

**THE REPUBLIC OF TURKEY
BAHÇEŞEHİR UNIVERSITY**

**STRATEGIC ANALYSIS OF AIRLINE PASSENGER
DEMAND CHANGES DUE TO GLOBAL CRISES:
COMPARING COVID-19 WITH PREVIOUS CRISES**

Master Thesis

MUSTAFA TUNCER

İSTANBUL, 2021

**THE REPUBLIC OF TURKEY
BAHCESEHIR UNIVERSITY**

**GRADUATE SCHOOL OF SOCIAL SCIENCES
MARKETING PROGRAM**

**STRATEGIC ANALYSIS OF AIRLINE PASSENGER
DEMAND CHANGES DUE TO GLOBAL CRISES:
COMPARING COVID-19 WITH PREVIOUS CRISES**

Master Thesis

MUSTAFA TUNCER

**SUPERVISOR: DR. CENGİZ MESUT BÜKEÇ
İSTANBUL, 2021**



**T.C.
BAHCESEHIR UNIVERSITY
GRADUATE SCHOOL**

...../...../.....

MASTER THESIS APPROVAL FORM

Program Name:	MARKETING
Student's Name and Surname:	MUSTAFA TUNCER
Name Of The Thesis:	STRATEGIC ANALYSIS OF AIRLINE PASSENGER DEMAND CHANGES DUE TO GLOBAL CRISES: COMPARING COVID-19 WITH PREVIOUS CRISES
Thesis Defence Date:	01.02.2021

This thesis has been approved by the Graduate School which has fulfilled the necessary conditions as Master thesis.

Assoc. Prof. Dr. Burak KÜNTAY
Institute Director

This thesis was read by us, quality and content as a Master's thesis has been seen and accepted as sufficient.

	Title/Name	Signature
Thesis Advisor's	Dr. Cengiz Mesut BÜKEÇ	
Member's	Dr. Devrim Gün	
Member's	Dr. Tüzün Tolga İnan	

ABSTRACT

STRATEGIC ANALYSIS OF AIRLINE PASSENGER DEMAND CHANGES DUE TO GLOBAL CRISES: COMPARING COVID-19 WITH PREVIOUS CRISES

Mustafa Tuncer

Marketing Program

Thesis Supervisor: Dr. Cengiz Mesut BÜKEÇ

January 2021, 63 Pages

Along with globalization and technological developments, first 19 years of the 21st century have created growth opportunities for the aviation industry. However, a virus that emerged in Asia in 2020 brought this unlimited freedom in the sky to the point of complete limitation. It is important that aviation sector stakeholders understand this and similar crises well in order to protect their corporate assets.

This study reveals the change in the demands of air travel passengers in times of global crisis. Within the scope of the study, the crises affecting the world economy in the 21st century, the 9/11 terrorist attack (2001), the SARS pandemic (2003), the great depression (2008), and the COVID-19 pandemic were discussed. International and domestic passenger numbers, Revenue Passenger Kilometers, Available Seat Kilometers, Load Factor, and Departures Worldwide data were used to examine the impact of crises on travel demand. In order to obtain a productive result in the analysis, the period of 2000 and after were evaluated as the data was shared more transparently in this period while the most important crises were experienced during this period as well. The obtained data were analyzed by the Data Envelopment Method. Thus, the goal was to prepare a guide for the stakeholders of the aviation industry.

The findings of the study revealed that crises that occur with different triggers, affect airline passenger demands in different ways. For this reason, it is seen that companies, governments, and other actors of the sector should examine passengers' expectations from a different perspective in every crisis.

Keywords: Global Crisis, Air Passenger Demand, Airline Management, COVID-19, DEA

ÖZET

KÜRESEL KRİZ DÖNEMLERİNDE HAVAYOLU YOLCULARININ SEYAHAT TALEPLERİNDEKİ DEĞİŞİMİN STRATEJİK ANALİZİ: KOVID-19 KRİZİNİN ÖNCEKİ KRİZLER İLE KARŞILAŞTIRILMASI

Mustafa Tuncer

Pazarlama Programı

Tez Danışmanı: Dr. Cengiz Mesut BÜKEÇ

Ocak 2021, 63 Sayfa

Küreselleşme ve teknolojik gelişmeler ile birlikte 21. yüzyılın ilk 19 yılı havacılık sektörü için önemli büyüme fırsatları yaratmıştır. Ancak, 2020’de Asya’da ortaya çıkan bir virus havacılık sektörünün gökyüzündeki bu sınırsız özgürlüğünü tamamen ortada kaldırmıştır. Havacılık sektörü paydaşları için bu ve benzeri krizleri iyi anlamak kurumsal varlıklarını sürdürebilmek adına önem taşımaktadır.

