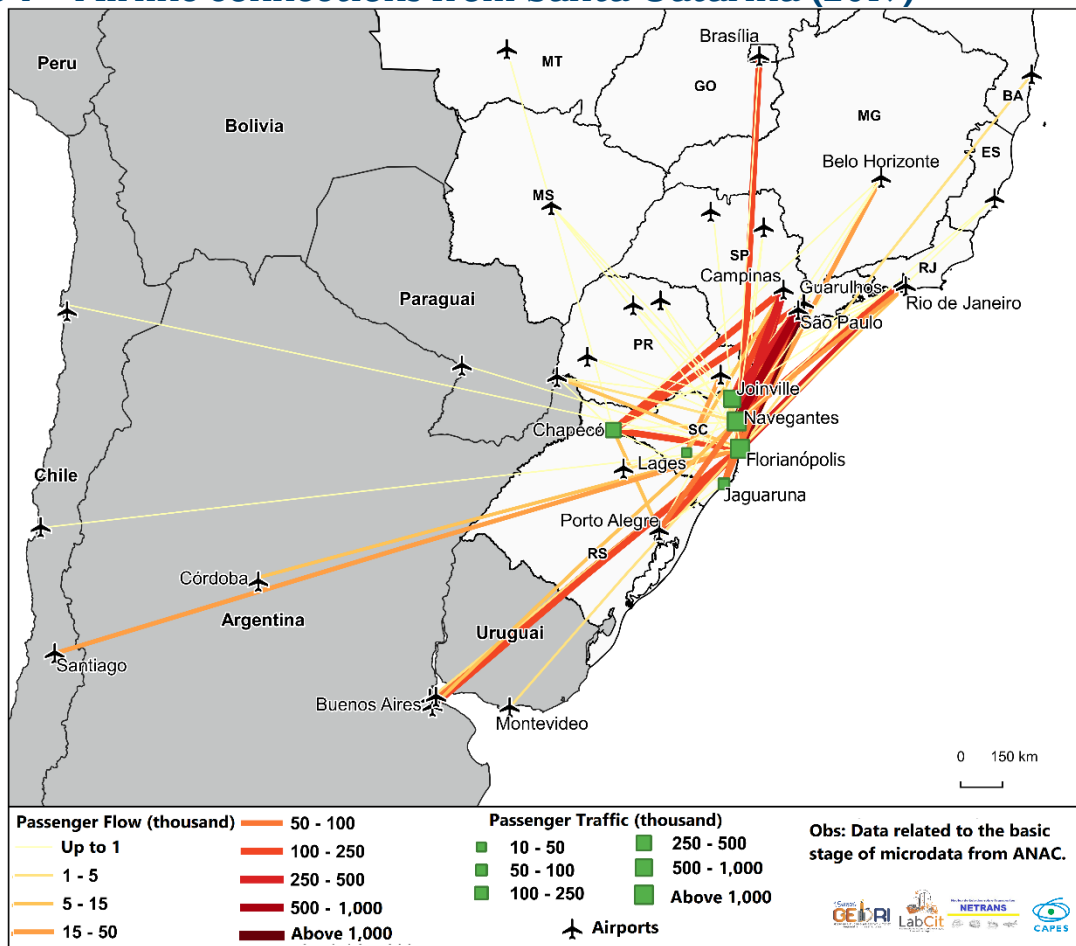
In view of the troubled scenario in 2016, culminating in the impeachment of President Dilma Rousseff, neoliberalism was resumed during the Temer government, leading to a disproportionate downsizing of public spending, with negative effects on aviation, including: (1) the extinction of the Ministry of Civil Aviation, (2) the possibility of increasing the insertion of foreign capital into airport concessions and (3) a drastic reduction in investments in the National Airway Plan, which affected regional airports, including those in Santa Catarina.

