

ARTIGOS

**LOGISTICS OF TRANSPORT IN AIRPORTS
CENTERS: A STRUCTURED LITERATURE
REVIEW****LOGÍSTICA DO TRANSPORTE NOS CENTROS
AEROPORTUÁRIOS: UMA REVISÃO
ESTRUTURADA DA LITERATURA**

ABSTRACT

This study has the purpose of bringing a verification about the logistics of transportation at the airport centers in Brazil through a literature review method using two databases (DOAJ and Scielo) to collect articles to create a portfolio that moved on into the thematic, analysis, and synthesis in the scientific production of logistics of transportation in the Brazilian Air Cargo sector. It was a literature review using two databases (DOAJ and Scielo), analyzing 33 articles related to the theme. After analyzing synthetically, the studies found, it was noticed that the studies directly related to the transport and distribution of goods are based on finding performance indexes within organizations or on the use of transport intermodality. The literature review used two databases (DOAJ and Scielo). This study presents suggestions for future scientific literary productions in the Logistics of Air Cargo, with guidelines for accounting costs, indices of logistical performance in air cargo terminals, and the application of tools to support decision-making within airport centers. It was possible to see the scientific production of the theme to better view the literature gaps about it and obtained suggestions for the production of future projects.

Keywords: logistics of transportation; logistics of cargo; airport centers; systematic review; supply chain.

RESUMO

Este estudo tem o objetivo de trazer uma verificação sobre a logística do transporte nos centros aeroportuários no Brasil através de um método de revisão de literatura utilizando duas bases de dados (DOAJ e Scielo) para coletar artigos para criar um portfólio que passou para a temática, análise e síntese na produção científica

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da logística do transporte no setor de Carga Aérea Brasileira. Foi uma revisão de literatura utilizando duas bases de dados (DOAJ e Scielo), analisando 33 artigos relacionados com o tema. Após analisar sinteticamente, os estudos encontrados, notou-se que os estudos diretamente relacionados ao transporte e distribuição de mercadorias são baseados na busca de índices de desempenho dentro das organizações ou no uso da intermodalidade do transporte. A revisão bibliográfica utilizou duas bases de dados (DOAJ e Scielo). Este estudo apresenta sugestões para futuras produções literárias científicas na Logística de Carga Aérea, com diretrizes para os custos contábeis, índices de desempenho logístico em terminais de carga aérea e a aplicação de ferramentas para apoiar a tomada de decisões dentro dos centros aeroportuários. Foi possível ver a produção científica do tema para melhor visualizar as lacunas da literatura sobre o mesmo e obter sugestões para a produção de projetos futuros.

Palavras-chave: logística de transporte; logística de carga; centros aeroportuários; revisão sistemática; cadeia de suprimentos.

1 INTRODUCTION

Many authors report the relevance, which is in the transport sector to many countries, whether in the performance of the sector, the economic impact that it produces, the influence power the level of industry service, or the costs that it comes together (SANTA; MUSSI, 2016; NASCIMENTO *et al.*, 2016; MELACINI; MARCHET; PEROTTI, 2013). Facing a globalization scenario where the air airport transport sector demand has been increasing day after day between countries, the transportation of air cargo contributes to economic growth in every country (ARCAR; UCAN; TAŞCI, 2016).

According to the National Transport Confederation (CNT), the Brazilian transport sector was responsible for consuming 12,7% of the GDP (Gross Domestic Product) with logistics

costs, this percentual corresponds to an expense of R\$ 749 billion which 0,4% of this value is destined to airport transport sector (CNT, 2016). In 2019, the Brazilian airport transport sector has 219 projects with R\$ 30,3 billion of investment. The air cargo centers integrate productive chains, offer support services, give quick and flexible reactions at the production, and can link users of technology, raw materials, components, final clients, suppliers of feedstock, and more (CAPPA; BOAS, 2015).

Going deep into the study of the Brazilian scenario, Quintino and Oliveira (2016) report that there is an absence of using more suitable strategic planning for air cargo transport and they emphasize that relating this information to strong global competitiveness, the infrastructure of the country is insufficient and weak to correspond to the market needs. So, the right logistics application for airport transport in air cargo centers becomes the answer to the problems that are presented in this sector, because this application promotes the production of comparative advantages, decreases costs, increases the limit of the consumer market, and brings to the companies systematic competitiveness (CAPPA; SOUZA; BIANCO, 2010).

This paper has the goal of build-up a theoretical investigation about the transport logistics at the air cargo centers in Brazil, to quantify and analyze the scientific production in this area using information science through literature systematic review resulting in a contribution for this thematic.

This paper is structured into four main sections with this sequence: Introduction, Theoretical Foundation, Methods, Results, and Discussion and Conclusion. This section was chosen to bring to the reader the objective relevance of the theme and this research, in the next section the concept around the subject is more open and brings more information about it. In the methods section was described all methods are used, in the fourth section is applied the massive and integral development of the researched content and in the conclusion is written the final considerations of this study are.

2 THEORETICAL FOUNDATION

This present section describes concepts that will guide this whole study to the reader may understand the keywords used in the methodology and the study field that is chosen for this article.

2.1 LOGISTICS

Historically, logistics appears through the French word “*logistique*” which originated in the XVII century at an army French patent in charge of designating activities like transport things, hosting, and camping troops during operations (LEITE *et al.*, 2015), as the authors mentioned that logistics already existed in remote times because of the human necessity of store, commercialize and transport products that exceeded their production (RIBEIRO; SILVA; BENVENUTO, 2005).

Operationally, logistics is focused on delivering some product with the right demand, at the right time, in the right place without damage to the consumer, becoming responsible for the operational activities. The logistics are responsible for the management of the resource moves of the company and are the coordinator of buy, moves, transport, store, and physical distribution. As a result, logistics has the mission of attending to the end consumer requirements and conducting the information at every step of the process (BOWERSOX *et al.*, 2014; MADHANI, 2017). According to Ballou (2006), logistics is also an area in convenient growth, the service area. Thus, the logistics are also linked to service flow beside the merchandise flow.