Bu çalışma, küresel kriz dönemlerinde yolcuların hava yolu ile seyahat etme taleplerindeki değişimi ortaya koymaktadır. Çalışma kapsamında 21. yüzyılda dünya ekonomisini etkileyen 9/11 terör saldırısı (2001), Sars pandemisi (2003), büyük buhran (2008) ve KOVID-19 pandemik krizleri incelenmiştir. İncelenen krizlerin yaşandığı yıllardaki yolcu sayıları, Ücretli Yolcu-Kilometre, Arz Edilen Koltuk-Kilometre, Doluluk Oranları ve Uçuş Sayıları yolcuların talebindeki değişikliğin analizi için göz önünde bulundurulmuştur. Çalışmanın verimliliği için en önemli küresel krizlerin yaşandığı ve verilerin daha şeffaf şekilde paylaşıldığı 2000 yılı sonrası dönem değerlendirilmiştir. Derlenen veriler, Veri Zarflama Yöntemi ile analiz edilerek havacılık sektörü paydaşları için rehber niteliğinde bir çalışma ortaya koymak amaçlanmıştır.

Araştırmanın bulguları krizlerin yaşandığı dönemin ve tetikleyici nedeninin yolcu taleplerini farklı şekilde etkilediğini ortaya koymuştur. Bu nedenle havayolu şirketlerinin, devletlerin ve diğer sektör paydaşlarının yolcu talebindeki değişimi her krizde farklı bir açıdan bakarak incelemeleri gerektiği görülmüştür.

Anahtar Kelimeler: Küresel Krizler, Havayolu Yolcu Talebi, Havacılık Yönetimi, Kovid-19, Veri Zarflama Analizi

TABLE OF CONTENTS

TABLE OF CONTENTS.....	vii
TABLES.....	ix
FIGURES.....	x
ABBREVIATIONS.....	xi
1. INTRODUCTION.....	1
2. DEMAND AND CRISIS RELATION.....	4
2.1. DEFINITION OF CRISIS.....	4
2.2. DEMAND IN AIR TRANSPORTATION.....	10
2.3. FACTORS AFFECTING DEMAND IN AIR TRANSPORTATION.....	13
2.3.1. Factors Directly Affecting the Demand in Air Transportation.....	14
2.3.2. Factors Indirectly Affecting the Demand in Air Transportation.....	15
2.4. EFFECTS OF GLOBAL CRISES ON AIR TRANSPORTATION.....	16
2.5. EFFECTS OF GLOBAL CRISIS ON DEMAND.....	18
2.6. RECOVERY PHASE.....	21
3. AIRLINE PRODUCT AND AIRLINE MARKETING STRATEGIES.....	24
3.1. AIRLINE BUSINESS AND ITS CHARACTERISTICS.....	24
3.1.1 Full-Service Carriers.....	25
3.1.2 Low-Cost Carriers.....	26
3.1.3 Charter Carriers.....	27
3.2. MARKETING STRATEGIES IN AIRLINE BUSINESS.....	27
3.3. SUPPLY AND DEMAND RESPONSIVENESS IN AIRLINES.....	31
3.4. THREATS AND OPPORTUNITIES FOR AIRLINES DURING CRISES.....	34
4. REVIEW OF PREVIOUS STUDIES: EFFECT OF CRISIS ON AIR TRANSPORTATION.....	35
5. RESEARCH METHOD.....	42
5.1. PURPOSE OF THE RESEARCH.....	42
5.2. RESEARCH DESIGN.....	42
5.3. DATA COLLECTION METHOD.....	43
5.4. DATA ANALYSIS TECHNIQUE.....	45

