

# Aviation policy development and market transformation in Vietnam

学位名	修士(海洋科学)
学位授与機関	東京海洋大学
学位授与年度	2022
URL	<a href="http://id.nii.ac.jp/1342/00002530/">http://id.nii.ac.jp/1342/00002530/</a>

**Master's Thesis**

**AVIATION POLICY DEVELOPMENT AND  
MARKET TRANSFORMATION IN VIETNAM**

**September 2022**

**Graduate School of Marine Science and Technology  
Tokyo University of Marine Science and Technology  
Master's Course of Marine Technology and Logistics**

**LE HONG KIM CHI**



**Master's Thesis**

**AVIATION POLICY DEVELOPMENT AND  
MARKET TRANSFORMATION IN VIETNAM**

**September 2022**

**Graduate School of Marine Science and Technology  
Tokyo University of Marine Science and Technology  
Master's Course of Marine Technology and Logistics**

**LE HONG KIM CHI**

## Table of contents

Abstract .....	i
1. Introduction .....	1
1.1 Research background .....	1
1.2 Research objective and research method .....	1
1.3 Research Structure .....	2
2. History and policy development of Vietnam aviation industry .....	3
2.1 History of Vietnam aviation industry. ....	3
2.1.1 The period from 1956 to 1975 .....	3
2.1.2 The period from 1976 to 1989 .....	3
2.1.3 The period from 1990 to now .....	4
2.2 Development of Vietnam aviation policy .....	5
2.2.1 Entry and designation.....	6
2.2.2 Ownership and control. ....	6
2.2.3 Market access .....	7
2.2.4 Price regulation .....	9
3. Literature review .....	11
3.1 Factors affecting air passenger demand and price .....	11
3.2 Deregulation impacts on aviation .....	15
3.3 LCC and its impact on aviation market .....	16
4. The development of Vietnam domestic aviation market.....	19
4.1 Overview of Vietnam domestics aviation market.....	19
4.1.1 Market growth.....	19
4.1.2 Market players.....	21
4.2. The rise of LCC in Vietnam – The case of Vietjet Air.....	24
4.2.1 Business performance .....	24
4.2.2 Cost .....	27
4.2.3 Airfare .....	30

5. Data and Methodology .....	31
5.1 Regression model.....	31
5.2 Variable description .....	32
5.2.1 Demand regressions .....	32
5.2.2 Vietnam Airline’s pricing regressions .....	34
5.3 Data sets .....	36
6. Empirical results.....	37
6.1 Demand regressions .....	37
6.2 Vietnam Airline’s pricing regressions .....	39
7. Conclusion and Discussion .....	40
Appendix 1 .....	42
Appendix 2 .....	43
Appendix 3 .....	44
References .....	45

## **Abstract**

From a military unit in 1960s, today, Vietnam aviation sector has transformed into a big business serving millions of domestic and international passengers. Such evolution is driven by several amendments in Vietnam aviation policy. Thus, this research seeks to answer two questions: How has Vietnam aviation policy developed and how has the aviation market transformed since then?

To address those questions, the research conducted: (i) the review of Vietnam aviation policy through years of amendment; (ii) the comparative analysis between Vietjet Air (with its successful low-cost model after deregulation) and Vietnam Airlines (the national carrier); (iii) the regression analysis using gravity model regarding the impact of several factors (including low-cost carrier's presence) on total flight frequency and Vietnam Airlines' yield on a specific domestic route.

Deregulation started after the Government realized that the first aviation law of 1991 did not support market development and therefore began to revise it. Aviation law was amended in 1995, 2006 and 2014. Significant amendments include ownership, market access and price. Foreign ownership ratio was deregulated from 30% to 34%. Private airlines have been granted the rights to explore new domestic routes. Maximum airfare was implemented according to flight distance but there is no limitation on minimum level.

The market has changed since then. From under two thousand passengers in 1995, the aviation sector then served approximately 36 million domestic passengers in 2019. Several private airlines came into operation such as Vietjet Air and Bamboo Airways. As there is no limitation on floor price, airlines can lower its airfare freely to attract more customers. Remarkably, since 2011, the market witnessed the rise of Vietjet Air, as the first private low-cost carrier (LCC). It is no surprise that market

share of Vietjet Air surpassed Vietnam Airlines in 2018. Compared to other competitors (Vietnam Airlines, Pacific Airlines and Bamboo Airlines), Vietjet Air offers the lowest fare. As a LCC, it always keeps the load factor high while operates at low cost.

Regarding the demand regressions, GRDP per capita has positive and significant sign as expected. HHI also shows negative and significant effect. This implies that for Vietnam aviation market, the more airlines on a route, the lower the concentration and the higher the flight frequency. Regardless the effect of competition, the presence of LCC has positive and significant impact on demand since LCC attracts a new set of customers rather than taking away those of FSA.

Regarding the Vietnam Airline's pricing regressions, regardless the LCC presence, market concentration degree – HHI as expected shows positive but significant effect which implies that Vietnam Airlines will increase their price on the less competitive routes . As expected, LCCs have negative and significant impact on yield which confirms that in those routes where LCCs enter the market, Vietnam Airlines will set lower airfares.

In short, it can be said that the main drivers for the development of Vietnam aviation market include economic growth, market deregulation and the emergence of LCC.



# **1. Introduction**

## **1.1 Research background**

The aviation industry plays an important role for a country's development. Nowadays, almost all industries and sectors of each country and the entire world are affected by air transport directly or indirectly to some extent. The impact of air transport on the entire national economy of each country and on a global scale can be seen in several areas. Aviation is the tool to expand business on a global scale, promote the development of international tourism and create the international integration among countries.

In recent years, Vietnam aviation industry has developed rapidly making great contributions to promote industrialization and modernization. The sector is one of the important bridges for Vietnam international economic integration process. This rapid development is based on major drivers including market deregulation, the emergence of low-cost carriers, and strong economic growth.

With the loosening of aviation business conditions from Vietnamese government and ASEAN Open Skies development, it can be said that competition in this developing market will be fiercer in the future with an increasing number of carriers.

Following the remarkable development, the issue regarding Vietnam aviation market policy and transformation needs to be taken into consideration; however, the number of related research in Vietnam is still limited.

## **1.2 Research objective and research method**

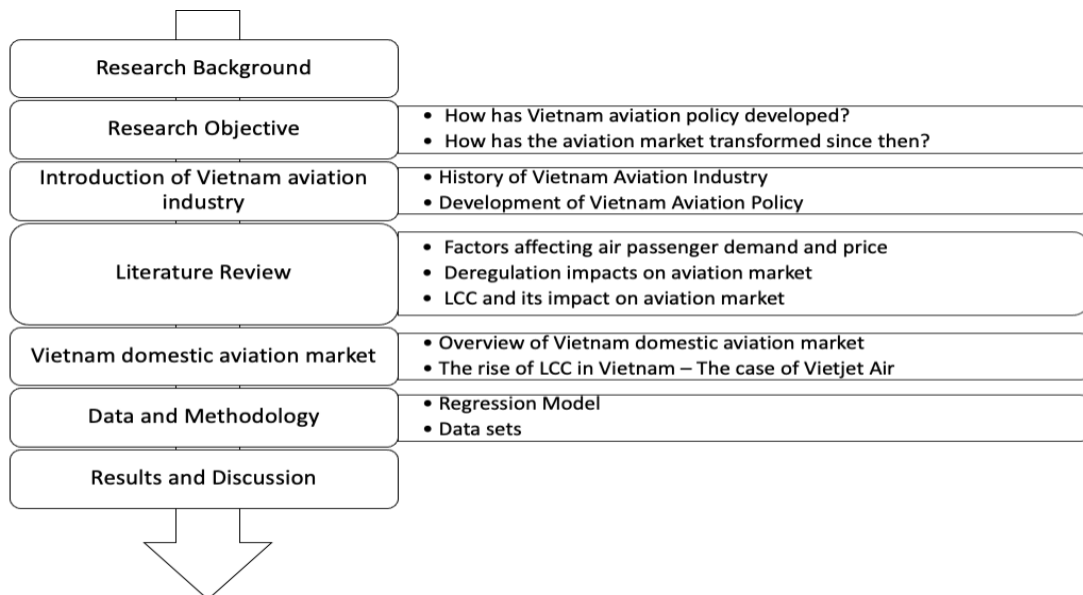
The purpose of this research is to evaluate the development of Vietnam aviation policy and to analyze the transformation of Vietnam aviation market. To justify those aforementioned issues, the research conducted: (i) the review of

Vietnam aviation policy through years of amendment; (ii) the comparative analysis between Vietjet Air (with its successful low-cost model after deregulation) and Vietnam Airlines (the national carrier); (iii) the regression analysis using gravity model regarding the impact of several factors (including low-cost carrier’s presence) on total flight frequencies and Vietnam Airlines’s airfare on a specific domestic route.

### 1.3 Research Structure

This research is structured as follows: Chapter 2 overviews the history and policy development of Vietnam aviation industry. Chapter 3 presents the literature review on determinants of passenger flow and price as well as the past studies relating to deregulation and low-cost carrier. Following this, Chapter 4 introduces the Vietnam aviation market and presents the comparative analysis between LCC and other carriers. Chapter 5 discusses the methodology and data set used in the empirical part of this study. Chapter 6 provides the empirical results. Finally, Chapter 7 concludes and gives some further discussion.

**Figure 1. Research flow**



## **2. History and policy development of Vietnam aviation industry**

### **2.1 History of Vietnam aviation industry.**

Due to the wars in the past, the formation and history of the aviation industry is divided into the three following phases: (i) The period from 1956 to 1975 ; (ii) The period from 1976 to 1989; (iii) The period from 1990 to now.

#### **2.1.1 The preperiod from 1956 to 1975**

This was the era of the national liberation war. During this period, the aviation industry was organized into the Civil Aviation Administration of Vietnam (CAAV), under the management of Ministry of National Defense. CAAV, established in 1956, performed three functions simultaneously: (i) national defense, (ii) state management and (iii) air transport business. In the early years of establishment, there were only a few medium and light propeller type of aircraft such as IL-14, AN-2, Aero-45. During this time, a number of routes were exploited in North Vietnam such as from Gia Lam to Quang Binh and Son La but the Government subsidized completely. The main task of the aviation industry was to serve national defense; the air transport business was just a secondary task.