There is no doubt that these events had a negative impact on aviation, resulting, for example, in the bankruptcy of Avianca Airlines in 2019. This directly affected operations at the state's airports, mainly in Navegantes/SC and Chapecó/SC, as was evidenced in field



work. Although the other companies captured part of the remaining market, there was still a pent-up demand, including for more regional flights. With the entry of Two Flex onto an extremely restricted regional market and its significant expansion throughout the country as a whole, the company began to operate in limited airports (as in Paraná), which favored the creation of a new regional market. However, in early 2020, Azul announced the purchase of this company, which unified its operations with “Azul Conecta”. Azul’s penetration into these markets was a step ahead of the other companies that only operated large jets (Gol and Latam).

**Figure 7 – Airline connections from Santa Catarina (2019)**



Source: Anac (2020).

Produced by the authors (2020).

The expansion of international routes connecting Florianópolis/SC to neighboring countries, particularly to Buenos Aires/ARG and Santiago/CHI, highlights the power of tourism in the coastal region of the state. The creation of regular routes beyond the summer period demonstrates that the sector is fundamental for the economy of Santa Catarina.

The market left by Avianca, the strengthening of Azul and the regional expansion of Gol and Latam illustrated signs of recovery within the sector, even in the face of the political instability established during the Bolsonaro government, mainly with the opening of 100% of foreign capital into airlines, which expanded the possibility of the sector’s internationalization. This action, following the systematization proposed in Rodrigues (2020), will probably be



accelerated by the pandemic of the novel coronavirus, which will intensify the insertion of international capital through the omission of the federal government.

Another plausible crucial point of debate is the issue of the state's airport infrastructure, which are also factors that integrate the recent configuration of air traffic flows. From the existing structure, it would appear possible to define which aircraft and airlines would be able to operate. Until the first half of 2020, of the main airports in Santa Catarina, only Florianópolis (Floripa Airport) was 100% given over to the private sector, in this case, to Swiss Zurich Airports. Of those under the control of Infraero, Joinville and Navegantes should be given over to the private initiative in the airport auctions of the Southern Block, scheduled for 2020. The airports of Lages, Criciúma/Forquilha and Jaguaruna are under private administration: the first by Infraceia and the last two by RDL Aeroportos. In 2019, the administration of Chapecó airport was transferred from the state government to the municipal government, which also has the aim of handing it over to the private sector. The other airports are managed either by the municipalities or by the state government.

It is important to highlight the issue of airport administration, in view of the investments that are made in infrastructure. With the exception of Floripa Airport, which has foreign capital, the others raise funds for investments through the Civil Aviation Secretariat, Infraero, the State Infrastructure Secretariat (SC) and parliamentary amendments, amongst others.

Through the management of these investments, there is a greater concentration of resources in some airports. The implementation of "aeroshopping" in the capital city has intensified (uneven) territorial competitiveness amongst those located along the coast. Furthermore, the construction of the Sul (Jaguaruna) and Planalto Serrano (Correia Pinto) "regional airports", by the state government, highlights the limitations that the Lages and Criciúma airports are facing, in addition to designing and characterizing these infrastructures to meet the regional demand (as well as the gradual reduction of ICMS<sup>15</sup>). With regards to the airports managed by Infraero, even though they are part of the company's cross-subsidy system, they undergo constant changes, such as the construction of the new Passenger Terminal in Navegantes. However, the downsizing of the public budget in the FHC government resulted in running down Infraero, which was repeated in the Temer and Bolsonaro governments and further accentuated the difficulties in managing the country's airport sector, thereby justifying possible privatization.

Although the novel coronavirus pandemic has had a strong impact on the country's economy, the gradual resumption of flights around the world has enabled the adoption of "new" logistical strategies. The losses are still being accounted for, and the sector is expected to recover in approximately three years, the level of which will be similar to that of 2019.

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15 This is a tax on sales and services and applies to the movement of goods, transportation, communication services and other general supplying of goods.

