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AIR CARGO TRANSPORTATION IN BRAZIL

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Abstract

In 2016, while the Brazilian economy suffered the consequences of the worst political crisis of its recent history, culminating with the impeachment of the former Brazilian president Dilma Rousseff (from left-wing party PT), Brazilian transport GDP decreased to the lowest performance ever, slowly recovering, since then. This article investigated the air cargo in Brazil, in comparison to other modals of cargo transportation, as well as the N=10 busiest world's air cargo hubs. Key findings pointed out the necessity for processes improvement, new technologies adoption, among others. The research results were attained through multiple-methods approach, such as descriptive case study and extensive archival research. This investigation is useful for managers, civil aviation agents, decision makers, students, academics, and overall practitioners. Case analysis and discussion compile the present work.

Keywords: air transportation, air cargo traffic, air freight

1.Introduction

This study investigated the air cargo freight in Brazil, as the unit of analysis (Yin, 1988). It aims to call into question (i) the air cargo freight in Brazil, in comparison to other freight transportation modals; (ii) performance air cargo comparison between the Brazilian airport network and the N=10 busiest air cargo hubs worldwide. We adopted a multi-method approach, such as extensive archival research combined with a descriptive case study, as well as direct observation.

The present research has also been primarily motivated by recent studies on civil aviation network in Brazil: Congonhas Airport - CGH (Dias, M.O. 2020); Guarulhos International Airport - GRU (Dias, M.O.; 2019); Brasilia International Airport - BSB (Dias, M.O.; 2019b); Rio de Janeiro International Airport Galeão/Tom Jobim - GIG (Dias, M.O. & Albergarias, 2019, 2019b); Santos Dumont Airport - SDU (Dias, M.O., 2019c, 2019d). Also, air passenger transportation in Latin America (Dias, M.O. & Pessanha, M. T., 2019), and the aircraft industry (Cruz, B. & Dias, M.O., 2020).

Recently, air cargo freight activities have been facing challenges worldwide. According to IATA[1], who represents 82 percent of total air traffic air cargo freight demand, "air cargo experienced a notable deceleration in 2018, growing 3.4% compared with its extraordinary 9.7% growth in 2017" (IATA, 2020, p.40).

In 2018, air cargo freight global performance is illustrated in the following Figure 1:

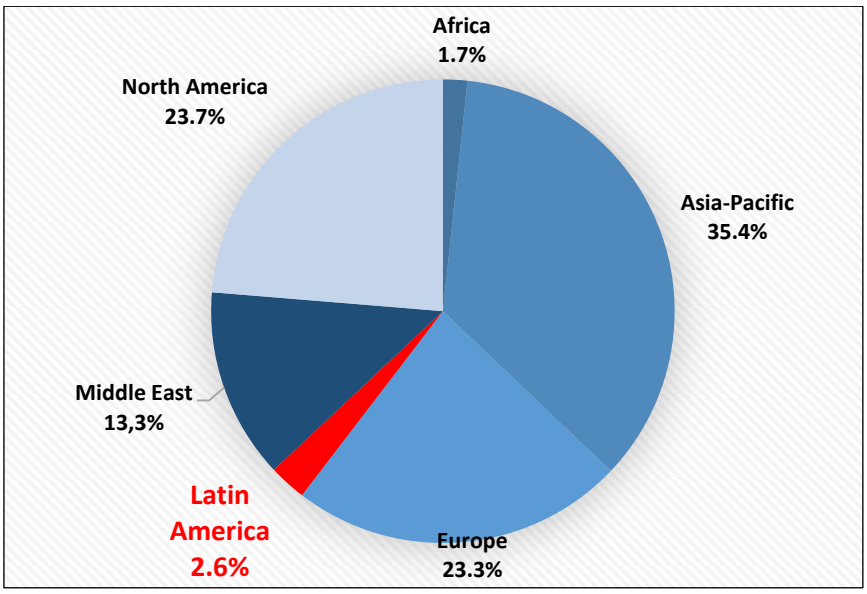

Fig.1: global air cargo performance. Source: IATA, 2020

According to the sector representative, Airports Council International (ACI), air cargo market did not perform as well as passenger traffic, between the period 2017-2018:

> (…) passenger traffic remained resilient in 2018 and is estimated to have reached 8.8 billion, growing by an estimated 6% as compared to the previous year. This increase is above the 4.3% compound annual growth rate for passenger traffic from 2007 to 2017. The air cargo market did not fare as well as passenger traffic with a year-end growth figure of 3.2%. This is in contrast to a much stronger year of growth in 2017 but comes against a backdrop of global trade tension between the United States and several of its closest trade partners (ACI, 2020, p.1)

Total air cargo volume at the N=10 busiest airports handled a combined near 31.7 million t of cargo, as illustrated in the following Figure 2, as follows:

[1] IATA - International Air Transport Association (IATA) is the trade association for the world's airlines.

Rank	Airport	Country	IATA	Total cargo (tons)
1	Hong Kong International Airport	China	HKG	5.120.811
2	Memphis International Airport	USA	MEM	4.470.196
3	Shanghai Pudong International Airport	China	PVG	3.768.573
4	Incheon International Airport	South Korea	ICN	2.952.123
5	Ted Stevens Anchorage International Airport	USA	ANC	2.806.743
6	Dubai International Airport	Dubai	DXB	2.641.383
7	Louisville International Airport	USA	SDF	2.623.019
8	Taiwan Taoyuan International Airport	Taiwan	TPE	2.322.823
9	Narita International Airport	Japan	NRT	2.261.008
10	Los Angeles International Airport	USA	LAX	2.209.650

Figure 2: Ten busiest world's air cargo hubs. Source: ACI, 2020

Observe in Figure 2 that Hong Kong International Airport (HKG) is the largest air cargo airport, handling more than 5 million t of cargo in 2018. The growth rate of 1.4 percent in 2018 was noted (ACI, 2020), while Memphis International Airport (MEM), has grown 3.1 percent in 2018, and Shanghai Pudong International Airport (PVG), had declines in their cargo volumes transported within the same period, respectively the three busiest air cargo hubs (ACI, 2020).

Finally, the international air cargo panorama, according to IATA, significant factors impacted the demand for air cargo, more recently: (i) the end of the business restocking cycle; (ii) weak global economic activity; (iii) the contraction of the export order books of all major exporting nations, except for the United States; and (iv) wavering consumer confidence, pointing out necessity for process improvements, regarding air cargo transportation:

> the macroeconomic outlook has deteriorated such that global GDP and trade forecasts have been revised downward. The greatest opportunities in air cargo are in e-commerce and special needs cargo, such as time- and temperature-sensitive shipments. To capitalize, however, it is critical that air cargo modernizes its processes significantly (IATA, 2020, p.40).

The next section presents the methods and limitations of the present research.

2.Methods and Limitations

This article is a qualitative, compiled of multiple-methods approaches, such as extensive archival research with a single, descriptive case study, which unit of analysis is the air cargo freight in Brazil (Yin, 1988). This article also combined the inductive reasoning and interpretive approach.

This research is limited to air cargo freight transportation, regardless of other transport modals, such as modal share (also called mode split, mode-share, or modal split), which is the percentage of travelers using a particular type of transportation or number of trips using said type.

Other airport activities, such as military aviation or passenger transportation, are not the scope of the present research. Neither are investigated other airport activities such as (i) parking lot administration, (ii) shopping center, (iii) food court administration, among others, not the scope of this study. This research is also limited to the N=10 busiest air cargo hubs (See Figure 2).

Finally, this study is limited to IATA's international standards (IATA, 2020, 2019), and National Civil Agency (ANAC) regulations, norms, resolutions, as well as the respective Federal Laws.