#### **2.1.2 The period from 1976 to 1989**

During this period after reunification, to meet the needs of economic development and national defense, the CAAV was still under the leadership the Ministry of National Defense and was organized as a military unit. Although it was an organization with the main function of doing business in air transport, at this stage, the CAAV operated completely under the subsidy mechanism. It is basically understood as the mechanism in which a country's economy operates under the Government's control on factors of production as well as income distribution. The aircraft fleet of this time has been added with a number of aircraft such as IL-62, DC-6, TU134. International routes were opened respectively to Laos, Cambodia,

China, Thailand, Malaysia, Singapore... However, the air transport business in this period still achieved low efficiency due to its implementation in the context of the subsidy mechanism and limited market. On April 12, 1980, Vietnam officially became a member of the International Civil Aviation Organization (ICAO).

### **2.1.3 The period from 1990 to now**

This is a period marking the strong development of the aviation industry in terms of both organization and business performance in the cause of economic renewal and market deregulation.

In order to be in line with the economic development strategy in each period, from 1990 to now, the aviation industry has undergone many changes in organization and management mechanism as shown in Table 1. Such changes include the enactment of Vietnam first Civil Aviation Law in 1991 and the establishment of Vietnam Airlines in 1993.

**Table 1. Some events of Vietnam aviation market during the period from 1990**

<b>Year</b>	<b>Events</b>
<b>1989</b>	Vietnam Aviation Corporation was established for the first time.
<b>1991</b>	The first Civil Aviation Law was passed by Vietnam National Assembly.
<b>1993</b>	The Government established the national airline – Vietnam Airlines.
<b>1996</b>	The Government established Vietnam Airlines Corporation on the basis of taking Vietnam Airlines as the core and linking 20 enterprises operating in the industry.
<b>2001</b>	The CAAV was transferred to the Ministry of Transport.

*Source: Civil Aviation Administration of Vietnam*

In 2001, the aviation industry was unified in which the CAAV now under the Ministry of Transport. CAAV performs the function of regulating and managing enterprises in the industry, including Vietnam's national airline, airport clusters, flight management center and other enterprises.

During this period, the industry's aircraft fleet was transformed from the out-of-date Soviet aircraft technology line to modern American and Western aircraft such as Boeing, Airbus, ATR, Foker. Airports and air traffic management services are modernized to serve the development requirements of air transport. Private airlines also came into operation such as Vietjet Air and Bamboo Airways. The route network has been gradually expanding to all continents in the world and the market has experienced high growth steps.

## **2.2 Development of Vietnam aviation policy**

Wassenbergh (1962) stated that international air transport is characterized by several factors such as the routes flown by the various airlines, the flight frequency with which these routes are flown, the capacity of the aircraft flying them (number of seats, aircraft size), and the airfares. Each of these factors forms a point which can be seized on by nations and made the subject of aviation regulations, thus allowing them to restrain unrestricted competition which is unfavored for their national airlines. Therefore, aviation policy is likely to be composed of regulations regarding entry and designation, market access (routes), ownership and control, frequency and price.

In Vietnam, Vietnam Civil Aviation Law was first enacted in 1991. The declaration of this law mostly created an essential legal framework for Vietnam civil aviation's management and development. Nonetheless, after some years of implementing, the Government recognized some drawbacks of the law that did not support the market transformation. Deregulation started as the law was revised in

1995, 2006 and 2014. Along with it, the Government has also enacted some decrees and circulars for implementation guideline.

The following part will give an overview of Vietnam aviation policy through regulations regarding (i) entry and designation, (ii) market access, (iii) ownership and control and (iv) price.

### **2.2.1 Entry and designation**

Regarding the entry to domestic market, according to the Civil Aviation Law in 1991 and so on, international carriers could not enter any domestic routes within Vietnam unless in case of (i) Prevention or combat of natural calamities or epidemics; (ii) Supplying emergency humanitarian relief.

For designation of airline, in most of Vietnam's Air Services Agreements (ASA) with other countries, Vietnam allows the multi-designation of airline with more liberalization towards air carrier ownership criteria. The designated airlines shall have its principal place of business in the Territory of the designating countries from which it has received the valid operating licence.

### **2.2.2 Ownership and control.**

When the Civil Aviation Law first passed in 1991, it was stated in Article 55 that only airlines established in accordance with the law of Vietnam may do business in aviation; however, there was no mention of foreign ownership. In 1995, it was then amended that a foreign-invested airline can operate if the Vietnamese party have sufficient capital and actual control conditions in accordance with the laws of Vietnam and international practices. However, there were no foreign capital enterprises operating during this time. Even though it was allowed, it was difficult to get a business license approved by the Government to operate.

It was not until 2006 that foreign investors were actually allowed to invest into local airlines with a limitation cap on ownership according Article 110 of Civil

Aviation Law 2006. This was the justification for the Australian airline, Qantas, to acquire a 30% stake in Pacific Airlines in 2007. Pacific Airlines was then restructured into a low-cost airline and renamed as Jetstar Pacific Airlines in 2008.

To be clear, in 2007, Decree No. 76/2007/ND-CP on air transportation business and general aviation stated that a foreign-invested airline must ensure its foreign ownership ratio shall not exceed 30% of the charter capital. This Decree was revised by Decree No. 89/2019/ND-CP in 2019 in which the Government raises the foreign ownership limit to 34% from the current 30%.

### **2.2.3 Market access**

#### **2.2.3.a Domestic market**

Regarding opening domestic routes, Civil Aviation Law in 1991 and 1995 did not mention anything about domestic air traffic rights; however, it is clear that during those times the Government focused only on the operations of the national airline as stated in Article 56. Therefore, hardly could any private airline open new routes.

Since the Civil Aviation Law 2006, private airlines have been granted rights to explore new domestic routes. Domestic air transportation rights are granted to Vietnamese airlines based on market demand, the capability of these airlines, the balanced development of air route networks, and national socio-economic development objectives.

Despite of that, private airlines often face problems in opening flight routes. They must go through several complicated administrative procedures to get approval from CAAV for route access and flight frequency. In contrast, the CAAV allows Vietnam Airlines to access new route faster than their private competitors. The Government also directly designates Vietnamese state-owned airlines to launch air routes to areas where there are essential needs for public air carriage in Article 115 of Civil Aviation Law 2006.

However, since 2012, the CAAV has constantly loosened the criteria for accessing domestic routes. According to Pham (2020), airlines with better performance on safety, on-time ratio and service quality have been awarded priority in launching new routes and increasing frequencies.

In addition, to develop hub-airports in central cities such as Hanoi, Ho Chi Minh City, Hai Phong, Da Nang, and Can Tho, the routes to these cities has been encouraged to open following the Article 17, Decree No. 76/2007/ND-CP of the Government on Air Transportation Business and General Aviation in 2017.

### **2.2.3.b International market**

Regarding international routes, since the Civil Aviation Law 1991 and so on, it is stated that foreign airlines may only provide transportation services from abroad to Vietnam and from Vietnam to abroad on the basis of aviation agreements signed with the Government of Vietnam.

Same as domestic routes' case, foreign airlines must also go through several complicated administrative procedures to get approval from CAAV for air traffic rights as stated in the Civil Aviation Law 2006.

In terms of Air Services Agreements (ASA), according to Vietnam's air transport market, legislations and regulations and policy during 2003-2013 (2013), from 1993 with only 20 ASAs, to 2013, Viet Nam has signed a total of 61 ASAs worldwide. In addition, Vietnam has officially signed five Multilateral ASAs including (i) CLMV Multilateral Agreement on Air Services, (ii) ASEAN Multilateral Agreements on Air Services, Air Freight and Full Liberalization on Passenger Transportation, and (iii) Viet Nam – EU Horizontal Agreement. Most of ASAs' clauses are in relation with global aviation liberalization, including the designation of airline and the expansion of the market access rights through codeshare agreements, freedom traffic rights, and etc.



#### **2.2.4 Price regulation**

Price regulations have been one of the concern for private competitors in Vietnam aviation market since it has been always regulated by the Government.

The 1991 Civil Aviation Law stated that the Government approved the air carriage rates which means air fare was completely regulated by the Government. Later in 1995, it was amended that the regular rates shall be submitted by the air carriers to the State management agency specialized in civil aviation for approval. In 2006 Amended Civil Aviation law, domestic air carriage fare was regulated to be decided by airlines within the frame prescribed by the Government.

In general, the price frame follows the principles for determining the price frame for air passenger transportation services which specified in Article 3 of the Circular No. 36/2015/TT-BGTVT dated July 24, 2015 of the Minister of Transport on management of service charges for domestic flights and prices for specialized aviation services. Even though, the government determines the price frame, it ensures that: (i) Prices are determined on the basis of actual and reasonable production and business costs; consistent with service quality, supply and demand situation in the market; (ii) The price level is consistent with the socio-economic development policy in each period and in line with the price level of the same type of service in the ASEAN region; (iii) The prices must ensure competitiveness and not abuse the monopoly power.

Price regulation currently follows Circular No. 17/2019/TT-BGTVT dated May 03, 2019 of the Ministry of Transport on the price frame for passenger transportation in the local routes as shown in Table 2. The price frame for domestic routes ranges from 0 (zero) VND to the maximum of each group of flight distance. The airline decides their price range of passenger transportation services within the price frame to ensure that it is consistent with the actual operation costs of each flight. In other words, maximum airfare was implemented according to flight distance but

there is no limitation on minimum level. As there is no limitation on floor price, airlines can lower its airfare freely to attract more customers.

**Table 2. Price frame for basic economy class of air passenger transportation**

<b>Group</b>	<b>Route distance</b>	<b>Maximum price (one way)</b>
<b>I.</b>	<b>Under 500km</b>	
<b>1.</b>	Routes for socio-economic development (to remote areas, border and islands and operated by only one airline.)	1,600,000
<b>2.</b>	Other routes under 500km	1,700,000
<b>II.</b>	<b>Routes from 500 km to 850 km</b>	2,200,000
<b>III.</b>	<b>Route from 850 km to 1,000 km</b>	2,790,000
<b>IV.</b>	<b>Route from 1,000 km to 1,280 km</b>	3,200,000
<b>V.</b>	<b>Route above 1,280km</b>	3,750,000

*Unit: Vietnam dong (VND)*

*Source: Circular No. 17/2019/TT-BGTVT dated May 03, 2019 of the Ministry of Transport*

In short, the amended aviation laws have provided a landmark in the deregulation and privatisation of the air transportation sector and given birth to many private airlines and other business enterprises in the aviation industry.

### **3. Literature review**

This chapter covers the review of some existing research papers regarding determinants of air passenger demand and price. Studies concerning the impact of deregulation and LCC's entry on aviation industry will also be taken into consideration.