5.5. SAMPLING METHOD46
5.6. RESULTS OF DATA ANALYSIS.....52
6. FINDINGS.....55
7. CONCLUSION59
REFERENCES.....60



TABLES

Table 2.1 External and internal threats of crisis.....	6
Table 2.2 A crisis classification matrix.....	8
Table 5.1 Descriptive statistics of the inputs and outputs in between 2011-2019	46
Table 5.2 Correlation analysis between inputs and outputs	51
Table 5.3 CCR-I and BCC-I Models.....	53
Table 5.4 Comparison of efficiency score	54



FIGURES

Figure 2.1 Crisis in Chinese	4
Figure 2.2 Crisis and disaster management: a strategic and holistic framework	9
Figure 2.3 Passenger numbers and load factors by year	11
Figure 2.4 World passenger traffic evolution.....	18
Figure 2.5 Interaction between economy and air transportation.....	19
Figure 2.6 Passenger numbers and world total GDP by year.....	21
Figure 4.1 International tourist arrivals, change over same period of the previous year	39
Figure 4.2 World destinations by the type of travel restrictions	40
Figure 4.3 Literature review design	41
Figure 5.1 Research design	43
Figure 5.2 The mean of Outputs.....	47
Figure 5.3 The mean of International and Domestic Passenger Numbers	48
Figure 5.4 The mean of Departures Worldwide.....	49
Figure 5.5 The mean of Load Factor.....	50
Figure 6.1 Design of analysis.....	58

ABBREVIATIONS

ASK	:	Available Seat Kilometers
ATAG	:	Air Transport Action Group
DEA	:	Data envelopment analysis
GDP	:	Gross Domestic Product
IATA	:	International Air Transport Association
ICAO	:	International Civil Aviation Organisation
ILO	:	International Labour Organization
OAG	:	Official Aviation Guide
RPK	:	Revenue Passenger Kilometers
UNWTO	:	United Nations World Tourism Organization

1. INTRODUCTION

Ninety-five years ago, visionary Turkish leader Mustafa Kemal Atatürk have mentioned a quote which shed light on aviation industry; “The future is in the skies.” In the time that has passed since then, journey through the skies has become ever more exciting. People grew their businesses, discovered the unique nature around the world and crossed borders. They traveled from darkness to light above the clouds and widened their world with the possibilities offered by aviation services. But how these years have passed? What kind of challenges this industry faced in as far as the passenger travel concerned and what were the milestones for the industry?

In the last hundred years, humankind has managed huge steps in commercial aviation sector. Thanks to these steps, aviation became one of the key industries for not only social and political culture but also for global economy. In 2018, if aviation were to be considered as a country, it would be 17th economy in the world, putting it at a similar level with Netherlands or Indonesia’s economy. Aviation industry powered global economy with 4.1 percent of total GDP (ATAG 2020, p. 10).

With the development of air transportation, this industry was intertwined with global economic, political and social developments and in that regard, it was exposed to external threats in addition to the operational, strategic and financial risks it carries. Over time, these threats have emerged in different ways and affected the aviation industry.

While various crises of all kinds that affected the industry in the last 50 years may be the cause of bankruptcy for some companies, each crisis was also an opportunity for some others. Organizations that anticipate upcoming threats, manage turbulent times well and make the right decisions afterwards have succeeded in turning crises into an opportunity.

Since the beginning of the year 2020, commercial sector has been struggling with the most difficult crisis in its history. The latest estimates show that the possible COVID-19 impact on world's scheduled passenger traffic compared to baseline (business as usual, originally-planned) would be an overall reduction of 51 percent of seats offered by airlines, overall reduction of 2,887 to 2,892 million passengers and approximately USD 390 to 391 billion potential loss of gross passenger operating revenues of airlines (ICAO 2020).

COVID-19 may be the most terrible crisis in aviation history which affected air passenger demand but in the past, there were other crises that came from different origins and affected the industry. Oil crisis (1973), Iran - Iraq wars (1980 - 1988), Gulf Crisis (1990-91), Asian Financial Crisis (1997), 9/11 attack (2001), SARS Pandemic (2002-03), Mortgage Crisis (2008), Financial Crisis (2007-08) were other crises which shaped commercial aviation industry and air passenger demand (ICAO 2020).

Within the scope of the research, the crises affecting the aviation industry in the twenty-first century and the data related to these periods were evaluated. Effects of Novel Coronavirus (COVID - 19) on Civil Aviation: Economic Impact Analysis reports shared by ICAO were taken as a source in determining the crises discussed. These crises are 9/11 attack (2001), SARS Pandemic (2002-03), Mortgage Crisis (2008), Financial Crisis (2007-08) and COVID-19 Pandemic. In the research, where the sector is handled with a general point of view, the breaking points of the industry are also mentioned.