The logistics' primary activities are storage maintenance, order processing, and transportation. However, there are support activities revealed in his execution, they are storage, handling of materials, management of information, products planning, obtainment, and products package.

a) storage maintenance: in this activity, the focus is on optimizing the time, making available the products under offer and demand from the clients, and keeping the stock levels low;

b) order processing: it is understood as a primary activity because is the beginning and

so indispensable for other activities through the processing of the orders;

c) transportation: the concept is about many ways to move materials and it is understood that this activity is the most important in companies (BALLOU, 1993).

The reduction of international trade barriers, globalization, several agreements between countries, new products entrance, and technology productions that begins a huge competition, caused the existence of a competitive scenario that stopped being local and intern to become global. With an embracing vision, this whole situation made logistics an answer to suppliers and clients to raise their competitiveness level in their international transactions, and consequently, the study field of logistics is a requisite nowadays (MINORI *et al.*, 2016).

Currently, it is known that the evolutionary development of logistics can be intensified through some tasks like cost reduction, flexibility, and an attempt to the consumer satisfaction. The evolution of some logistics terms is well known today like “Just in Time (JIT)”, “Efficient Customer Response (ECR)” and “Quick Response (QR)” show the focus of increasing the level of service for clients being even attached to many other areas like marketing area, for example. Logistics is not just a strategic sector in some company or some part of an action plan, but it is a fundamental component to leverage competitiveness at the level of global trade (MADHANI, 2017).

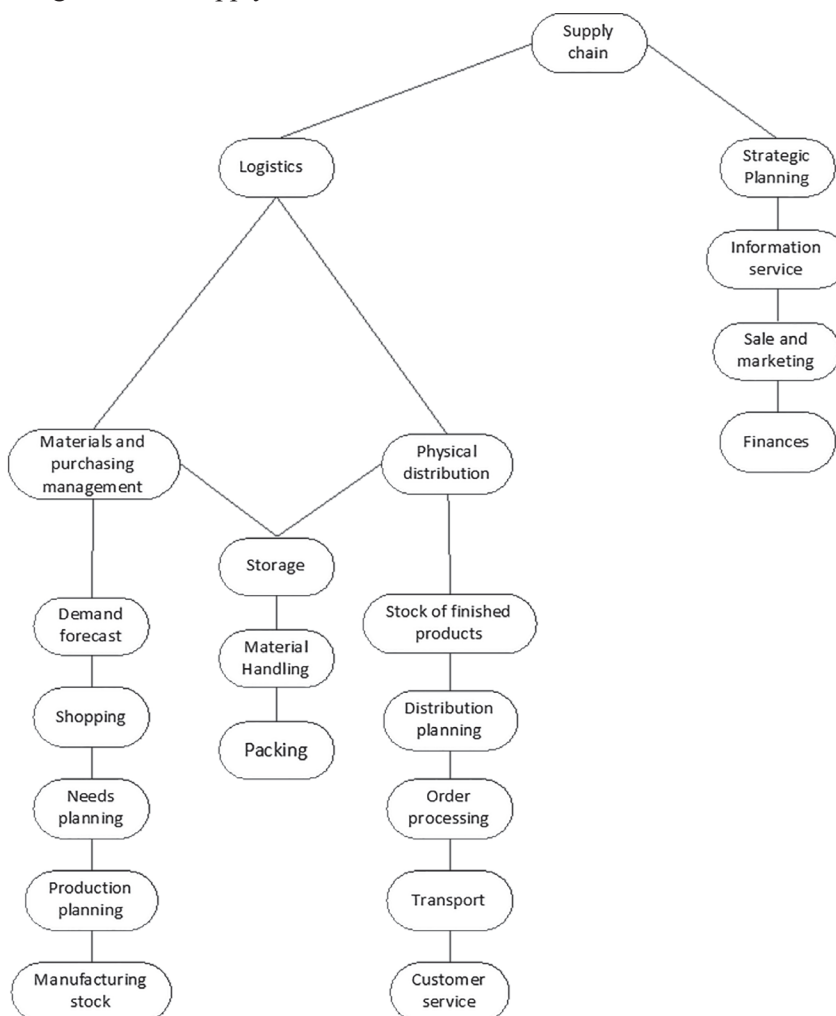
An expression also well-known nowadays is directly connected to logistics, which is Supply Chain Management (SCM). Supply Chain Management is understood as strategic planning, and the definition of it is bigger than the logistics definition, although, both expressions are similar. The SCM brings a panoramic vision of the many processes inside the company, where it has from primary stages to the most advanced stages, including in its visual map of suppliers, manufacturers, and clients (be they retailers, distribution networks, or the end consumers). The supply chain also includes the operations of

several areas of an organization that communicate to do the enterprise delivery as financial, marketing, development of new products, and others (LEITE *et al.*, 2015; SOARES, 2015).

According to figure 1 below, the most important difference between logistics and supply chain is that: logistics have intra-company focus, integration between areas, focus on operation, logistics indicators, and information technology (I.T.) is support for a technical approach. In the supply chain, the focus is inter-company, the perspective is systemic, supplier indicators, attention to conception, I.T. has relevance and the approach is orientated for business (BALLOU, 2006).

According to Bowersox *et al.* (2014), in the supply chain, the structure and strategy are responsible for heading the scenario of logistics needs. The author also mentioned that is necessary to act directly about the supply chain and its structure strategy. Madhani (2017) explains that the supply chain and logistics contribute to the competitive capacity of companies, the author also conceptualizes the two terms as a process of information and materials management that roam from the companies to the consumer (final client). The management logistics activities are composed of fleets management, logistics net projects, and others. So, logistics is a component of planning, flow, and implementation control, further providing entrance and exit information, from starting point to the consumption point in the supply chain.

Figure 1 - Logistics and Supply Chain



Source: designed from the Ballou (2006).

2.2 LOGISTICS OF TRANSPORT

Space is understood by geographers as a social purpose as it is used by people (SILVEIRA, 2018). This concept allows the understanding that the use of some space or many spaces generates production and during the production existence, the human being needs mobility which means transport. As the spaces (territories) are far from one another is necessary to introduce planning and management to move what is produced from social interactions. In some acts of movement, beyond transport, there is also storage of what is produced in society. This fact makes transport something indispensable to human survival and becomes society more productive (SILVEIRA, 2018; MESQUITA, 2018).