#### **3.1 Factors affecting air passenger demand and price**

Commonly, when analyzing the determinants for air passenger demand, past studies used the gravity model. The gravity model is built on the concept of a relationship between airport demand and the casual factors. The model explains the flow of people between pairs of locations in terms of income and distance as well as other variables that could promote that flow. Table 3 displays some existing papers regarding the relationship between demand and some explanatory variables. Main variables often used in the model are income and distance. Additionally, authors such as Endo (2007), Zhang and Findlay (2014) and Zhang and Zhang (2016) also considered other factors that potentially influence air traffic flow in the model, including population, open skies agreement, language, the presence of LCCs, etc. The result from those studies shows that variables representing income, population, and the presence of LCC between two points has a positive relationship with air passenger number. In contrast, following distant decay theory, the distance between two cities should have a negative relationship with traffic flows between them.

**Table 3. Existing papers regarding the relationship between demand and some explanatory variables**

<b>Author</b>	<b>Region and Time</b>	<b>Dependent Variable</b>	<b>Some explanatory variables</b>
Endo (2007)	US and major countries worldwide (1992 – 1999)	US imports and exports in passenger air service	GDP per capita (+), Distance (–), Open skies agreement (+), Language (+)
Matsumoto (2007)	(Intra) Asian, European and American regions (2000)	International air passenger and cargo flows	GDP (+), Population (+), Distance (–)
Hazledine (2009)	Canada (city pairs) (Wednesday March 21, 2007)	Domestic and international air travel of Canadian passengers	GDP (+), Distance (–), Population (+)
Zhang and Findlay (2014)	19 Asia-Pacific economies (2009)	Passenger flow and tourist flow	GDP (+), Distance (–), LCC (+)
Zhang and Zhang (2016)	China (city pairs) (2000 – 2012)	Air passenger traffic	GDP (+), Distance (–), LCC (+)
Das, Bardhan and Fageda (2022)	India (city pairs) (2019)	Air passenger demand	Population (+), Income (+), Distance (–)

In research on airfare, factors affecting how airline(s) set its price on a route are examined including route distance, demand (traffic volume or flight frequency), market concentration (HHI) and presence of LCC. Table 4 displays some existing papers regarding the relationship between price and some explanatory variables.

Distance is commonly included in the studies to control for price factors related to flying distance. It often has positive relationship with price as a longer distance route links with a higher price. However, regarding price per distance or yield, it should have negative relationship. “As the distance of a route increases, the price per mile or yield should decrease, given the fixed costs associated with flying a route.” (Dresner et al., 1996, p. 320)

Traffic volume, the number of passengers, has two effects. On the one hand, regarding the demand side, Dresner and Tretheway (1992) believed that increase in passenger volume (or flight frequency as a proxy) should be associated with higher airfares. On the other hand, regarding the traffic density economies, Graham et al. (1983) stated that higher passenger density should result in reducing cost and thus, lowering price.

Flight frequency is also a proxy for service quality, which could increase price. As a result of deregulation, the competition becomes more extreme. To attract more customers, airlines might also emphasize on service quality. D Jorge-Calderón (1997) and Brueckner (2004) considered flight frequency as a main determinant of service quality. Alderighi and Gaggero (2014) used flight frequency instead of total passenger volumes as the dependent variable in their paper. They mentioned the positive relationship between frequencies and passenger demand. And as frequency is a main determinant of flight supply quality, they stated that their presented results had an additional interpretation in terms of quality.

Hirschman-Herfindahl Index (HHI) is a measurement of market concentration which is applied in several studies regarding transport. Market concentration

measures whether market shares is occupied by a small number of firms. Firms with great market shares are more likely to have market power and the ability to control price. Higher HHI implies higher market concentration and therefore higher price.

**Table 4. Existing papers regarding the relationship between price and some explanatory variables**

<b>Author</b>	<b>Regions and Time</b>	<b>Dependent Variable</b>	<b>Some explanatory variables</b>
Dresner et al. (1996)	Top 200 U.S domestics origin and destination pairs (3rd quarter of 1991 – 2nd quarter of 1994)	Average price per mile (yield)	Passengers (+), HHI (+), LCC (-), Distance (+), Distance-squared (-)
Fu et at. (2015)	514 city-pair routes in the domestic market (August 2008 to July 2012)	An FSC's average yield	HHI (+), Distance (-), LCC (-)
Wang et at. (2018)	Top 20 Indian and Chinese domestic routes (2012 – 2015)	The route-level average yield	Population (+/-), HHI (+), LCC (-), Distance (-)

Past studies focus mostly on the effects of LCCs on airline pricing. Dresner et al. (1996) examined reduced form fare equation to consider the determinants of average price per mile (yield) on a route in the US. The authors assumed that Southwest Airlines (LCC)'s presence significantly reduced average price per mile on the US domestic routes. Fu et at. (2015) stated that competition from Spring Airlines (LCC) in China forced the FSCs to lower their airfare. Wang et al. (2018) also confirmed that presence of LCC on a route reduces airfare in both China and India.

### **3.2 Deregulation impacts on aviation**

Thanks to the 1978 Airline Deregulation Act, unnecessary policies for the United States of America (U.S.) aviation market were removed, average airfare was reduced, greater traffic volume was generated and aviation market was expanded. Following it, airline deregulation has significantly transformed the airline industry throughout the world.

Endo (2005) shows that in Japan, ever since 1986, when Japanese government started to implement gradual deregulation measures on the its aviation market, the market concentration ratio fell while the number of routes in which numerous carriers serving increased remarkably. The competition has become intensive.

Endo (2007), when examined the impact of the bilateral aviation framework on US and Japan passenger air transport service imports in 1990s, found out that the volume of both US and Japan increased. Since US started its progress of Open Skies liberalization with other countries, the air passenger import ratio in US showed a significant increased. The penetration of foreign imported air services into Japan also has been persistently remarkable. US and Japanese citizens have increasingly used foreign carriers' service.

Zhang and Findlay (2014) used policy indices to set up the relationship between passenger flow and liberalisation in policy. Their gravity models suggested that liberalisation is significantly and positively associated with the traffic flow and that passenger traffic between city-pairs has been hindered by the restrictive air transport policies.

It is obvious that air deregulation has the positive impact on aviation industry including creating intensive competition, reducing airfare, increasing demand and expanding domestic and international market.

### 3.3 LCC and its impact on aviation market

Low-cost carrier (LCC) is an airline which eliminates several services provided by traditional airlines in pursuance to offer customers lower airfares. Thanks to deregulation, this concept was initiated in the U.S. (Pacific Southwest Airlines) and was afterwards applied in Europe and other parts of the world. Starting from the late 1990s, the LCCs has witnessed an accelerated growth and expansion. The fundamental competitive advantage of the LCCs is the ability to provide significant lower airfares, whilst being able to earn profits through obtaining low unit costs.

**Table 5. Key elements of LCCs**

<b>Element</b>	<b>Details</b>
Service Offering	Concentrated on most basic transportation function. Pay-per-service approach
Network Structure and Scheduling	Point-to-point route structure Usage of Secondary or Regional Airports High Aircraft Utilization Shorter stage lengths
Fleet	Fleet Standard and Commonality Aircraft Configuration
Marketing	Pricing strategy
Labor	Increasing labor productivity Pay significantly lower salaries comparing with traditional airlines.

*Source: Schlumberger and Weisskopf (2014)*

There are some key elements of the LCC business model which enabled them to attain this aforementioned cost advantage and therefore offer lower airfares to customers. Schlumberger and Weisskopf (2014) describes 5 key elements of LCC



regarding service offering, network structure and scheduling, fleet standard, marketing and labor as displayed in Table 5. It is noted that not all LCCs apply the same following features.

The development of LCCs can have a significant impact on the aviation market. Overall, the entrance of LCCs made the average airfares drop while increase the traffic volume. LCCs attract new set of customers rather than taking away FSCs' customers.

Table 6 displays some studies regarding the sequence of common effects to aviation market related to the entrance of LCCs. Windle and Dresnder (1995) used time series analysis and econometric models to examine the effect of carriers' entry on prices and traffic (1991 – 1994) on top Top 200 U.S domestics origin and destination pairs. Their research confirmed that the entry of the LCC – Southwest Airlines resulted in a significantly greater price reduction and increase in traffic. In both China and India, the deregulation started from the 1980s creating rapid growth in these two countries' aviation sector. Wang et al. (2014) selected the top Indian and Chinese domestic routes for their log-linear demand and pricing estimation. Due to the difference in market regulatory conditions, LCC presence rate between the two markets is different. However, in both countries, the LCC presence has a significant impact on reducing price and increasing traffic. Ma et al. (2021) obtained a reduced-form price and traffic equations to examine the impact of the presence of LCCs in the North East Asia (NEA) intra-market on traffic flow and airfares. The three NEA countries in the research are Japan, Korea and China. The result of their reseach suggested that the increase in market share of LCCs from these countries results in yields' reduction and passenger traffic growth in the NEA markets.

**Table 6. Researchs regarding the impact of LCC on traffic volume and fare**

<b>Author</b>	<b>LCCs/Area</b>	<b>Time</b>	<b>Impact on</b>	
			<b>Fare</b>	<b>Traffic Volume</b>
Windle and Dresnder (1995)	Southwest (USA)	1991 – 1994	Negative	Postive
Wang et al. (2014)	LCCs (China and India)	2012 - 2015	Negative	Postive
Ma et al. (2021)	LCCs (Northeast Asia's intra-markets)	2009 – 2019	Negative	Postive

## 4. The development of Vietnam domestic aviation market

It is clear that air deregulation has the significant impact on aviation market. It allows the development of low-cost model (the typical example was Pacific Southwest Airlines in U.S.) which creates intensive competition among airlines. This help to boost market growth with increasing demand.