Although it can be seen that airline passenger transportation has shown a significant improvement after 1970, the 1944 Chicago Convention was the first spark of today's industry. The conference which held in Chicago had a vital role in the history of aviation. 54 states that came together in Chicago determined the international aviation diplomacy and formed the first framework of the current system (Belobaba et al. 2009, p. 20).

Until the 1970s, the aviation sector, which could not find the opportunity to grow under the strict control of the states, became even more liberated with the deregulation decisions taken in the USA and EU region.

In the scope of the study, the crisis periods experienced in the past and their effects in the air passenger demand were examined. The main purpose of the study is to examine the crises that affected the passenger demand in the aviation industry in order to produce proposals for strategy formulators of both the airline industry and the airline business considering any possible future crises.

With this aim, in the first part, the dimensions of global crises and the factors affecting the demand of passengers traveling by airlines are discussed in the light of the literature. Studies prepared in line with this study were added to the study by scanning among academic and sectoral sources. Finally, the findings of the study are detailed in the last section with the analysis of the data obtained.

2. DEMAND AND CRISIS RELATION

2.1 DEFINITION OF CRISIS

Due to the COVID-19 pandemic, which shows its effects in all industries and countries around the world, the concept of crisis has perhaps reached the top among the most frequently mentioned topics. The crisis concept, which has been spoken more in the last hundred years with technological developments, changes in international relations, and globalization, etymologically dates back to Ancient Greek. The concept of crisis (κρίσις), which means "judgment" or "decision" in ancient Greek, had been defined as a process affecting the positive or negative development of a process (Milašinović and Kešetović 2008, p. 168). While it is seen that crisis processes can have positive and negative effects in Ancient Greek, the concept of crisis has a more negative connotation in our age. Many scholars who made an explanation of the concept of crisis, which does not have a definite definition, have focused on the negative side of crises. However, it is not necessary to go back to Ancient Greek to find a positive meaning in the concept of crisis. The expression, which is the equivalent of the word crisis in Chinese (figure 2.1), is a compound word made up of two words together. The first part of this compound word means "danger (wei)" and the second part means "opportunity (ji)".

Figure 2.1: Crisis in Chinese



Source: McMullan, C., 1997, Crisis: when does a molehill become a mountain?, p.1

Crises may appear in different forms. The meaning of a crisis depends in part on whether it is a crisis for an individual or an organization. In the scope of business and management literature, crisis typically defines an event that damages the company's economical condition or prestige. Or the definition of crisis for a medical researcher means any potentially life-threatening situation (Legg and Sweeny 2012, p. 618). Pearson and Clair (1998, pp. 59-76) define a crisis "as an event of small probability and great consequences, which imperils the life of an organization, being characterized by unclear causes, effects, and means of solution, as well as a conviction that decisions must be made quickly."

Another definition is provided by Pauchant and Mitroff (1992, p. 117). "A company's corporate image- describing how favorable and accurate public perceptions are about an organization-reflects its reputation but does not represent its essence. A crisis delves into the soul of an organization and dissects its core identity" According to Charles F. Hermann "*Crisis is a situation that disrupts the system or a part of the system. More specifically, a crisis is a process that produces a sudden or sudden change in one or more of the basic systemic variables. Especially crises threaten the high priority targets of the decision-making unit.*" However, according to Hermann, whether crises create significant changes in the international dimension depends on the factors that trigger the crisis (Hermann 1972, p. 13).

Although the definition of crisis is made in many different ways by different scholars, there is no internationally accepted definition. But there are many comments on this issue, it is a common view that crises include the following three elements; triggering event which causing significant change or having the potential to cause significant change; the perceived inability to cope with this change; and a threat to the existence of the foundation of the organization" (Keown-McMullan 1997, p. 4). Understanding the causes of crises that constitute a threat to organizations is important to overcome these difficult times with minimal damage. When the general causes of crises that are felt in a specific region of the world or on a global scale are examined, it is seen that the threat emerges in different ways.