3.Air cargo freight in Brazil

According to the National Transport Confederation (CNT), from 1996 to 2018 (the last data available), the Brazilian transportation GDP follows the Brazilian GDP, as depicted in Figure 3:

Brazilian GDP year rate x Transportation GDP. Source: CNT, 2020

Observe in Figure 3 that from 2016 to 2018, Transportation GDP reached the worst performance in 2016, when Brazil faced on of the worst domestic crisis in the recent Brazilian history, the impeachment of President Dilma, from left-wing Labor Party (PT), on August 31, 2016. From 2016 to 2018, observe also the GDP Transportation recovery, from -5.6 to +2.2, due to significant changes in the Brazilian transport policy, promoted under Michel Temer administration, former Brazilian vice president, who remained in office until December 31, 2018, when president elected Jair Bolsonaro took office, on January 1, 2019. Air cargo, however, represents only 0.4 percent of the total modal transport in Brazil, as illustrated in the following Figure 4:

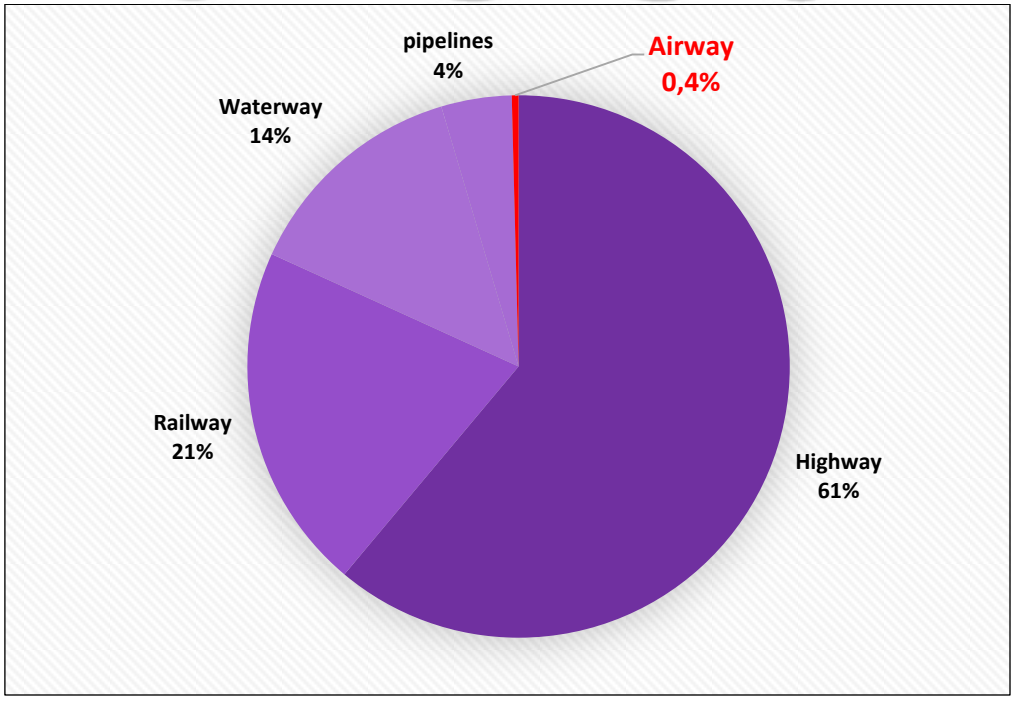

Figure 4: Brazilian transport modals share. Source: CNT, 2020

According to the National Transport Confederation (CNT), air cargo in Brazil is represented in Figure 4, as follows:

Figure 4: air cargo share in Brazil. Source: CNT, 2020

Observe in Figure 4 that the Southeastern region is responsible for more than half air cargo transportation in Brazil (529 percent). Comparing Figures 4 and 5, observe that six out of the ten busiest airports in Brazil are located in the southeastern region, respectively GRU, CGH, GIG, CNF, SDU, and VCP (GRU, CGH and VCP both located in São Paulo state, GIG and SDU in Rio de Janeiro, and CNF in Minas Gerais state). The next Figure 5 depicts the ten busiest airports in Brazil:

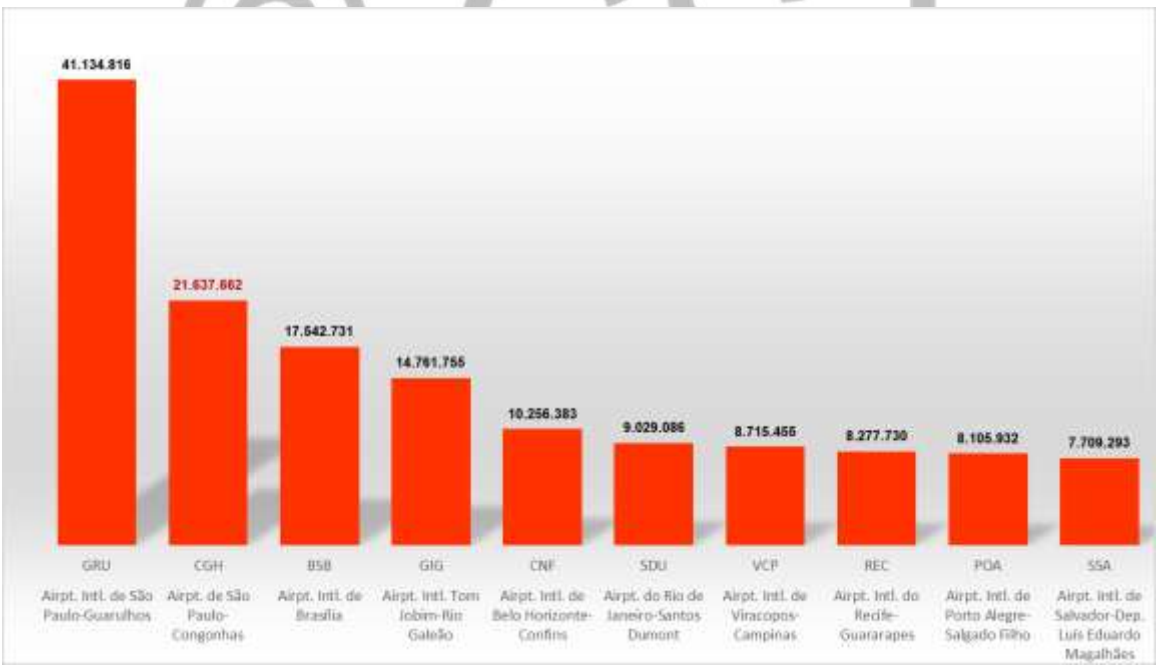

Figure 5: ten busiest airports in Brazil. Source: Infraero, 2019

Figure 6 evidences the number of runways within the ten busiest airports in Brazil. Observe that four over ten airports (40 percent) have only one runway (CNF, VCP, REC, and POA), from which both passenger and cargo landings and take-offs share the same runways. A quick analysis indicates that the more runaways active, the higher the transport capacity in a given airport.

Runways (m)	GRU	CGH	BSB	GIG	CNF	SDU	VCP	REC	POA	SSA
#1	3.000	1.940	3.300	4.000	3.600	1.323	3.240	3.007	2.280	3.005
#2	3.700	1.935	3.200	3.180		1.260				1.520

Figure 6 - Brazilian airports' runways. Source: Infraero, 2020, Dias, 2020. Reprinted under permission.

Observe in Figure 6 that Tom Jobim International airport in Rio de Janeiro (GIG) - highlighted in yellow, has the longest runway in Brazil.

Next, the evolution of the overall cargo transportation in Brazil, from 2007 to 2018, is illustrated in the following Figure 7:

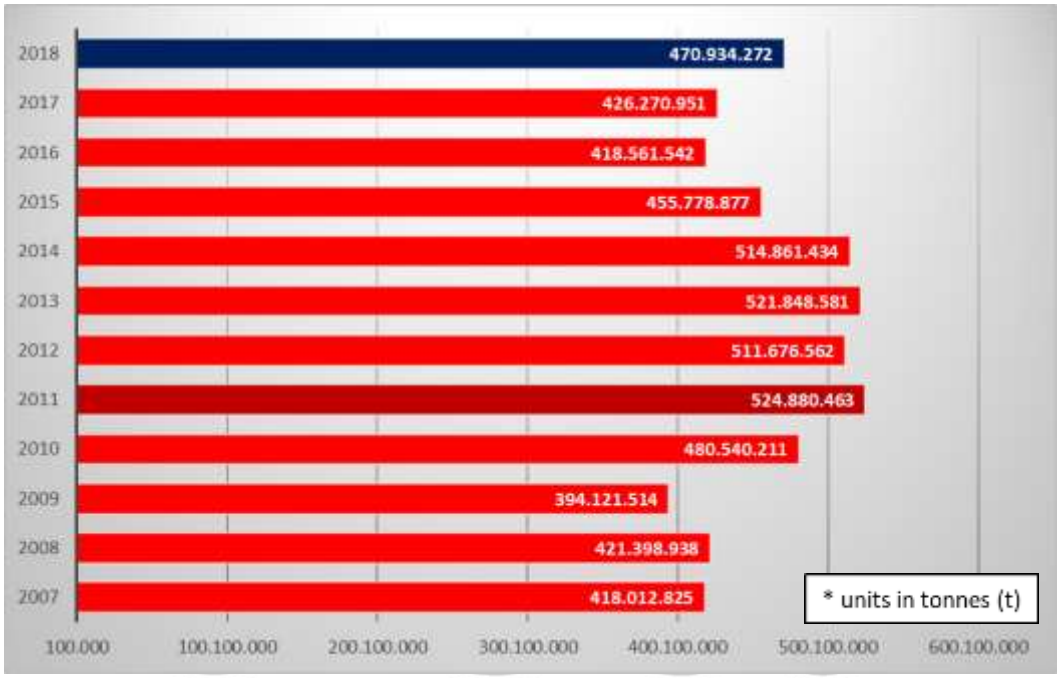

Figure 7: volume of cargo paid and couriers transported - domestic market, 2007 - 2018. Source: CNT, 2020

Observe in Figure 7 that the best performance in the overall cargo transportation in Brazil (all modals) occurred in 2011, with 524,880,463 t transported. In 2018, 470, 934,272 t of cargo were transported, evidencing two years recovering. Nevertheless, air cargo represents 0,4 percent of the total, according to the CNT, as demonstrated in the following Figure 8:

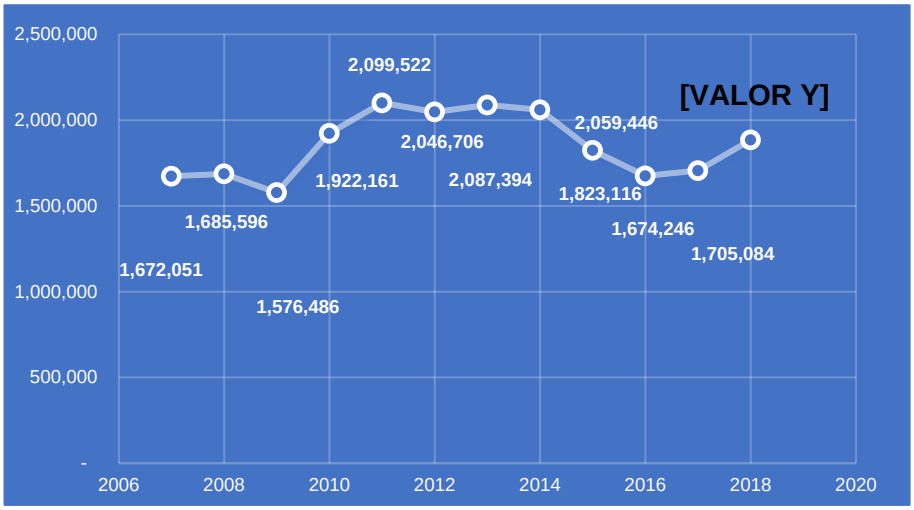

Figure 8: evolution of air cargo paid and couriers transported - domestic market, 2007 - 2018. Source: CNT, 2020