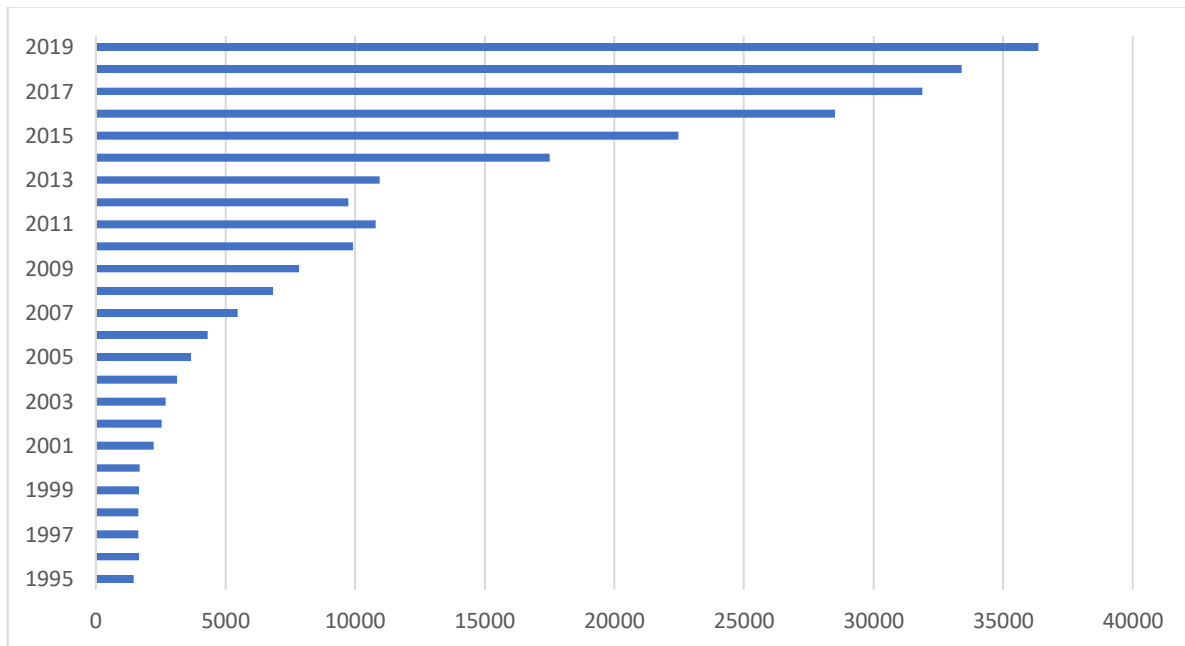
After several amendments in policy as discussed in Chapter 2, one can assume that Vietnam domestic aviation market has gone through some significant changes. This chapter will examine Vietnam aviation market transformation by reviewing its development, competition and the rise of LCC.

### 4.1 Overview of Vietnam domestics aviation market

#### 4.1.1 Market growth

In recent years, the domestic market has witnessed a remarkable growth as shown in Figure 2. From under two thousand passengers in 1995, the aviation sector then served approximately 36 million domestic passengers in 2019.

**Figure 2. Vietnam domestic air passenger volume (1995 – 2019)**



*Unit: Thousand people*

*Source: General Statistics Office*

#### 4.1.2 Market players

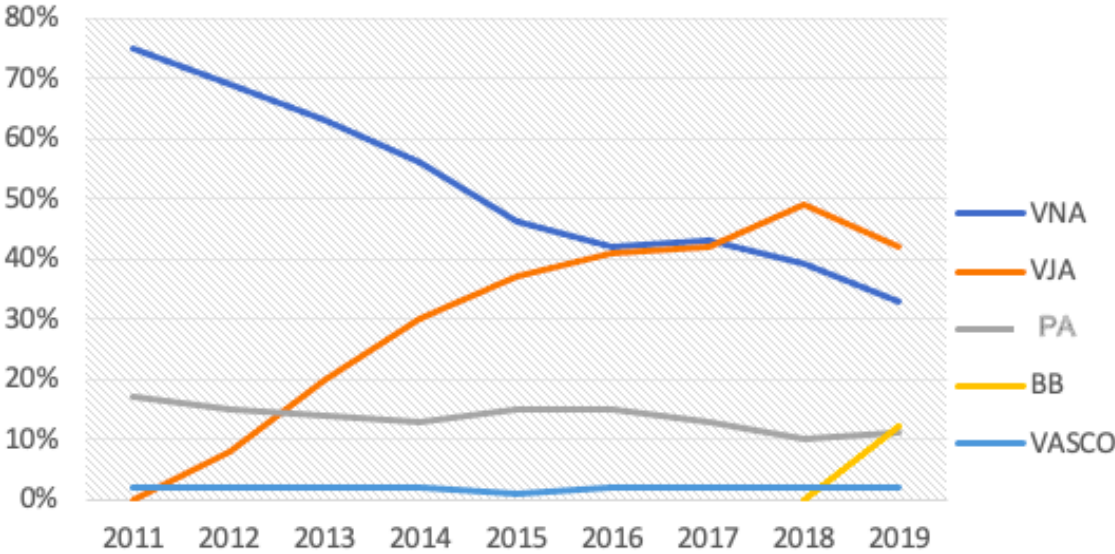
**Table 7. Airlines operating in Vietnam domestic aviation market (2020)**

Airlines	Type	Year of Establishment	Information	
VNA GROUP	Vietnam Airlines	Full service carrier	1991	National full service carrier Member of SkyTeam Alliance 2021: All Nippon Airways (Japan) holds 8.77% of shares in Vietnam Airlines
	Vietnam Air Service Company (VASCO)	Service Carrier	1987	Fully owned subsidiary of Vietnam Airlines Mostly provide regional flights in Northern and Southern areas on behalf of Vietnam Airlines
	Pacific Airlines	Low-cost carrier	1991	Vietnam first LCC since 2007 2007: Qantas Airways (Australia) held 30% of shares in Jestar Pacific Airlines (its name at that time) 2020: Vietnam Airlines holds 98% of shares in Pacific Airlines
Vietjet Air	Low-cost carrier	2011	First privately owned airline in Vietnam	
Bamboo Airways	Hybrid carrier	2019	Vietnam's first hybrid airline Private airline owned by FLC Group in Vietnam	

Table 7 shows the information on domestic airlines operating in Vietnam aviation market. Basically, VNA group (Vietnam Airlines, VASCO and Pacific Airlines) dominated the Vietnam domestic market in both traditional and low-cost

segment. Vietnam Airlines is the one and only national carrier of Vietnam with its 8.77% of shares held by All Nippon Airlines. Vietnam Air Service Company (VASCO), owned by Vietnam Airlines, is the regional service carrier with its focus on Northern and Southern routes which is only suitable for short and small capacity flights and airports with limited infrastructure. It operates on behalf of Vietnam Airlines on those regional routes under 500 km. Pacific Airlines has been Vietnam first LCC since 1991. Following the change of 2006 Vietnam aviation policy, Qantas Airways (Australia) bought 30% of shares in Pacific Airlines and renamed it Jestar Pacific Airlines. However, in 2020, its name was changed back to Pacific Airlines following the event of Vietnam Airlines becoming its largest shareholder (98%).

**Figure 3. Vietnam domestic aviation market share (2011 – 2019)**




*Source: Data gathered from CAAV and airlines’ annual reports.*

Under the management of VNA group and the regulation of the Government, as a low-cost carriers, Pacific Airlines always remains its market shares just under 20%. It was not until late 2011, with the appearance of VietJet Air, the low-cost sector has risen and consolidated its position, making Vietnam aviation market among the fastest growing groups in the world in both domestic and international market. Figure 3 displays Vietnam aviation market share in the period of 2011 –

2019, it can be seen that VietJet Air, as the first privately owned airline in Vietnam, has an outstanding growth of 42% and thus exceeded Vietnam Airlines’ market shares of 33% in 2019. The latest newcomer who debuted in the early 2019 is Bamboo Airways, created by FLC Group. FLC has positioned Bamboo Airways as a hybrid airline, blending low-cost traits with those of traditional carriers. By the end of 2019, after a year of launching, market share of Bamboo Airways was 12% overpassed the market share of VNA group’s LCC – Pacific Airlines.

**Table 8. Vietnam domestic aviation market’s HHI (2011 – 2019)**

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	Trend
HHI Index	5954	5090	4570	4209	3711	3674	3786	4026	3122	

*Source: Calculated based on Vietnam domestic aviation market share.*

Table 8 displayed Vietnam domestic aviation market’s HHI from 2011 to 2019. In terms of measuring market concentration, when the considered market’s HHI is between 1,500 and 2,500, it is moderately concentrated, while the market is highly concentrated if its HHI is over 2,500. It can be seen that the HHI of Vietnam domestic aviation market was extremely high, which was extra higher than 2,500. This proved that this market is highly concentrated. In fact, from the past until 2020, the market only including up to five licensed domestic carriers. However, it can be seen that the market concentration has decreased by 47.5% from 2011 to 2019. Ever since the launching of private LCC – VietJet Air in late 2011, the market power of Vietnam Airlines as a monopoly has fell quickly because VietJet Air has increasingly gained market shares. This has made the market concentration dropped remarkably but still high. It can be said that the entry of LCC plays an important role in reducing HHI and thus, market concentration. With the liberalization in this industry and launching of new carriers, it is expected that the market concentration will continue to fell and competition will be more intensive in the future.

## 4.2. The rise of LCC in Vietnam – The case of Vietjet Air.

It can be said that Vietnam aviation market competition at the moment is generally the confrontation between Vietnam Airlines (traditional and state-owned sector) and Vietjet Air (low-cost and private sector). Among the domestic airlines currently operating in Vietnam, Pacific Airlines belonged to the same VNA group with Vietnam Airlines and thus are not considered a competitor to Vietnam Airlines.

This part will provide the comparative analysis on business performance between Vietjet Air and Vietnam Airlines. Since the fundamental competitive advantage of LCC is the ability to provide significant lower airfares and to earn profits through obtaining low unit costs. Comparison of costs and airfare factors between Vietjet Air and Vietnam Airlines will also be taken into consideration.

### 4.2.1 Business performance

The expansion of Vietjet can be seen clearly through its outstanding performance. As can be seen in Table 9 and Figure 4, from only 10 domestic route and 4 aircrafts in 2012, to 2019, Vietjet has expanded its network both domestically and internationally with total of 139 routes (higher than VNA group with only 108 routes in 2019) and 79 aircrafts.