As one of the three primary logistics activities, transport is also responsible for one or two-thirds of logistics costs at an organization (BALLOU, 2006). The transport area of logistics is inside of the supply chain being part of logistics processes. Being a logistics function to move cargos, the logistics of transport is important for his activities of distribution, a portion of participation at GDP, and his influence in almost every economy sector (SANTA; MUSSI, 2016). The sector's relevance is highlighted in times of adverse situations such as the strike that makes it impossible to transport materials, an example of this is what happened in Brazil in 2018 with the national road transport strike that exposed the dependence of the movement of the things to regions to different purposes (SATO, 2018).

The logistics of transport is composed of a sequence of technical and organizational operations interconnected as also characterized as a logistic chain. Thus, logistic planning interacts with continuous decisions that try to promote cost savings of storage and freightage. The logistics of transport is divided into many kinds of transport which are known as transportation models. The transportation models are air, road, railway, sea shipping, and pipeline. Each modal has its aspects that make

them be chosen strategically by the logistics sector for some product or service delivery. The transport sector has a delivery deadline and distance is an important aspect because logistics proposes the delivery of a product or service at the right time to the consumer. The transport models existent from high speed to low speed are in order below:

- **Air:** This modal is considered the faster speed in comparison to other models. Beyond the high speed and reduced time, some other evaluated characteristics as perishability, level of urgency of receipt, cargo size, cargo type (net, solid, among others), modal consistency, the modal cost to be used, and modal availability (SOUZA; SOUZA, 2013).
- **Road:** There is the possibility of transporting materials with various compositions either liquid or gaseous or solid and besides this, it is possible to adapt the modal to the cargo, refrigerating if necessary or organizing in an efficient way and other things. The Brazilian logistics of transport is highly dependent on road modal because a huge part of the transactions around the country happens on the road so when there are no investments in infrastructure on roads, the transports that move on these roads without quality maintenance, makes necessary tolls or privatized areas and it increases the modal cost (REZENDE; LIMA; VERSIANI, 2012). The percentage of road modal use in Brazil is 60% in comparison to other models, according to Sato (2018), the road strike that happened in 2018 emphasized the importance of this modal because this occurrence directly impacted the national economy, and it is remembered as a crisis. Even though Brazilian roads are not in the international quality standard in comparison to countries such as the United States, French and even in comparison to countries under development like China and India, a

road modal is an option for the country because the necessary investment to this modal is not so high (SATO, 2018). Even if the scenario to this modal does not hold high governmental investments even with the level of relevance to this country it is in the Federal Constitution of the Union that the State will correspond with responsibility as an institution of guidelines for the development and urban transport (BRAZIL, 2019).

- **Railway:** The railway modal is composed of trains and convoys to transport people and things, it has a high capacity to transport large volumes of loads, is less polluting than the other models, does not provoke traffic congestion and the maintenance costs are low. And, to public transportation, the railway modal use has advantages like flow control and people volume being superior to the other urban options like a bus. Many countries that had invested in railway modals, expanded their productive transactions. However, Brazil had not advanced in railways like other nations because investments in this modal are high either for an enlarged area or new installations (SANTOS; SOBRAL, 2014).
- **Sea shipping:** Some authors refer to this modal as “hydro-way” as a transportation mode, the use of this modal happens through ships containers, dedicated ships, and others. Besides that, there are three ways for navigation with this modal and navigation can happen in ports or navigations places in the country or the interior navigation through national and international hydro-ways and long-haul navigations that can be national or international or used in ports to transport many supplies with large quantity in containers that unitizes different loads (RIBEIRO; FERREIRA, 2002). The maritime modal is one of the possible modes of internationalization of goods, and there is a market where large

corporations looking to increase their international strategies. Because of these facts, the maritime modal is the main modal to transport goods in the global market because it holds a large volume of materials over long distances, which costs less than other options. In this case, the ports are conceptualized as centers of integration between various modality systems, receiving products through other types of models and transporting them by maritime modal. As this transportation takes place, multinational corporations, national exporting companies, or logistics operators are involved in the operations generating value and moving savings (NEVADO; SOARES, 2009).

- **Pipeline:** this type of modal transports gas pipelines (gases), ore pipelines (minerals), and oil pipelines (crude oils) and is considered one of the slowest modes. Within the national scope, this modal is still less used in contrast to the international market, for example, in the United States, 67.8% of the transportation of oil pipelines in 2007 was done by pipelines. It works through mechanical pressure or gravity to move the inputs (FERNANDES, 2012). According to Oliveira and Boccaletti (2018), the pipeline modal does not have high participation in transposing bulk cargo in Brazil, but this modal has the highest frequency, a small variation in time, safety, and high-volume capacity. In practice, the transport of materials in this mode takes place through specific pipes or ducts to transport the necessary products. Thus, with low use in the Brazilian market, there is a need for the logistics sector to be aware of the possibility of using this mode is highlighted, to reduce costs when transporting high volumes of cargo that require a high level of safety.

Nowadays, in the national territory, another category has been mentioned, motorcycle freight, which reflects the reality of motorcycles spread across the country making deliveries in response to the chaotic traffic that the big cities face. Although the capacity to transport large volumes is non-existent, this new logistics handling solution has an adequate cost-benefit regarding delivery time. When comparing the models in Brazil, it is possible to verify that the pipeline has a higher level of reliability than the others, the maritime modal has greater movement capacity and availability, and the road modal is what serves on a large scale for easy access displacements (SOUZA; SOUZA, 2013; FERNANDES, 2012).

For exportation through transport modes, some questions are intensified to the increase in demand, these being: longer storage time, bottlenecks, depreciation of infrastructure (physical capital), and problems in the flow of cargo handling in national and international trade (BETARELLI JUNIOR; BASTOS; PEROBELLI, 2011). This described scenario, therefore, leads Brazil to take planning measures, as the country is the largest exporter of food.