Table 2.1: External and internal threats of crisis

<i>Domain</i>	<i>External</i>	<i>Internal</i>
Economic	Currency fluctuations Taxation Recession	Rising Costs Falling revenues Unprofitability
Political	Government policy International relations Instability Terrorism	
Socio-cultural	Unrest Crime	Staffing Cultural conflicts
Environmental	Natural phenomena Natural disasters Pollution Health scares	Environmental degradation Overdevelopment Cultural conflicts Staffing
Technological	Computer systems failure Mechanical failure Design faults Fire	Transport accidents
Commercial	Regulation Government intervention	Labor disputes Management decisions Human error Competition

Source; Henderson, J. C. 2007. Tourism Crises, Causes, Consequences and Management, p.8

Crises can threaten organizations' not only economic strength and existence but also their dignity, their relations with the society or states, the trust of their employees, and their cooperation with stakeholders (Coombs 2016). With the gradual removal of international social, cultural, and economic boundaries, crises in one part of the world show their effects in another geography, even if they are small scale. Understanding crises and disasters, their

lifecycle, future effects, and practices may help organizations in creating plans to deal with those issues (Ritchie 2003, p. 675).

Although scholars expressing the concept of crisis use different words, they draw a similar picture. And this picture often contains elements that could threaten the future of organizations. Crises that need to be approached from different frameworks often occur unexpectedly and are overwhelming (Barton 2001, p. 2). These crisis periods are breaking points that will have a good or bad effect on the structure of organizations. For this reason, the difficult process to overcome should be managed well (Fink 1986, p. 15).

When the ways of its occurrence are analyzed, the concept of crisis can be examined in three different versions. Immediate Crises; where little or no warning exists, therefore organizations may not be able to research the problem or prepare a plan before the crisis occurs. Emerging Crises; slower in developing and may be able to be stopped or limited by the organizational attention. Sustained Crises; these types of crises may last for weeks, months or years. (Parsons 1998, p. 27)

John Burnett says that crises are difficult to resolve due to time pressure constraints, limited control and high uncertainty and classifies these critical processes into a four-dimensional matrix (table 2.2). The matrix in which crises are classified according to the threat dimension, reveals that not every crisis is of the same size and that every crisis has different characteristics. According to Burnett, determining strategies according to the size of the crisis, the level of threat and time pressure provides numerous advantages to organizations (Burnett 1998, p. 476).

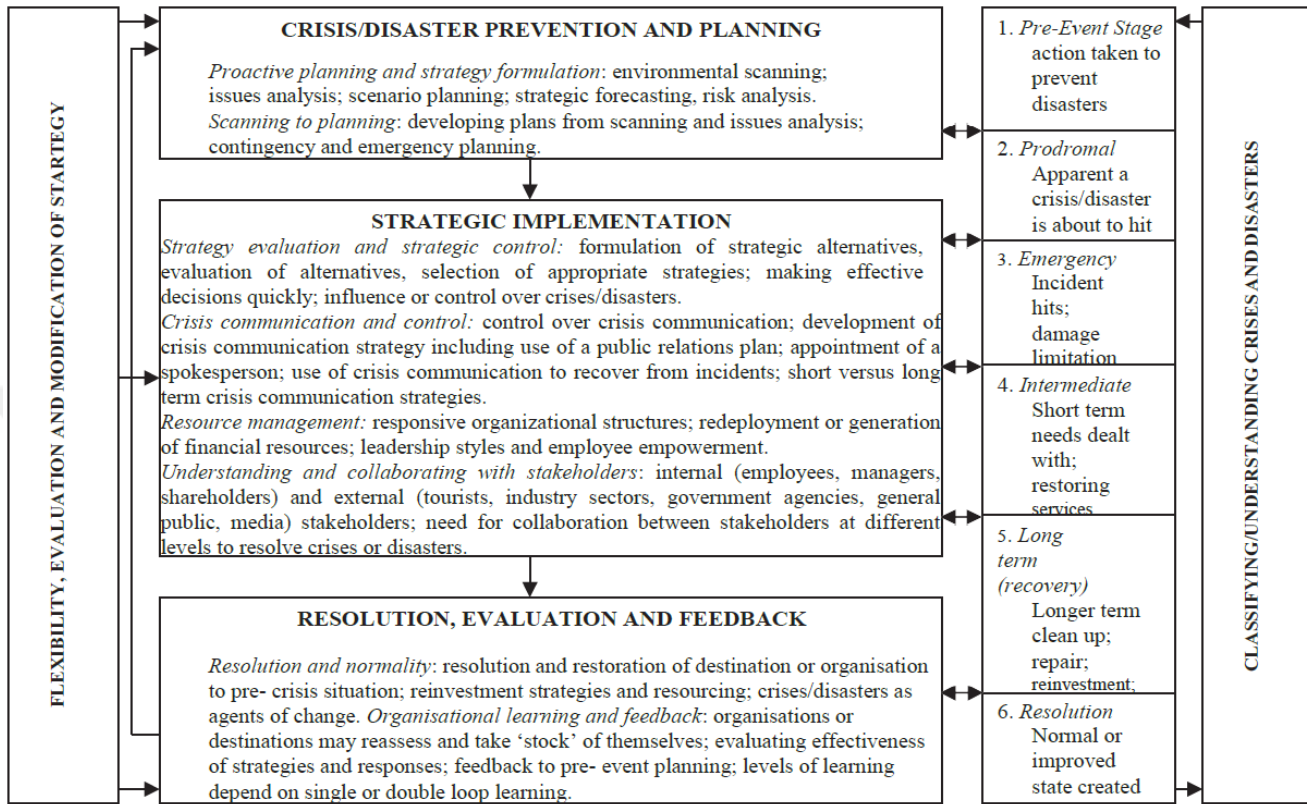
Table 2.2: A crisis classification matrix