**Table 9. Number of Route and Aircraft operated by Vietjet (2012 – 2019)**

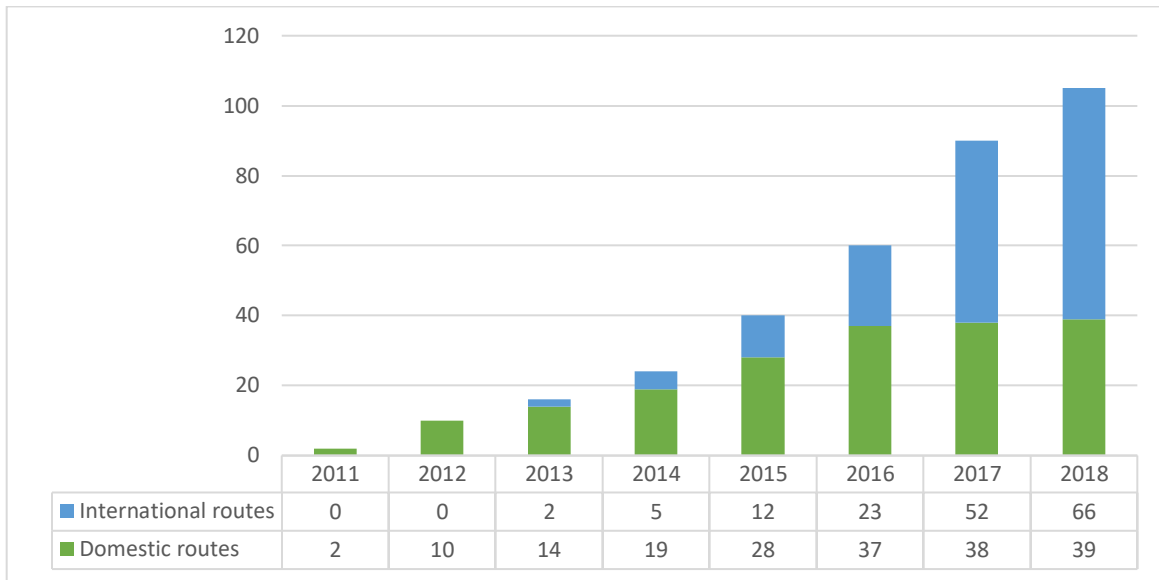
	2012	2013	2014	2015	2016	2017	2018	2019
<b>Number of Route</b>	10	16	24	40	60	90	105	139
<b>Number of Aircraft</b>	4	9	18	30	41	52	74	78

*Source: Vietjet Air's annual reports*

Different from Vietnam Airlines which uses both Airbus and Boeing, VietJet is a low-cost carrier so it only operates with Airbus aircraft. This reflects one of the key elements of LCC – Fleet standard and commonality. The use of a single aircraft type fleet will minimize costs as it can reduce ground support and inventories and obtain discount from bulk purchases.

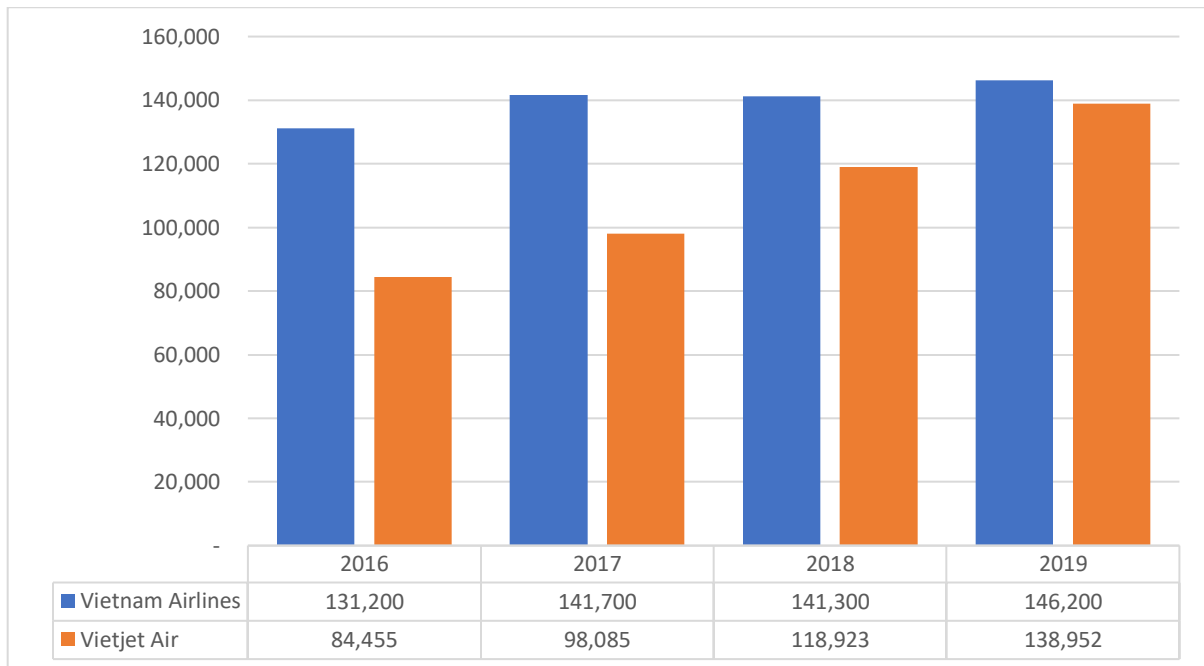


**Figure 4. Number of routes of Vietjet Air (2011 – 2018)**



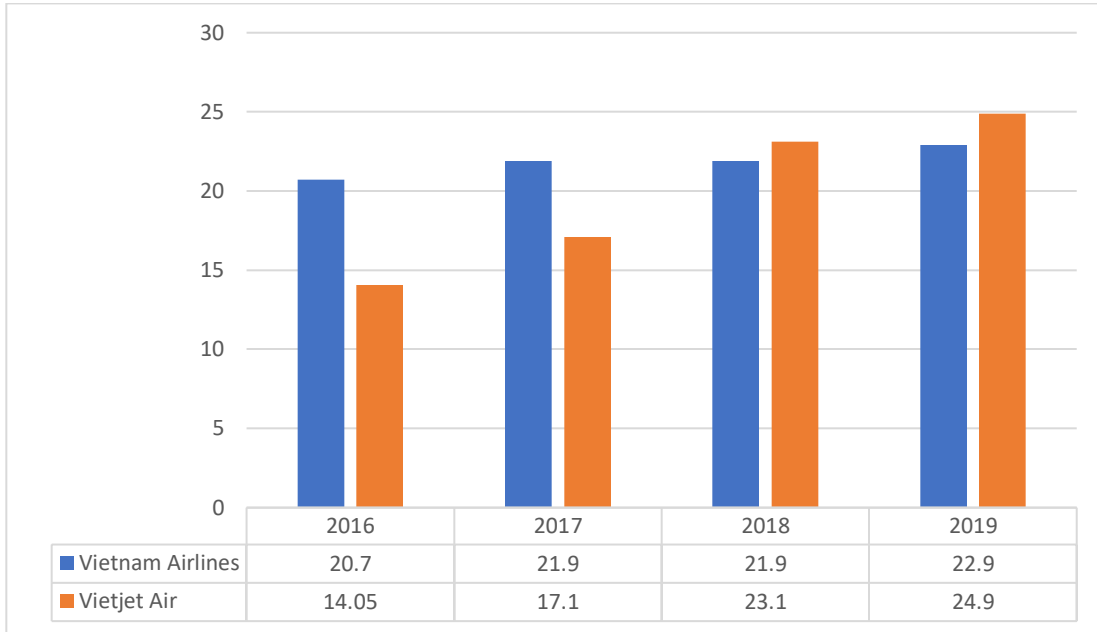
*Source: Vietjet Air's annual reports*

**Figure 5. Total flight number of VNA and VJA (2016 – 2019)**



*Source: Data gathered from airlines' annual reports.*

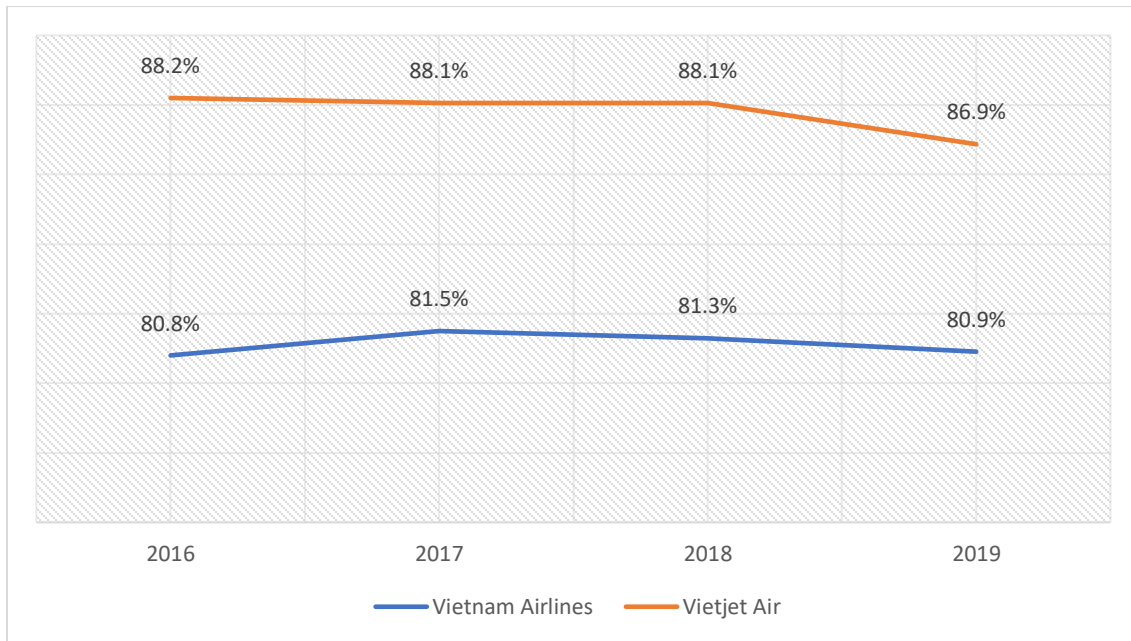
**Figure 6. Total passenger volume of VNA and VJA (2016 – 2019)**



*Unit: Million people*

*Source: Data gathered from airlines' annual reports.*

**Figure 7. Load factor of Vietnam Airlines and Vietjet Air (2016 – 2019)**



*Source: Data gathered from airlines' annual reports.*

Figure 5, 6 and 7 compare the business performance between Vietnam Airlines and Vietjet Air regarding total flight number, passenger volume and load factor in the period from 2016 to 2019. Along with the expand in market and fleets, total flight number of Vietjet has been also increasing dramatically and almost caught up with Vietnam Airlines' in 2019, although its flight frequency factor is still under Vietnam Airlines' performance. Total number of passengers of Vietjet shows a significant growth and surpassed its competitor in 2018 and so on. The load factors of Vietjet are always higher than those of Vietnam Airlines.