Observe in Figure 8 that 1,883,737 t of cargo were air transported in Brazil in 2018 (CNT, 2020). However, in comparison with the busiest air cargo airport, the Hong Kong International Airport (HKG), the entire Volume of cargo freight transported in Brazil is approximately 2.71 times lesser than one single chine airport (compare Figures 2 and 8). China is Brazil's leading trading partner since 2009. The leading Brazilian air cargo companies, as well as their share participation in the air cargo market, is depicted in the following Figure 9:

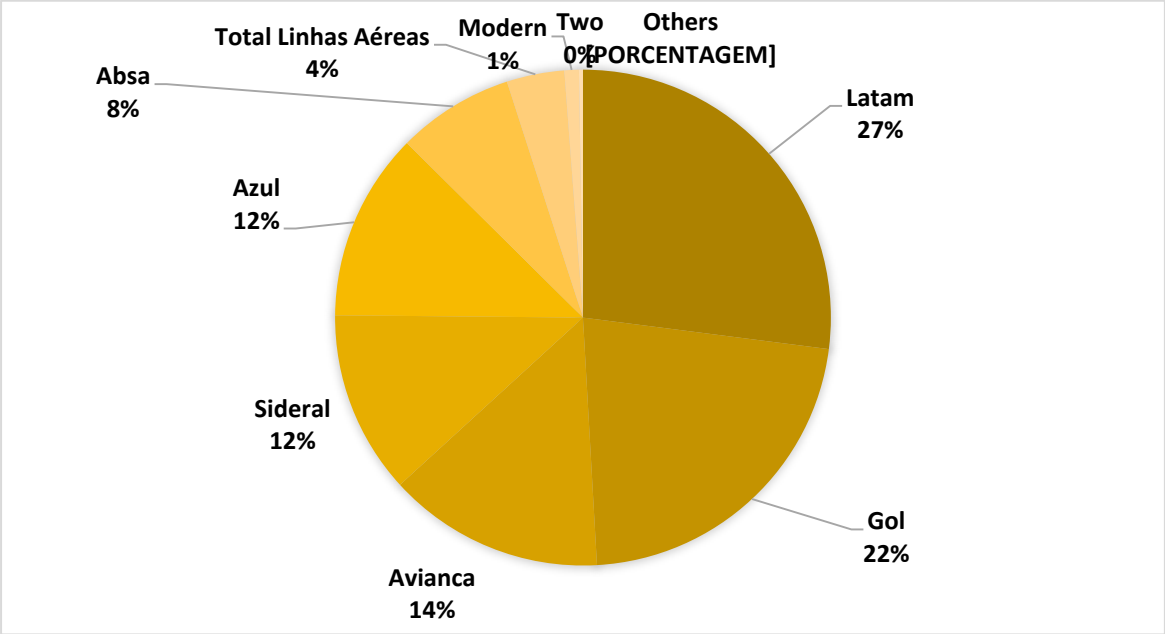

Figure 9: Major companies' participation in terms of air cargo and couriers transported - domestic market, 2018. Source: CNT, 2020

Observe in Figure 9 that Latam has the most substantial participation in the Brazilian air cargo market (27 percent). Note that Avianca Brasil, due to bankruptcy, was prohibited from operating in Brasil, according to the National Civil Aviation Agency (ANAC), in April 2019.

The two main air cargo routes in Brazil are (i) São Paulo GRU to Manaus, Amazonas, a northern state, responsible for 35,434 t of cargo transported in 2018, and (ii) Manaus to São Paulo GRU, responsible for 33,479 t of cargo transported in the same period (CNT, 2020). Figure 10 depicts the main international routes on air cargo freights in 2018 (in both directions):

Continent	Cargo transported in 2018 (t)
North America - Brazil	188.673
Europe - Brazil	164.861
South America - Brazil	56.836
Asia - Brazil	13.831
Africa - Brazil	7.323
Central America - Brazil	758
Brazil - North America	140.822
Brazil - Europe	129.715
Brazil - South America	75.762
Brazil - Asia	9.585
Brazil - Africa	7.295
Brazil - Central America	1.579

Figure 10: main destinations for air cargo transportations in 2018. Source: CNT, 2020