## Final considerations

The typology of air passenger flow has been changed by the insertion of new market models through the logistical strategies adopted by the State (via investments in infrastructure or airport concessions), and also by the corporate environment (dumping, acquisition, merger, association, aggressive marketing, predatory competition, market niche and airways network).

Although the different parts of the state of Santa Catarina have different characteristics, all constitute a considerable regional and urban development for the provision of air services. In relation to the territorial configuration of the airports, it may be observed that they are located in important logistic nodes throughout the state, such as Chapecó/SC, Joinville/SC, Lages/SC and Florianópolis/SC. The Jaguaruna/SC airport replaced the Criciúma/SC airport, which now has operational limitations for larger aircraft. Navegantes/SC, on the other hand, serves the port logistics complex, extending its operations throughout the Itajaí Valley and along the axis of coastal cities such as Balneário Camboriú/SC.

In the mid-2000s, there were still airports in the mid-west of Santa Catarina that received small aircraft, unlike those that fly today on the Brazilian market. Even the airports of Videira/SC and Concórdia/SC used to receive some flights before the rupture of regional aviation. And although Caçador/SC and Joaçaba/SC used to receive flights from NHT, the company's operating strategies were insufficient to compete in the market with larger companies. Currently, of these four airports, only Caçador/SC is able to receive scheduled flights, with the ATR turboprop being a critical aircraft (currently operated by Azul and Voepass).

With the purchase of Two Flex, the use of Cessnas by Azul Conecta has made it possible to recover aviation in these critical airports and also to provide a regular air passenger service in cities such as Blumenau/SC and Mafra/SC. Indeed, it is possible to consider the applicability of a project similar to Voe Minas Gerais and Voe Paraná, which stimulated regional aviation amongst the main cities of the respective states.

In 2019, to promote the resumption of operations at regional airports, the state government adopted a strategy of staggered, proportional exemption from ICMS on aviation kerosene. For this, it is necessary to urgently update the State Airways Plan (Paesc), conceived in 1989.

The change of the origin-destination is no longer a link between regional centers and has become centralized in the main airports of the São Paulo macro-metropolis (Guarulhos, São Paulo and Campinas), which demonstrates an improvement and a redefinition of the flows and nodes of the network air transport and, conversely, also of the Brazilian urban network. However, as the regional centers establish a direct relationship with the major national hubs, there is an increasing process of deconcentration and spatial decentralization to other spaces across Brazil (Brasília/DF, Belo Horizonte/MG, Recife-Guararapes/PE, Porto Alegre/RS, Salvador/BA, Fortaleza/CE). Economic deconcentration (production and consumption) have led to a logistical reconfiguration of large public and private investments, and to the creation of a new passenger demand, business tourism, fostered by the possibility of coming and going on the same day, given the offer of flights, although there is considerable tourist demand for the coastal strip, especially in the summer.

On the other hand, the displacement of regional flights in the state of Santa Catarina is concentrated on the Chapecó/SC-Florianópolis/SC axis. Although other cities have this demand, the development of road transport (such as the duplication of BR-101 and the improvement of others, such as BR-282 and BR-471) favors this option.

It is evident that there has been a rupture in regional aviation derived from combined actions between State logistics and corporate logistics. State logistics has aimed to create the ideal conditions to increase its territorial competitiveness through greater fluidity, and the air transport of cargo and passengers is an important element for this. Airlines, on the other hand, have taken advantage of this territorial competitiveness to increase and reconfigure their spatial performance and take better advantage of this territorial competition for their inter-capitalist competition (cost reduction and capital accumulation). On the one hand, the concentration of investments in regional pole cities, the neglect of smaller airports (mainly in the interior) and the lack of development policies indicate the need for urgent measures to recover resources for the sector (a factor that is directly linked to territorial/local competition that increasingly advances towards sub-regional and local scales). On the other hand, capitalist accumulation causes airlines to concentrate their operations, although they also choose to carry more and more passengers per flight, demanding greater airport infrastructure, in addition to targeting its market niches and the air network for greater competitiveness in the sector.

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