#### **4.2.2 Cost**

As a low – cost airline, cost management is an important aspect for Vietjet Air. To compare cost efficiency between VNA group and Vietjet Air, Cost per available seat kilometers (CASK) including Fuel cost is used based on the data gathered from each company's annual report from 2016 to 2019. Table 10 and 11 show the data on Costs and ASK of VNA group and Vietjet Air.

For VNA group, data on available seats-kilometers (ASK) (in billion seats.km) and total operation cost (in VND) from 2016 to 2019 is available. From that, CASK is calculated by divided total operation cost by ASK.

However, for Vietjet Air, the data on CASK is in US cents. For comparison, each year's CASK in US cents is converted to VND at the exchange rate on the date of issue of Vietjet Air's annual report on their website. USD – VND exchange rate is referenced from Vietcombank website.

Particularly, the same process is applied for Fuel cost per ASK (FASK) to compare fuel cost between two companies. Since only data from 2016 to 2018 is available for Vietjet Air, only Fuel cost per ASK in this period can be compared.

**Table 10. Data on Costs and ASK of VNA group**

<b>Year</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>
<b>Total operation costs (in VND)</b>	65,964,130,852,436	79,476,421,285,200	80,235,277,957,266	82,563,541,653,566
<b>Fuel costs (in VND)</b>	21,239,887,669,048	28,708,818,293,926	27,356,787,652,449	
<b>ASK (in billion seats.km)</b>	44.9	48.0	50.8	52.8

*Source: Vietnam Airlines' annual reports*

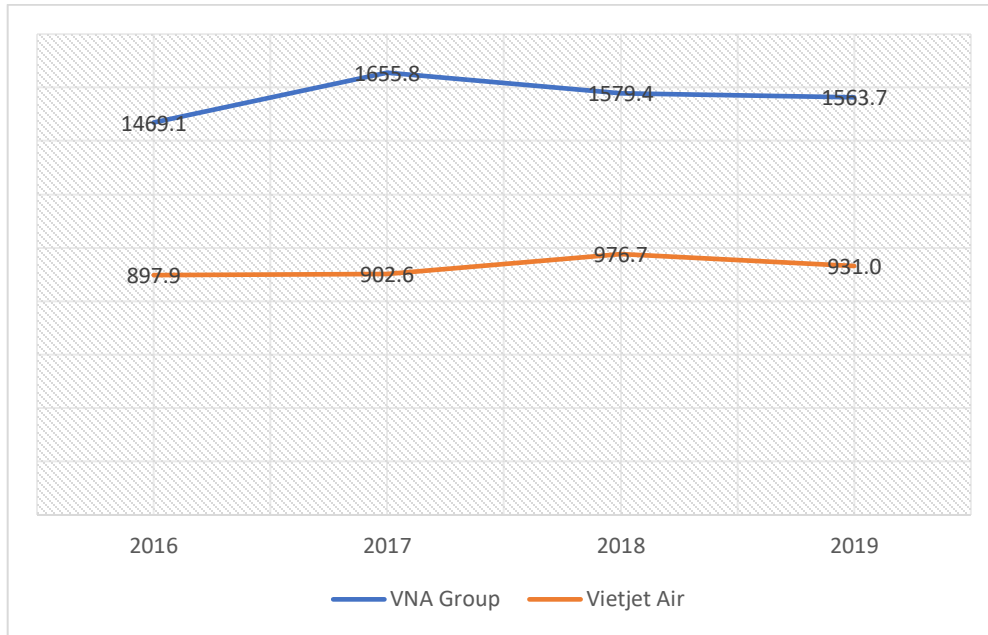
**Table 11. Data on Costs and ASK of Vietjet Air**

<b>Year</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>
<b>CASK (in US cent)</b>	3.94	3.95	4.19	3.96
<b>Fuel ASK (in US cent)</b>	1.44	1.56	1.81	
<b>Exchange rate (USD - VND)</b>	22,790	22,850	23,310	23,510
<b>Issued Date</b>	31/3/2017	17/04/2018	25/04/2019	30/04/2020

*Source: Vietjet Air's annual reports*

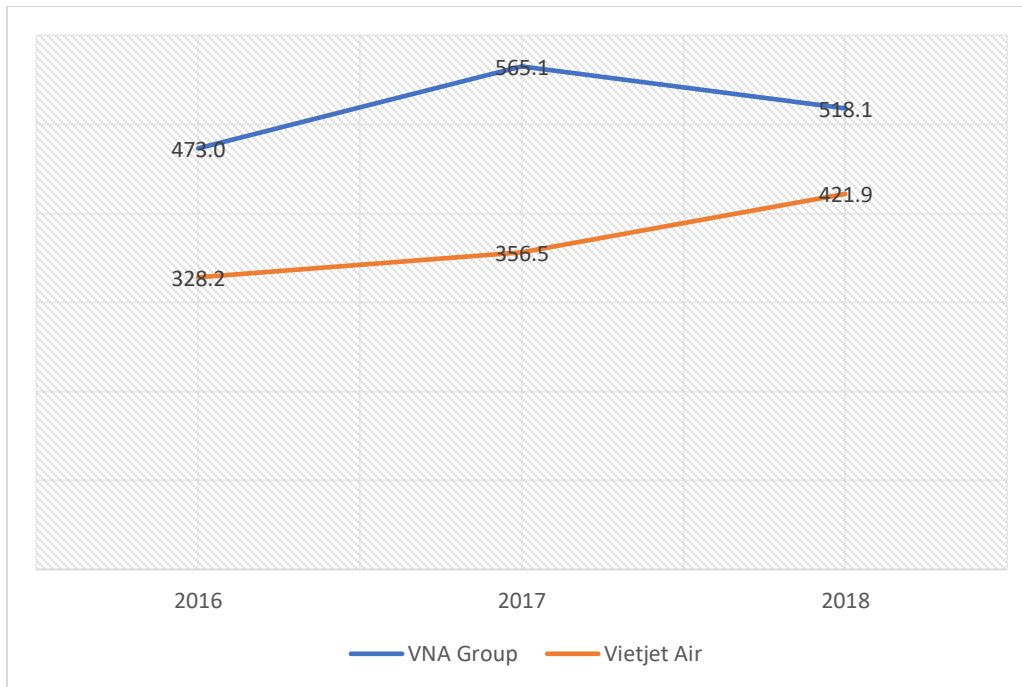
Figure 8 and 9 display CASK and Fuel cost per ASK VietJet Air. In general, CASK of VietJet Air is significantly lower than Vietnam Airlines' (approximately 40.5% in 2019). It is obvious that Vietjet Air as a low – cost carrier is keeping its competitive advantage greatly with the exceed performance at insignificant costs.

**Figure 8. Operating cost per ASK between VNA group and Vietjet Air  
(2016 – 2019)**



*Unit: VND*

**Figure 9. Fuel cost per ASK between VNA group and Vietjet Air  
(2016 – 2018)**



*Unit: VND*

### 4.2.3 Airfare

In domestic market, Vietjet Air mainly operates on 4 route ranges that varies from 500 km to 1280 km. The routes under 500km or beyond 1280km are served by VNA group. Table 12 displays the lowest air fare in September 2022 of all airlines on a famous route of each range that VietJet Air currently operating.

As a low-cost airline, Vietjet Air has a lower fare than VNA group (Vietnam Airlines – FSC and Pacific Airlines – LCC) and a lowest fare among all airlines in Vietnam. In addition, Vietjet Air also launches programs with fares from 0 dong, usually open for sale at 12am – 2pm every day to attract customers.

**Table 12. Lowest fare of airlines on speicified routes in September 2022  
(including tax and other fees)**

Route	Flying distance (km)	Route range (km)	Maximum Price	Vietjet Air	VNA group	Bamboo Airline
Ho Chi Minh – Phu Quoc	301	Under 500	1,700,000	658,920	899,000	840,000
Ha Noi – Da Nang	626	500 - 850	2,200,000	669,720	899,000	753,000
Ha Noi – Quy Nhon	874	850 - 1000	2,790,000	766,920	899,000	840,000
Ha Noi – Ho Chi Minh	1155	1000 - 1280	3,200,000	874,920	1,129,280	1,250,000

*Unit: VND*

*Source: Data gathered from flight schedule on all airlines' website.*

In short, compared to Vietnam Airlines, Vietjet Air has always kept its load factor at high rates while operated at low costs and offered low airfares. It is obvious that Vietjet Air has done its function as a LCC very well. This explains why its market share has surpassed Vietnam Airlines' in 2018.

## 5. Data and Methodology

### 5.1 Regression model

Same as other aviation markets all over the world, Vietnam domestic market depends heavily on the development of the economy and the liberalization policy. In addition, based on the aforementioned literature review, it can be assumed that there are several factors affecting air passenger demand and price in Vietnam. Thus, this research will justify the two following issues:

(i) The impact of some factors including LCC presence on total flight frequency on a specific domestic route is examined by the following three equations:

$$\ln FRQ_{ij} = \beta_0 + \beta_1 \ln(PGDP_i + PGDP_j) + \beta_2 \ln(POP_i + POP_j) + \beta_3 \ln DIS_{ij} + \beta_4 HHI_{ij} + \beta_5 dumLCC; (1)$$

$$\ln FRQ_{ij} = \beta_0 + \beta_1 \ln(PGDP_i + PGDP_j) + \beta_2 \ln(POP_i + POP_j) + \beta_3 \ln DIS_{ij} + \beta_4 HHI_{ij}; (2)$$

$$\ln FRQ_{ij} = \beta_0 + \beta_1 \ln(PGDP_i + PGDP_j) + \beta_2 \ln(POP_i + POP_j) + \beta_3 \ln DIS_{ij} + \beta_4 dumLCC; (3)$$

(ii) The impact of some factors including LCC presence on how Vietnam Airlines sets its airfare on a specific domestic route is examined by the following three equations:

$$\ln YIELD_{ij} = \beta_0 + \beta_1 \ln FRQ_{ij} + \beta_2 \ln DIS_{ij} + \beta_3 HHI_{ij} + \beta_4 dumLCC; (4)$$

$$\ln YIELD_{ij} = \beta_0 + \beta_1 \ln FRQ_{ij} + \beta_2 \ln DIS_{ij} + \beta_3 HHI_{ij}; (5)$$

$$\ln YIELD_{ij} = \beta_0 + \beta_1 \ln FRQ_{ij} + \beta_2 \ln DIS_{ij} + \beta_3 dumLCC; (6)$$

As discussed in Chapter 4, the entry of LCC can play a significant role in reducing HHI. Therefore, the effect of HHI and LCC entrance were also separated in regression (2) and (3) for demand and regression (5) and (6) for yield to examine the independent effect.