Silveira (2018) points out that historically, professionals in the sector have claimed that the country suffered from a “logistical blackout” due to the lack of logistical planning measures in the transport sector and problems in the national infrastructure in 2003 when China became one of Brazil’s market partners causing an increase in freight transport, as demand has increased. However, the country supported this trade opening along with other factors beneficial to the country: increased income, increased GDP (Gross Domestic Product), consequently the exchange of information increased volume, and the sale of private cars was higher (SILVEIRA, 2018)

Economically, factors such as systematic productivity, and transport infrastructure, directly affect varied businesses, in final products or intermediaries in the sectors. If there are deficiencies in the transportation area, setbacks occur, as the probable commercial transactions

will not be carried out. In addition to some tools in the area, such as transportation planning, being important, investments in the sector also trigger the development of economies of scale and accessibility (expanding access to markets - product and input), in addition to generating and contributing to the advantage competitive, specifically for each region (BETARELLI JUNIOR; BASTOS; PEROBELLI, 2010).

Andrioli, Diehl, and Hansen (2015) report that the analysis of logistical costs for an organization is indispensable. Transport logistics has a big relevance and influence in reducing costs or increasing costs. Logistics costs can be divided into operating and capital costs or fixed and variable costs, considering the company’s activities. However, the focus of logistics is not based on the costs involved, but on the strategic understanding of how to remain in the market with a competitive advantage. In this case, understanding the costs will help to have a competitive advantage (NASCIMENTO *et al.*, 2016; PETRAGLIA *et al.*, 2009; ANDRIOLI; DIEHL; HANSEN, 2015).

2.3 LOGISTICS OF AIR CARGO

With internationalization becoming an inevitable factor for countries, intermodally, interoperability and logistics are necessary factors in the transport scenario. In general, in this scenario of global trends and markets, a promotion is progressive, and the activities of the economy are indicators of direction for trade, investments, and transport (NEVADO; SOARES, 2009).

Currently, it is necessary to deal with diverse economic systems, government policies from other countries, legislation, and varied cultures, in addition to long-distance demands. This increases the need and dependence to have “know-how” (knowledge of how to do it) in international logistics for all countries whose economies are open for business (CAPPA; SOUZA, 2010).

An example of this is the case of Turkey, before the year 1980, the country had legislation that allowed business transactions

in the field of industrial aviation only in state-owned organizations. However, in 1983, with the opening of countries such as the United States and European countries, it culminated in the Turkish Civil Aviation Law, which allowed the business to operate in the Turkish aviation area (ARCAR; UCAN; TAŞÇI, 2016).

Moori, Felix and Lelis (2013) discuss international logistics saying that the choice of transportation is a decisive factor for the activities of the foreign market, in addition to describing that the major focus of this type of logistics is transportation. That is, in the entire globalized scenario, cargo transportation is the priority of this trade and depends directly on logistical functions for success.

In an environment of constant changes, capitalism moves forward transforming structures and establishing connections and demands with technologies, and innovations that open the markets to great competition. The fierce competition for high levels of competitive advantage signals the fact of this study: logistics of air cargo has become a differential for different levels of commerce, especially regional and international, happening in a strategic way to align the many purposes of the business world (CAPPA; BOAS, 2015).

The explanation is that the air modal is faster, and does not need more careful handling, which facilitates more effective transport actions and sustains part of the economic growth of many blocks, in addition to offering integration of “marketplaces” and consequently removing barriers between countries’ economies. Considering the cost-benefit, this modal is indicated for loads of greater value, with a high level of urgency and priority, as is the case of the medical-pharmaceutical industry, for example. This means that despite being an important mode and adding value to the logistics service, unlike other modes it has a lower load capacity and a high freight value.

Silveira (2018) points out two concepts that allow fluidity and competitiveness in Brazil: corporate logistics and State logistics. The author describes corporate logistics as a

strategy that is developed by large corporations and State logistics would be when the State performs interventions in the transport sector through works, taxation, or other actions. In Brazil, InfraAero has Air Cargo Terminals known as “Teca” that are located at airport centers using Electronic Data Interchange to bring efficiency to logistics operations. Airport centers are responsible for connecting various links in the supply chain, whether customers, suppliers, inputs, technologies, or various sectors that work for the same purpose. Airport centers are usually inside or near airports, to contribute to the logistics of air transport by signaling actions in a short time, optimizing processes, monitoring minimum stocks, and distributing deliveries to various destinations (SOARES, 2015; MELACINI; MARCHET; PEROTTI, 2013; ARCAR; UCAN; TAŞÇI, 2016; SOUZA; SOUZA, 2013; FERNANDES, 2012; TADEU *et al.*, 2010; CAPPA; SOUZA, 2010; MOORI; FELIX; LELIS, 2013).

According to the Oxford Economics report for the Air Transport Action Group (ATAG), the movement of air cargo reaches 62 million tonnes per year. In 2017, for example, the balance was six trillion dollars generated in air cargo transactions around the world. In Latin America and the Caribbean, air transport and its industry directly generated 813,600 jobs. According to the Brazilian Ministry of Infrastructure, the increase in air cargo handling in the country in 2017 was 10.47% in national and international transactions (IATA, 2018; MINISTRY OF INFRASTRUCTURE, 2018; ATAG, 2018; OLIVER, 2014).

3 MATERIALS AND METHODS

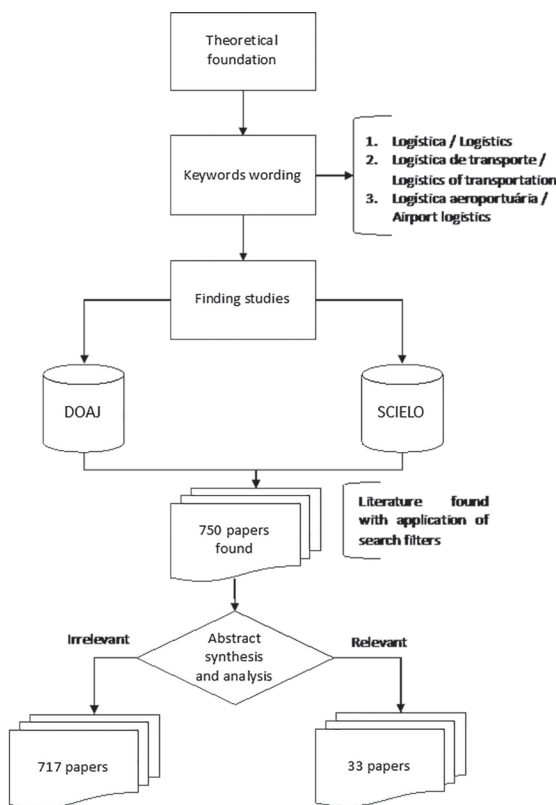
The literature review helps to advance the study (COLICCHIA; STROZZI, 2012). The methodology chosen was a literature review, a structured method that is used to find studies in a specific area, to research it. Several steps are used to collect and analyze the works found according to the theme to be addressed (DEMO; FOGAÇA; COSTA, 2018).