Observe in Figure 10 that North America - Brazil is the main international destination for air cargo transportation in Brazil. Finally, the air cargo companies in Brazil employed 44,970 workers, including aircraft pilots, co-pilots, and crewmen, according to the CNT (CNT, 2020). Figure 11 illustrates the aircraft operating in Brazil and their respective manufacturers:

Manufacturer	Aircrafts operating in Brazil (2018)
Airbus	193
Boeing	186
Embraer	63
ATR	47
Fokker	-
LET	-
Cessna	-
McDonell	-

Figure 10: aircrafts operating in Brazil. Source: CNT, 2020; ANAC, 2020.

Finally, 815,862 domestic flights and 151,197 international flights were registered in Brazil, totaling 967,059 flights in Brazil, in 2018 (CNT, 2020).

4. Discussion

Air cargo transportation in Brazil has been influenced by the economic crisis, facing the slow recovery process, since 2016, however, still 2019 without reaching the highest air cargo performance achieved in 2011 (See Figure 8).

Despite Chinese airports (HKG and PVT) are amongst the busiest world's air cargo hubs, the recent outbreak of Coronavirus (Covid-19). The first case was detected in the province of Wuhan, China, on December 2019, and subsequent suspension of flights from and to China, due to the quarantine imposed by the Chinese government and other countries, as preventive measures to avoid a pandemic, reflects in the 2020 statistics. On February 16, 2020 the Japanese Government announced that the economy shrank 1.6 percent in the fourth quarter of 2019, and might face recession, due to the Coronavirus effects on the economy (CNN, 2020). Until this article is written, there is no cure for Covid-19, neither the real dimension of the impact on the global economy. Further studies are necessary to investigate the impact of Covid-19 in air cargo transport worldwide, as well as the economic impact on the Brazilian Transport GDP.

Regarding the Brazilian air cargo market, the major change occurred in 2019, when the Avianca airline company was prohibited by ANAC (2020) to operate in Brazil, due to bankruptcy, as a preventive measure.

This case analysis evidenced implications observed in other fields of research, such as (i) aircraft manufacturer industry (Cruz, B.S. & Dias, M.O., 2020; Dias, M.O., Teles, and Duzert, 2018; Dias, M.O. and Duzert, 2018), (ii) mining industry (Dias, M.O., & Davila, 2018); (iii) e-business negotiation (Dias, M.O. & Duzert, 2017); (iv) automobile industry (Dias, M.O., Navarro and Valle, 2013, Dias, M.O., et al., 2014; Dias, M.O., et al., 2013); (v) non-market forces (Dias, M.O. & Navarro, 2018); craft beer industry (Dias, M.O. & Falconi, 2018; Dias, M.O., 2018); (vi) public administration (Dias, M.O., 2018); (vi) Non-governmental organizations (Paradela, Dias, M.O.; Assis; O., J.; Fonseca, R. (2019); (vii) governmental negotiations (Dias, M.O. & Navarro, 2017); (viii) copier manufacturer industry (Dias, M.O., 2012); (ix) streaming film industry (Dias, M. O.,

& Navarro, 2018), (x) craft beer industry (Dias, M.O., 2020; Dias, M.O. & Falconi, 2018), among others.

The analysis suggested further process and cargo transport technologies in Brazilian airports. For instance, the construction of larger and longer runways should be improved, to four out of ten busiest Brazilian airports, which are equipped only with one runway. All processes involved in air cargo operation should also be improved.

Finally, this investigation, in comparison to the previous body of research, has the merit of compiling sparse data regarding air cargo in Brazil, providing a comprehensive overview on the present economic sector, useful to students, academics, decision-makers in the air cargo sector, managers, and other practitioners.

5. Future Research

Future research is encouraged regarding the investigation of the impact of the Coronavirus outbreak, affecting the route China-Brazil-China directly in the first place, and the impact on the Brazilian economy in general, once China is the most important Brazilian trade partner. Performance analysis on air cargo transportation in Brazil are also recommended, regarding the government Jair Bolsonaro.

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