## 5.2 Variable description

### 5.2.1 Demand regressions

**Table 13. Description of variable for demand regressions**

Variable	Definition	Expected Sign
FRQ	The total scheduled flight frequencies of all carriers on a route between city i and j.	
PGDP	The sum of GDP per capita of city i and j. (in VND)	Positive
POP	The sum of population of the two endpoints. (in thousand)	Positive
DIS	The flying distance between city i and j on a route. (in km)	Negative
HHI	Herfindahl Hirschman Index for the route based on airlines' scheduled flight frequency.	Negative
LCC	A dummy variable coded 1 if there is a presence of any LCC on the route and 0 otherwise.	Positive

The total scheduled flight frequencies of all airlines on a Vietnam city-pair route between city i and city j in a specific time ( $FRQ_{ij}$ ) is the dependent variable for Demand regression. For the independent variables, their definition and expected sign can be explained as follows.

$PGDP_i, PGDP_j$  respectively is the GDP per capita of city i and city j. The sum of GDP per capita of two cities is expected to have the positive sign. The reason is that, as mentioned above, GDP per capita is used to measure national living standard. It is the proxy for income level. When more and more people can afford



air travel, demand increases. As the results, flight frequency will also increase to meet the demand.

$POP_i, POP_j$  respectively is the population of city i and city j. The sum of population of two cities is also expected to have the positive sign. As population is an indicator of potential market size, larger population implies greater air travel demand tendency.

$DIS_{ij}$  represents distance the flying distance between city i and j. Following the distance decay theory in the gravity model, the distance between two endpoints should have a contrary relationship with air passenger demand. Thus, the expected sign for this variable is negative.

$HHI$  is the Herfindahl Hirschman Index for the route based on airlines' scheduled flight frequency. It is a proxy for market concentration and market power among airlines in the market. The HHI in this regression is calculated by squaring the market share regarding flight frequency of each airline competing in a route and then summing the resulting numbers. The expected sign for this indicator is negative. When HHI decreases (low market concentration), price also reduces which attracts more passengers and the competition becomes more extreme. To cope with the situation, airlines might also emphasize on service quality such as increasing flight frequency.

$LCC$  is a dummy variable coded 1 if there is a presence of any LCC on the route and coded 0 otherwise. As LCC has market growth effect, the sign for this indicator is expected to be positive. Because of low-cost model, they are likely to attract new customers rather than taking away market share of FSC. When they enter a route, traffics in such route increase.

In regression analysis, the variables FRQ, PGDP, POP and DIS are used in their logarithm forms.

### 5.2.2 Vietnam Airline's pricing regressions

**Table 14. Description of variable for Vietnam Airlines' pricing regressions**

Variable	Definition	Expected Sign
YIELD	The lowest one-way fare per km of Vietnam Airlines and VASCO on a route between city i and j.	
FRQ	The total scheduled flight frequencies of all carriers on a route between city i and j.	Positive/ Negative
DIS	The flying distance between city i and j on a route. (in km)	Negative
HHI	Herfindahl Hirschman Index for the route based on airlines' scheduled flight frequency.	Positive
LCC	A dummy variable coded 1 if there is a presence of any LCC on the route and 0 otherwise.	Negative

The lowest one-way fare per km of Vietnam Airlines on a route between city i and j in a specific time ( $YIELD_{ij}$ ) is the dependent variable for Vietnam Airlines' pricing regression. On the regional routes where VASCO operates on behalf of Vietnam Airlines, their price is considered as Vietnam Airlines' airfare. For the independent variables, their definition and expected sign can be explained as follows.

$FRQ_{ij}$  is the total of scheduled flight frequencies of a route between city i and city j. Since flight frequency is a proxy for demand, it often has two effects. On the one hand, increase in flight frequency should be associated with higher airfares. On the other hand, regarding the traffic density economies, higher passenger density should result in reducing cost and thus, lowering price.

**$DIS_{ij}$**  represents distance the flying distance between city i and j. Since the dependent variable is price per km (yield), distance is expected to have negative relationship. As a route's distance increases, yield should be decrease.

**$HHI$**  is the Herfindahl Hirschman Index for the route based on airlines' scheduled flight frequency. It is a proxy for market concentration and market power among airlines in the market. The HHI in this regression is calculated by squaring the market share regarding flight frequency of each airline competing in a route and then summing the resulting numbers. Routes which have greater market concentration, in which only few airlines operating, will have greater price because they have more market power to set price. Therefore, HHI is expected to have positive sign.

**$LCC$**  is a dummy variable coded 1 if there is a presence of any LCC on the route and coded 0 otherwise. The entry of LCC in a route will result in a significantly greater price reduction. The expected sign for this dummy variable is negative.

In regression analysis, the variables YIELD, FRQ and DIS are used in their logarithm forms.

### 5.3 Data sets

Data on flight frequency of 5 airlines and one-way lowest airfare of Vietnam Airlines within the total of 56 domestic routes of Vietnam was gathered through public schedule on their official website. In which, the data on 31 daily routes are collected on a specific date (February 23, 2022), while the data on the remaining 17 weekly routes are collected in the week from February 20, 2022 to February 26, 2020. On the regional routes where VASCO operates on behalf of Vietnam Airlines, its price is considered as Vietnam Airlines' airfare.

Based on the flight frequency of all carriers on a specific route, HHI index was calculated. Market share of Vietnam Airlines and VASCO are combined together since VASCO operates on behalf of Vietnam Airlines on regional routes under 500km. Through their schedule, information on LCC presence (Pacific Airlines and Vietjet Air) on a route also can be seen. Data on population in 2020 (most updated year) of the provinces at the both ends of a route is obtained from Vietnam General Statistics Office (GSO) website. For GDP per capita, data on GRDP (Gross Regional Domestic Product) in 2020 of provinces is available on their website and with population indicator, GDP per capita of each province can be calculated by divided its GRDP to population. Distance variable data (in km) was gathered from [www.airmilescalculator.com](http://www.airmilescalculator.com) which calculates the fly distance between the two airports of both ends on a route. The number of observations for demand regressions are 54 and for pricing regressions are 102.

## 6. Empirical results

### 6.1 Demand regressions

**Table 15. Result of demand regressions**

	Regression 1	Regression 2	Regression 3
<b>Constant</b>	-2.378 (4.627)	-2.212 (4.585)	-6.904 (4.803)
<b>POP</b>	-0.411** (0.156)	-0.386** (0.149)	-0.345** (0.169)
<b>PGDP</b>	0.637*** (0.232)	0.602*** (0.222)	0.823*** (0.245)
<b>DIS</b>	0.174 (0.145)	0.210 (0.129)	0.043 (0.204)
<b>HHI</b>	-0.0001*** (0.000045)	-0.0001*** (0.00003)	
<b>LCC</b>	0.156 (0.277)		0.810*** (0.204)
<b>R<sup>2</sup></b>	0.466	0.466	0.356
<b>Adjusted R<sup>2</sup></b>	0.422	0.422	0.303
<b>Observations</b>	54	54	54

(1) The number in brackets is the standard error

(2) \* Significant at 10% level, \*\* Significant at 5% level, \*\*\* Significant at 1% level

Table 15 displays the result for demand regressions. In all three regressions, the variable POP shows unexpectedly negative and significant sign. In Vietnam, due to the long and narrow terrain, the domestic market is currently divided into routes that mostly connecting the North and the South. In those city-pair routes, only Ha Noi and Ho Chi Minh city have the population over 8 million people, while other remaining cities' population is under 4 million people, which can explain why population has inverse impact on the city-pair route demand. In contrast, GRDP per capita has positive and significant sign which confirms that when more and more people can afford air travel, demand increases. As the results, flight frequency will

also increase to meet the demand. The variable DIS shows unexpectedly positive but insignificant sign. This maybe due to the fact that for short distance routes in Vietnam – a developing country, other inexpensive modes of transport are more popular. Table 16 gives an example of mode of transport for a route from Northern part to Central part of Vietnam. It can be seen that bus and train are much cheaper than air service; therefore, passenger may choose the inexpensive one.

**Table 16. Comparing mode of transport for  
Hanoi – Vinh route on July 26, 2022**

<b>Mode of transport</b>	<b>Hours</b>	<b>Price (VND)</b>	<b>Provider</b>
<b>Bus</b>	6.4 hours	292,600	Nam Quynh Anh
<b>Train</b>	6 hours	378,000	Vietnam Railways
<b>Airplane</b>	1 hour	1,978,200	Vietnam Airlines

*Source: 12go.asia*

The sign for HHI variable is negative as expected and significant in both Regression (1) and (2). This implies that for Vietnam aviation market, the more airlines on a route, the lower the concentration and the higher the flight frequency. Interestingly, the variable LCC shows positive but insignificant sign on the flight frequency in Regression (1). Rather than flight frequency, Vietnamese LCCs may focus on cost reduction, load factor and routes expansion as discussed in Chapter 4. However, regardless the effect of competition, Regression (3) confirms the presence of LCC has positive and significant impact on demand since LCC attracts a new set of customers rather than taking away those of FSA.

## 6.2 Vietnam Airline's pricing regressions

**Table 17. Result of pricing regressions**

	<b>Regression 4</b>	<b>Regression 5</b>	<b>Regression 6</b>
<b>Constant</b>	11.966*** (0.418)	11.908*** (0.421)	12.074*** (0.410)
<b>FRQ</b>	0.301*** (0.064)	0.316*** (0.064)	0.270*** (0.059)
<b>DIS</b>	-0.803*** (0.070)	-0.851*** (0.065)	-0.771*** 0.066
<b>HHI</b>	0.000032 (0.000026)	0.000069*** (0.000015)	
<b>LCC</b>	-0.240* (0.140)		-0.383*** (0.080)
<b>R<sup>2</sup></b>	0.662	0.652	0.653
<b>Adjusted R<sup>2</sup></b>	0.649	0.642	0.647
<b>Observations</b>	102	102	102

(1) The number in brackets is the standard error

(2) \* Significant at 10% level, \*\* Significant at 5% level, \*\*\* Significant at 1% level

Table 17 displays the result for pricing regressions. In all those regressions, the variable FRQ shows positive and significant sign which implies increase in flight frequency is associated with higher yield from Vietnam Airlines. The variable DIS has expectedly negative and significant impact on yield.