The first action of this work was to look at the literature to choose the keywords so that it covered all the content about the theme to not have contradictory biases in the searches. Understanding the didactics of the steps in Figure 2, data collection was divided between Location of studies Analysis and Abstract Synthesis. To that, it manages a research portfolio where the chosen theme is applied. In the location, the base filters and the quantification of the studies found were applied. In the Abstract Analysis and Synthesis, the studies were put in a new review in an abstract way to compose this work on the theme. Figure 2 shows the steps of the methodology used for the systematic review of the literature on airport transport logistics and then conceptualized each stage of the research.

- **Stage 1:** Theoretical Foundation - in this stage an explanation of the relevant concepts of the approached theme was carried out, dividing the foundation through the studies reported. Through the research carried out on a theoretical basis was possible to choose and determine the keywords of the area covered.
- **Stage 2:** Formulation of keywords - based on the theoretical basis, these keywords were chosen and used in Portuguese and English: logistics (*logística*), logistics of transport (*logística de transporte*), and airport logistics (*logística aeroportuária*) to compose the article to direct it objectively.
- **Stage 3:** Locating studies - in this third stage, as described in Figure 2, two bases were selected to search for articles inside the theme addressed, these are: DOAJ and Scielo.
- **Stage 4:** Quantification of studies found - 750 articles on the topic were found in this stage based on the keywords logistics, logistics of transport, and airport logistics, the explanation of what was found, and the search filters applied in the databases are in the following topic, the 3.1 Finding studies.
- **Stage 5:** Analysis of studies; after reading

the articles, it was decided to discard 717 articles due to the lack of relationship with the studied theme, leaving 33 articles considered relevant to the theme of this research. Relevant articles will be presented in the next section.

Figure 2 - Methodology Structure



Source: the authors.

4 RESULTS AND DISCUSSION

In the present study, two research bases were selected: DOAJ and Scielo, each base was applied with limited filters, according to the organization of the bases. In the search engine of the DOAJ database, the selection of articles from the Business (1), Industrial Engineering-Management Engineering (2), Social Sciences (3), and Transportation Engineering (4) areas was limited.

In the search on the Scielo database were language filters: English and Portuguese, from thematic areas: (1) Production Engineering, (2)

Applied Social Sciences, (3), Transport, and (4) Management, besides, was limited to selecting an option from just one article. However, it was not possible to use articles that use the following keys: Logistics of Transport - Logística de Transporte and Logistics of Air Cargo - Logística Aeroportuária, however, studies related to these keywords were found in the use of the first keyword in this article Logistics - Logística.

Table 1 shows the number of articles located in the DOAJ and SciELO databases. A total of 750 articles were found in these two databases from 1996 to 2018. For the keyword Logistics / Logística in the DOAJ database, 100 articles were found, while in the Scielo database 650 articles were found. Of the 100 articles located at DOAJ 61 were linked to the keyword Logistics of Transport / Logística de Transporte and only 1 was linked to Logistics of Air Cargo / Logística Aeroportuária. As for the Scielo database, of the 650 articles found, only 3 were linked to the keyword Logistics of Transport / Logística de Transporte and none to the keyword Logistics of Air Cargo / Logística Aeroportuária.

Table 1 - Articles founded at DOAJ e SCIELO between 1996 to 2018

	DOAJ (1996-2018)	SCIELO (1996-2018)
Logística/Logistics	100	650
Logística de Transporte/Logistics of Transportation	61	3
Logística aeroportuária/Airport Logistics	1	0

Source: the authors.

After reading 750 articles, it was decided to discard 717 articles and to study abstractly 33 articles that were relevant to the theme of this research. The searches in the databases using the filters were carried out in January 2019. Charts 1 and 2 presented below were divided by database, specifying the keyword and the subcategory of the indicator, the authors and the year of publication of the article, the title of the article, and the summary, importance, and result of the studies.

Chart 1 - Relevant articles found in the DOAJ database

KEYWORDS AND SUBCATEGORIES	AUTHORS AND YEAR	TITLE	ABSTRACT
Keyword Logística <i>Logistics</i> Subcategory <i>Industrial engineering.</i> <i>Management engineering.</i>	Soares and Caixeta Filho (1997)	Characterization of the highway freight market for agricultural products	A survey of values was carried out for agricultural products and the main characteristics of the road flow of agricultural cargo, the study concluded that many factors are related to the value of freight. And formal hiring is not taken into account because of the high cost it has. The study used points of intersections in variables for conclusions. They concluded that it is necessary to have freight calculated through costs common to the transport market and that there is a differentiation in freight according to the type of product transported.
	Bowersox and Closs (1997)	Brazilian logistics: a time for transition	It discusses the logistical dimensions used by multinational organizations to find differentiation in their capacities in the face of competition and mentioned the logistical capacity during World War II to contribute to the development of the United States. Reports six management initiatives, and scores them: Customer Success, Functional Excellence, Internal Process Integration, Supply Chain Alignment, Process Performance Metrics, and Financial Impact Linkage. Also, they focus on their observations that bring suggestions for management initiatives. It concludes that Brazil has challenges for the 21st century and logistics professionals in the face of increased demand. The practice of excellent international logistics is exposed to excellent knowledge through management reporting seminars, among others.
	Macedo and Canen (2009)	Cultural Diversity And Third Party Logistics Services: An Exploratory Study	This study tried to find, through a multicultural approach, the cultural aspects of the provision of logistics services, through a case study of four Logistics Service Providers. With the focus on showing the impact of the different strategies present in the multiculturalism of companies, the study demonstrated which are the cultural issues that benefit the relationship between companies in the logistics area. Both the contracting companies and the Logistics Service Providers, face difficulties in the short term. With this exploratory case, the following results were obtained: there are different understandings about what multiculturalism is, cultural diversity is clear for one of the companies studied, Brazil has barriers for Logistics Service Providers on cultural issues, the cultural issue affects negotiations, and it is easy to implement new ideas in a different environment internally for companies.