In regression (4), HHI as expected show positive but insignificant effect on yield of Vietnam Airlines. However, in regression (5), regardless the presence of LCC, HHI shows positive and significant effect which implies that Vietnam Airlines will increase their price on the less competitive routes. Lastly, as expected, LCCs have negative impact on yield in both regression (4) and (6) which confirms that in those routes where LCCs enter the market, Vietnam Airlines will set lower airfares.

## **7. Conclusion and Discussion**

This research seeks to address two issues regarding the development of Vietnam aviation policy and its market transformation. To accomplish that, the research conducted the review of Vietnam aviation policy through years of amendment, the comparative analysis between the successful LCC – Vietjet Air and other carriers, and last but not least, the regression analysis regarding the impact of several factors including LCC presence on passenger demand and price in Vietnam domestic aviation market using gravity model.

It can be said that the Vietnam aviation sector has changed completely from military unit into a big business. The main drivers for such evolution include economic growth, market deregulation and the emergence of LCC.

Indeed, regarding the aviation policy, significant changes in regulation can be seen through several law amendments regarding ownership and control, market access and price. As the results of deregulation, Vietjet Air as the first private LCC in Vietnam is growing significantly. Its market share has surpassed Vietnam Airline since 2018. Compared to Vietnam Airlines, Vietjet Air has always kept its load factor at high rates while operated at low operation costs and provided low airfares. It can be said that Vietjet Air has done its function as a LCC very well.

This research also used gravity model for regression analysis to estimate the determinants (including LCC presence) of Vietnam domestic passenger flow and airfares. The results confirms that economic and population growth has the positive relationship with passenger demand. Especially, the results regarding the presence of LCC in Vietnam domestics market are also consistent with past studies. LCCs, especially private ones, has helped to promote the market growth and left the impact on how full-service carrier sets its price. In that way, more and more people can approach air travel service.



Recently, the Government has established key priority for airport infrastructure investment from now till 2030. With the improvement of aviation infrastructure and thereby passenger capacity, it is reasonable to expect that there will be a certain level of potential passenger demand along with the existing one in the industry in the future. In accordance with the entrance of new carriers especially LCCs, the market competition in Vietnam domestic aviation passenger sector will be increasingly intensive. It is believed that the low-cost model helps Vietjet, the low-cost carrier, be more proactive in the price competition. The finding in this research may contribute to support relevant authorities in terms of regulating for a more liberalized market and for the rights of customers.

Regarding the limitation of this thesis, since Vietnam aviation sector has just been developed since 1991, the data on Vietnam aviation market is limited and extremely difficult to access. When the market becomes more mature, it is necessary to conduct further research.

## Appendix 1

### Gross Regional Domestic Product (GRDP) and Population of cities in Vietnam in 2020

City (Province)	GRDP (thousand billion VND)	Population
Ho Chi Minh	1372	9,227,600
Ha Noi	1016	8,246,600
Thanh Hoa	172.57	3,664,900
Vinh (Nghe An)	136.5	3,365,200
Hai Phong	276.6	2,053,500
Buon Ma Thuot (Dak Lak)	94.42	1,886,900
Phu Quoc (Kien Giang)	101.25	1,728,900
Rach Gia (Kien Giang)	101.25	1,728,900
Pleiku (Gia Lai)	79.39	1,541,800
Chu Lai (Quang Nam)	110.01	1,505,000
Quy Nhon	89.67	1,487,900
Van Don (Quang Ninh)	172.223	1,337,600
Da Lat (Lam Dong)	94.12	1,309,800
Can Tho	121.81	1,240,700
Nha Trang (Khanh Hoa)	91.88	1,240,400
Ca Mau	62.81	1,193,900
Da Nang	130.8	1,169,500
Con Dao (Ba Ria Vung Tau)	314.203	1,167,900
Hue (Thua Thien Hue)	56.91	1,133,700
Dong Hoi (Quang Binh)	39.28	902,000
Tuy Hoa (Phu Yen)	43.62	874,300
Dien Bien	18.59	613,500

## Appendix 2

### Descriptive statistics of demand regressions (1), (2), (3)

	<b>FRQ</b>	<b>POP</b>	<b>PGDP</b>	<b>DIS</b>	<b>HHI</b>	<b>LCC</b>
Mean	11.8333333	7957651.85	21067310.4	720.7962963	5643.316839	0.592592593
Std. Dev.	8.23189838	3642720.47	7323284.51	338.2876625	2848.458554	0.495965554
Minimum	2	2337400	9060197.29	181	2562.358277	0
Maximum	46	17474200	41771683.3	1385	10000	1
Observation	54	54	54	54	54	54

### Descriptive statistics of pricing regressions (4), (5), (6)

	<b>YIELD</b>	<b>FRQ</b>	<b>DIS</b>	<b>HHI</b>	<b>LCC</b>
Mean	1876.40414	6.00980392	710.098039	5487.6747	0.58823529
Std. Dev.	1541.5342	4.15002111	341.973206	2778.76522	0.49458336
Minimum	661.417323	1	181	2561.98347	0
Maximum	8464.0884	23	1385	10000	1
Count	102	102	102	102	102

### Appendix 3

**Correlation matrix for demand regressions (1), (2), (3)**

	<b>FRQ</b>	<b>POP</b>	<b>PGDP</b>	<b>DIS</b>	<b>HHI</b>	<b>LCC</b>
FRQ	1.000					
POP	0.040	1.000				
PGDP	0.323	0.073	1.000			
DIS	0.197	-0.079	-0.035	1.000		
HHI	-0.529	-0.531	-0.102	-0.017	1.000	
LCC	0.407	0.523	-0.076	0.265	-0.779	1.000

**Correlation matrix for pricing regressions (4), (5), (6)**

	<b>YIELD</b>	<b>FRQ</b>	<b>DIS</b>	<b>HHI</b>	<b>LCC</b>
YIELD	1.000				
FRQ	0.005	1.000			
DIS	-0.737	0.237	1.000		
HHI	0.191	-0.491	-0.059	1.000	
LCC	-0.386	0.389	0.261	-0.825	1.000

## References

1. Alderighi, M., Gaggero, A. A., 2014. The effects of global alliances on international flight frequencies: Some evidence from Italy. *Journal of Air Transport Management*. Vol. 39, p. 30-33.
2. Brueckner, J., 2004. Network structure and airline scheduling. *Journal of Industrial Economics*. Vol. 52, p. 291-312.
3. Dasa, A. K., Bardhan, A. K., Fagedab, X., 2022. What is driving the passenger demand on new regional air routes in India: A study using the gravity model. *Case Studies on Transport Policy*. Vol. 10, P. 637-646.
4. Dresner, M., Lin, J.S.C., Windle, R., 1996. The Impact of Low-Cost Carriers on Airport and Route Competition. *Journal of Transport Economics and Policy*. Vol. 30, p.309-328.
5. Dresner, M., Tretheway, M. W., 1992. Modelling and Testing the Effect of Market Structure on Price: The Case of International Air Transport. *Journal of Transport Economics and Policy*. Vol. 26, p.171-184.
6. Endo, N., 2005. Measuring Conjectural Variations Competitive Nature of the Japanese domestic airline market: Analysis of Competitive nature of the market after the 1986 policy change. *Journal of Shipping and Logistics*. Vol. 47, p. 243-258
7. Endo, N., 2007. International trade in air transport services: Penetration of foreign airlines into Japan under the bilateral aviation policies of the US and Japan. *Journal of Air Transport Management*. Vol. 13, p.285–292
8. Fu, X., Lei, Z., Wang, K., Yan, J., 2015. Low-cost carrier competition and route entry in an emerging but regulated aviation market – The case of China. *Transportation Research Part A* 79 (2015) 3–16.
9. Graham, D. R., Kaplan, D. P., Sibley, D. S., 1983. Efficiency and Competition in the Airline Industry. *The Bell Journal of Economics*. Vol. 14, p.118-138.

10. Hazledine, T., 2009. Border effects for domestic and international Canadian passenger air travel. *Journal of Air Transport Management* 15, p.7–13.
11. Jorge-Calderón, J.D., 1997. A demand model for scheduled airline services on international European routes. *Journal of Air Transport Management*. Vol. 3, p.23-35.
12. Ma, W., Zhang, A., Zhang, Y., Xu, S., 2021. The growing influence of low-cost carriers in Northeast Asia and its implications for a regional single aviation market. *Journal of Air Transport Management* 91, 101994.
13. Matsumoto, H., 2007. International air network structures and air traffic density of world cities. *Transportation Research Part E* 43, p.269–282.
14. Pham, H. H., 2020. Development of a competitive air-transport market in vietnam: Issues and experience for countries in transition. *Vietnamese Journal of Legal Sciences* 02 (01), p.45–57.
15. Schlumberger, C. E., Weisskopf, N., 2014. Ready for Takeoff?: The Potential for Low-cost Carriers in Developing Countries. World Bank Publications.
16. Wassenbergh, H. A., 1962. Post-war international civil aviation policy and the law of the air. Springer Science and Business Media LLC.
17. Windle, R. J., and Dresner, M. E., 1995. The Short and Long-Run Effects of Entry on US Domestic Air Routes. *Transportation Journal* 35 (2), p.14–26.
18. Zhang, Y., Findlay, C., 2014. Air transport policy and its impacts on passenger traffic and tourist flows. *Journal of Air Transport Management*. Vol. 34, p.42-48.
19. Zhang, Y., Zhang, A., 2016. Determinants of Air Passenger Flows in China and Gravity Model: Deregulation, LCCs, and High-speed Rail. *Journal of Transport Economics and Policy*. Vol 50, pp. 287-303.

20. Wang, K., Zhang, A., Zhang, Y., 2018. Key determinants of airline pricing and air travel demand in China and India: Policy, ownership, and LCC competition. *Transport Policy*. Vol. 63, p.80-89.
21. Civil Aviation Administration of Vietnam (CAAV).
22. Decree No. 76/2007/ND-CP
23. Decree 92/2016/ND-CP
24. Decree No. 89/2019/ND-CP
25. Circular No. 36/2015/TT-BGTVT
26. Circular No. 17/2019/TT-BGTVT
27. General Statistics Office of Vietnam.
28. Vietjet Air Annual Report (2016 – 2019).
29. Vietnam Airlines Annual Report (2016 – 2019).
30. Vietnam Aviation Law (1991, 1995, 2006, 2014)
31. Vietnam's air transport market, legislations and regulations and policy during 2003-2013 (presented by Vietnam). 2013 Worldwide air transport conference (ATCONF) Sixth meeting.