KEYWORDS AND SUBCATEGORIES	AUTHORS AND YEAR	TITLE	ABSTRACT
Keyword Logística Logística Subcategory Industrial engineering. Management engineering.	Conceição and Quintão (2004)	Evaluation of the logistic performance of Brazil's soft drink supply chain	The study focused on analyzing through four links in the supply chain (suppliers of soft drink packaging, soft drink industry, wholesale, and supermarket) the logistical performance of the Brazilian chain regarding soft drink supplies. He applied the electronic survey methodology, also using structured questionnaires for the links in the chain, with dimensions of the company's internal and external logistics. Central indicators were pointed out for calculations and statistical tests to design comparative analyzes between evaluations of logistic performance. It is concluded that the cost of stock and storage of goods in this sector is poorly evaluated in the industry, and logistics are better used internally than externally
	Amaral, Almeida and Morabito (2012)	A model for flow allocation and location of intermodal terminals for the Brazilian soybean exports	The study suggests a model of flows and locations of intermodal terminals for the transportation of agricultural products for export. With a minimum flow as one of the following aspects, he represented the transport system in networks (road, waterway, and railway) using mathematical formulations. The applied model is suitable for the sector and the choice of intermodal terminals is either in location binary variables or non-negative flow variables to allocate intermodal flows in the network.
	Barros (1997)	A global view of industrial logistics	The research seeks to find a definition for the term "industrial logistics", using categories of logistical support activities. The following sentence is scored: materials management + distribution = logistics. So, it is established that industrial logistics includes all activities that relate to the world before and after the production of services.
	Ballou (1997)	Business logistics: importance and some research opportunities	The presented study reveals how the design of the logistics network is and how it is helped by computational modeling. The research also suggests research opportunities in the area. The study unravels the importance of business logistics through topics such as the importance of costs, globalization of industries, logistics as a strategic foundation, and response to customer service. In this way, the article highlights three variables to satisfy the consumer of the logistics service: strategy in location, strategy in transportation, and strategy in inventory management. It also addresses territorial and temporal models and reveals the research opportunities on customer service logistics, inventory management, transportation, location, and data issues. Finally, it is considered that business logistics is a relevant area for business management.

KEYWORDS AND SUBCATEGORIES	AUTHORS AND YEAR	TITLE	ABSTRACT
<p>Keyword Logística <i>Logistics</i> Subcategory <i>Industrial engineering.</i> <i>Management engineering.</i></p>	<p>Yoshizaki, Muscat, and Biazzi (1997)</p>	<p>Redefining the logistics of ethanol-fuel distribution</p>	<p>The research seeks to show the economic advantage involved in the decentralized distribution of ethyl alcohol so that it used an investment analysis model for some points of view: Government (society), distributor, and Distributor + COSAN consortium. He defined the problem in focus through the number of associated nodes and used the overflow model. The result obtained was that when choosing distribution terminals built close to the plants, they have reduced costs and the return-on-investment time, in this case, would be from two up to two and a half years.</p>
	<p>Fleury, Avila and Wanke (1997)</p>	<p>Seeking effectiveness in third-party transportation: cost structures, partnerships, and increased efficiencies</p>	<p>The study describes three reasons why cargo loading and unloading operations in Brazil are not efficient and present a rational model for transport costs. The article discusses the logistical activity of transportation, decision-making in carriers, logistics partnerships, and commercial partners in the sector, among others. The mode of transportation used for discussion is the road and a single type of product to an exclusive contractor. After development throughout the study, using accounting costing formulas, potential gains are quantified, as well as the percentage shares of costs involved in the process and the practical part concludes with the definition of margin for the operation partners. It was understood, therefore, that the technology involved influences the functioning and flow of information, one should aim at the perspective of the contractor and the contractor, among other resolutions. In short, the study described that there are numerous options for cost reduction in transport logistics in the mentioned characteristics.</p>
<p>Keyword Logística <i>Logistics</i> Subcategory Business</p>	<p>Andrioli, Diehl and Hansen (2016)</p>	<p>Proposal for a Flexible Model for Decision Support of Outsourcing: an Application in Transportation Logistics</p>	<p>The objective of the article is to use transport logistics to test and develop a model for economic-strategic analysis to support externalization decisions. The quantitative and qualitative application of the study led to the conclusion that it is indicated to outsource the fleet through the supplier's option and revealed that the model is of value to support the area's decisions regarding fleet outsourcing.</p>

KEYWORDS AND SUBCATEGORIES	AUTHORS AND YEAR	TITLE	ABSTRACT
Keyword Logística <i>Logistics</i> Subcategory Business	González (2002)	Logistics: total cost, decision-making, and future trends.	The present study exposes the reality of logistics, discussing concepts of the sector, such as supply chain, and decision-making in its processes (low price, costs, and total value for the consumer). It also discusses the types of costs in the hierarchy model and future trends in the logistics sector. Finally, it considers that, with globalization, integrated logistics has been revealed to new market demands and that this logistics is a new vision of study, as it includes several other areas in its composition.
Keyword Logística de Transporte Logistics of Transportation Subcategory Business	Jiménez, Figueroa and Arroyo (2012)	Logistics Competitiveness: Mexico vs BRICS	The study reveals the competitiveness between some countries (Brazil, Russia, India, and South Africa) regarding logistics compared to Mexico. The research is based on the 2012 competitiveness report published by the World Bank using some variables. This paper revealed another level of analysis of logistical competitiveness among the countries in addition to the World Bank report using the Valenzo-Martínez methodology. According to the application of the aforementioned methodology, the logistical performance position between countries: in South Africa and China (in the highest position), Brazil, India, and Mexico (in the regular position), and Russia (in the lowest position).
	Antoniolli <i>et al.</i> (2015)	Outsourcing of logistics transport: A Brazilian leather industry case study	The research is proposed to analyze the Brazilian transport sector using a study case of the leather industry, understanding the growth of outsourcing logistics and considering what would be the most relevant criterion for outsourced transport for leather distribution. Concluding that an organization can save 60% in transportation costs, increasing its operational level.
	Yemal and Pascotto (2009)	Sugar exports: the containerization of sugar sacks	The study discussed the importance of exporting sugar through containers. Through a detailed description of logistics, international trade, ports, production, and sugar in Brazil, it concluded that companies in the airport sector need to adapt to the transformations that refined sugar transport has to add value to the product through the management strategy of logistics operations.
	Detofol, Rauta and Winck (2018)	Logistics applied in the commercial egg production process	The article used an exploratory methodology about logistics and discussed the supply chain and its respective purposes to obtain improvements in the logistics process. The study concluded that the correct application of the logistics methods promotes improvements in several aspects: activity time and labor, employee satisfaction, management of production resources, and product quality.

KEYWORDS AND SUBCATEGORIES	AUTHORS AND YEAR	TITLE	ABSTRACT
<p>Keyword Logística de Transporte Logistics of Transportation Subcategory <i>Social Sciences</i></p>	<p>Silva, Araújo and Brito (2018)</p>	<p>Intermodal logistics in the state of Rio Grande do Norte: an exploratory study</p>	<p>The research focused on exposing the barriers to logistical integration in the state of Rio Grande do Norte, interviewing professionals with experience in the air, road, and sea modes in the state. The study concluded that the main challenge is infrastructures and passageways en route to the port and airport of poor quality and the absence of a railway modal. Thus, it is considered a problem for the application and use of intermodality within the State for cargo transportation.</p>
<p>Keyword Logística de Transporte Logistics of Transportation Subcategory <i>Industrial engineering Management engineering</i></p>	<p>Silva (2014)</p>	<p>Intelligence logistics: a study on the implementation of a logistic platform in the southern state of Tocantins</p>	<p>The study emphasizes that there is a need to use logistical intelligence for the integrated planning of Brazil's transport infrastructure. Logistics platforms are highlighted as a response to economic frontiers, uniting factors such as cost reduction, and application of efficient services in levels. The study is concluded in thirteen stages and considers that the Logistics Platform is relevant to cases of need to create differentiated alternatives for companies that want these services in the face of competition.</p>
	<p>Colona, Kelch and Gomes (2018)</p>	<p>Reduction of operational costs in the management of load distribution by using the ABC and solver curve tools: a case study of a logistic operator in São José dos Campos – sp</p>	<p>The study sought to observe the distribution process of the main customers of a logistics operator in São Paulo to result in reduced costs and improvements. In addition to the bibliographic method, the research applied a quantitative methodology. The data collection made it possible to apply the ABC curve and linear programming in such a way that it was concluded that only two of the logistics operator's customers are responsible for 90% of the revenue, in addition to this the study allowed the reduction of operating costs by R \$ 32,500.00 monthly.</p>
	<p>Macário <i>et al.</i> (2017)</p>	<p>The constraints faced in the distribution of fractional loads: a case study</p>	<p>The study uses the HUB head-up butt operation in an organization to recognize the barriers regarding the distribution of fractional loads since the road transport companies lost market during the economic crisis due to several factors. The research mentioned the theory of restrictions related to logistics and explored literature on the topic in other topics. He used a comparative-statistical method and concluded that there was an absence of planning in the operational flow and poor use of the physical space. A new layout was the answer to the problems mentioned, reducing costs and optimizing time. It also concluded that the restrictions found externally are not as relevant to the company as the internal conditions.</p>

KEYWORDS AND SUBCATEGORIES	AUTHORS AND YEAR	TITLE	ABSTRACT
Keyword Logística aeroportuária/ <i>Airport Logistics</i> Subcategory Industrial engineering Management engineering	Cappa, Sperancini and Cunha (2017)	Analysis of Viracopos international airport as integrated infrastructure into business strategies in the international market	The present study analyzes between the years 2010 and 2015, the relevance of Viracopos international airport for inducing regional development. The study concludes that there is a need to implement a systemic view of transportation as an economic activity for a Metropolitan Development Plan. The methodology that supported the study was to use public and private investment records in the Campinas region and use the research empirically.

Source: the authors.

Chart 2 - Relevant articles found at Scielo database

KEYWORDS AND SUBCATEGORIES	AUTHORS AND YEAR	TITLE	ABSTRACT
Keyword Logística Logística Subcategory Engenharia da Produção Ciências Sociais Aplicadas Transporte Gerenciamento	Fialho and Martins (2016)	The Institutional elements and logistics performance of a public pharmaceutical care network.	The study used quantitative methods through structural equation modeling to understand the elements that impact the logistics of a public pharmaceutical assistance organization. Two models were applied, one with mediation and the other directly addressing logistics performance. The results showed that several logistical operations within pharmaceutical assistance are seen as rules and that as professionals follow institutionalized practices, the performance of logistics is greater. Thus, the study contributes to assisting decision-making by managers in the public sector and pharmaceutical sector about logistics.
	Moori <i>et al.</i> (2015)	The effect of the type of product and the logistics capabilities on the order delivery cycle	The study focused on the importance that logistical capabilities demonstrate regarding the offer of products at low prices to consumers and the speed of service, in addition, the research sought to understand the effect of the type of product exported. By applying a quantitative approach with 56 managers in logistics and supply chains for various products, through exploratory research. He concluded, therefore, that there is no relationship between logistical capabilities and the type of product to be exported and induced those other factors (logistics infrastructure, exchange rate, among others) probably influence logistics efficiency. It suggests that there are studies on the same theme on subjects such as rate of return on investments, obsolescence of stocks, and customer satisfaction.

KEYWORDS AND SUBCATEGORIES	AUTHORS AND YEAR	TITLE	ABSTRACT
	Faria, Souza and Vieira (2015)	Evaluation of Logistic Performance Indexes of Brazil in the International Trade	The study reported the index of the performance of logistics in Brazil concerning the largest competitors of foreign trade, for this purpose, using data provided by the World Bank, SECEX, and COMTRADE. The literature review describes descriptions of logistical aspects and in the methodological section, it establishes three questions as well as some other criteria for selecting the countries to be compared, finally, it uses an equation to calculate the competition grid. 39 major competitors from Brazil were selected and the United States ranked first.
Keyword Logística <i>Logistics</i> Subcategory Engenharia da Produção Ciências Sociais Aplicadas Transporte Gerenciamento	Moore and Riquetti (2014)	Cargo Transshipment Stations as Logistic Mediators for the Fertilizer Industry	The purpose of this study was to check the importance of transshipment stations for fertilizer logistics. With the data collection, the authors conclude that the integrated management can impact directly or indirectly the fertilizer companies, also that the availability of the road modal is insufficient for the sector, in addition, he encountered challenges in the use of intermodality, however, it remains a preferred option for fertilizer companies.
	Almeida and Marcondes (2014)	Physical distribution is a strategic resource for consumer goods manufacturers aiming at achieving a competitive advantage.	The study proposed to understand the aspects that influenced the possibility of competitive advantage for manufacturers of consumer goods through physical distribution. Therefore, the researchers used a descriptive and exploratory methodology with a resource-based view (VBR). At the end of the results obtained, he considered that the main sources of potential competitive advantage are intellectual capital, the culture of services, and collaboration between participants.
	Santos and Sobral (2014)	Evaluation, prospects of use, and expansion of services regarding metropolitan trains in Brazil	The study aimed to investigate the situation of the use of the services of Brazilian metropolitan trains. Bibliographic data collection and field research was used in the methodological process. The article concluded that the services present expansion failures and communication barriers with society.

KEYWORDS AND SUBCATEGORIES	AUTHORS AND YEAR	TITLE	ABSTRACT
Keyword Logística <i>Logistics</i> Subcategory Engenharia da Produção Ciências Sociais Aplicadas Transporte Gerenciamento	Rezende, Lima and Versiani (2012)	The evolution of knowledge in the buyer-supplier relationship	The study aimed to understand the impact that logistics, the market, and the evolution of technological knowledge have on the buyer-supplier relationship. To obtain the discussion and results, it used the relationship between the two companies and applied a qualitative methodology. From the information received, it concluded that the evolution of this knowledge involved in the relationship is by the type of knowledge that one has (logistical, technological, or market knowledge).
	Pimenta, Silva and Yokoyama (2011)	Integration between logistics and marketing: critical factors in the interaction and collaboration's perspective	The study aimed to recognize elements that strengthen or hinder the integration of the Logistics and Marketing areas to increase the performance of organizations. It discussed concepts such as formal and informal integration. In the methodological approach, the character of the research is qualitative, as it used a bibliographic review and interviews. He concluded that managers in the areas of logistics and marketing have factors that hinder the integration of the areas.
	Martins <i>et al.</i> (2011)	Transportation management oriented for customers: service level desired and perceived	The study aimed to target transportation as service management through a survey of 400 small and medium-sized Brazilian industrial shippers to understand the essential aspects of the shippers' demand. The study was based on a Factor Analysis, obtaining conclusions that Safety, Reliability, Time, Price, and Service are the constructs best recognized by shipping companies.
	Martins and Xavier (2011)	Attributes of Transport Service in Retail-Industry Relationship	The study aimed to understand the transport management of industrial companies providing retail services. With this, a statistical method with a non-probabilistic approach was applied, evaluating the service provided through four factors. At the end of the research, it considered that there is a need to increase the number of levels of the distribution channels and that the attendances at the factory have a lower level than the others.

KEYWORDS AND SUBCATEGORIES	AUTHORS AND YEAR	TITLE	ABSTRACT
Keyword Logística <i>Logistics</i> Subcategory Engenharia da Produção Ciências Sociais Aplicadas Transporte Gerenciamento	Vaz and Lotta (2011)	The contribution of integrated logistics to public policy management decisions in Brazil	The study focused on the identification and systematization of logistical components for the management of Brazilian public policies. Thus, integrated logistics used a detailed description of the theme and considered that the knowledge and application of integrated logistics are necessary for the success of public policy decisions within the country.
Keyword Logística <i>Logistics</i> Subcategory Engenharia da Produção Ciências Sociais Aplicadas Transporte Gerenciamento	Wanke (2005)	Logistics strategy dynamics in Brazilian Companies	The article proposed to analyze the logistic strategy measuring the relevance of different business characteristics for Brazilian companies, focusing on the production decisions and physical distribution of finished products. It used quantitative approaches and concluded that the suitability for each policy is dependent on the delivery time and that although the sample is not as large compared to the population in the sector, the mathematical models used to understand the study theme can be used in future research.
	Wanke (2003)	The impact of business characteristics on logistical decisions and product flow organization: an exploratory study in six economic sectors	The study proposed an assessment of the logistics decisions for managing finished flows with product characteristics, operation, and demand. It used a correlation analysis with the six largest industrial sectors. And it concluded with the establishment of two different tables to assist in decision-making at different levels and characteristics of the business.

Source: the authors.

After analyzing synthetically and in an abstract way the studies found in the area, it was noticed that most of the research in the logistics area has several studies related to industrial sectors of production of consumer goods, also, the studies directly related to the transport and distribution of goods are based on finding performance indexes within organizations or on the use of transport intermodality.

Another important recognition was that many of the studies have focused on how to use accounting costing within the logistics sectors or used costing methods to foster studies. Re-

garding the studies in the airport sector, there were gaps in the literature, since only one article was found in the DOAJ database on the subject and no article in Scielo.

This study was used throughout the Introduction and Theoretical Foundation articles from other bases to support the concepts discussed (logistics, logistics of transport, and logistics of air cargo), and only in this way, it was possible to discuss airport logistics, in such a way that, it was necessary to be searching for data and information on governmental and non-governmental websites that contain information on the topic.

5 CONCLUSION

In the scenario of Brazilian literature production, the area of operations management has developed in a relevant and growing way compared to other areas. Throughout this study, it was possible to understand that logistics is an indicator of organizational performance in several sectors of the Brazilian economy, whether as transport activity or other activities.

When focusing on transport logistics, it also found that this is one of the most relevant themes in the Brazilian operations sector and that it is important to produce qualitative or quantitative studies that contribute to the national performance of the transport sector. Finally, this study presents suggestions for future literary productions in the Logistics of Air Cargo, with guidelines for accounting costs, indices of logistical performance in air cargo terminals, and the application of tools to support decision-making within airport centers.

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