Threat Level	Time pressure	Intense		Minimal	
	Degree of control	<i>Low</i>	<i>High</i>	<i>Low</i>	<i>High</i>
	Response options				
<i>Low</i>	<i>Many</i>	(4) Level 2	(3) Level 1	(2) Level 1	(1) Level 0
	<i>Few</i>	(8) Level 3	(7) Level 2	(6) Level 2	(5) Level 1
<i>High</i>	<i>Many</i>	(12) Level 3	(11) Level 2	(10) Level 2	(9) Level 1
	<i>Few</i>	(16) Level 4	(15) Level 3	(14) Level 3	(13) Level 2

Source: Burnett (1998:483)

It is always beneficial to create a plan so that organizations can manage the crises they will encounter more effectively. The plan which created previously, provides a road map for those who will manage the crisis in case of a sudden crisis. B. Ritchie has focused (2004) on three different periods of the crisis in his strategic plan and each period should be evaluated within the confines of itself. These periods are explained as prevention and planning, implementation, evaluation and feedback (figure 2.2).

Figure 2.2: Crisis and disaster management: a strategic and holistic framework



Source: Chaos, crises and disasters: a strategic approach to crisis management in the tourism industry (Ritchie 2004).

Preparing for a crisis is not just about procedural and paper preparedness. At the same time, individuals and leaders who take responsibility within the organization should be well equipped for the crisis. The decisions taken by the leaders in times of crisis will not only help the crisis to be overcome successfully, but may also cause worse results than expected. However, crisis periods that have many negative consequences usually occur due to unsuccessful management. In times of crisis, what is expected from leaders is to successfully manage the crisis and minimize the possible negative impact (Boin et Al. 2013, p. 81). Just like humans, organizations also have a life cycle, and just like the human body, the system of organizations may encounter unhealthy situations. The world economy, which has expanded its borders with globalization, has also become more open to these unhealthy situations. As stated in table 2.1, many internal and external factors can turn into crises that

threaten the environment, societies and economies. Air travel industry, which connects different cultures and economies of the world, is an industry that is most open to crises and has always been cyclical with this international aspect and as the industry has an interlinked structure with the world economy, it is directly affected by global crises (Doganis 2006, p. 4). If it is necessary to define the crisis for the tourism industry, of which airline companies are a part of, Sönmez, Bachmann and Allen (1994, p. 2) explains that as "any occurrence which can threaten the normal operations and conduct of tourism-related businesses; damage a tourist destination's overall reputation for safety, attractiveness, and comfort by negatively affecting passengers' perceptions and, in turn, cause a downturn in the travel and tourism economy." While the economic developments in the world (unstable fuel prices, exchange rate fluctuations etc.) significantly affect the financial structure of airline companies, the fact that if these developments reach a crisis level, they also affect air travel demand (Nolan et al, p. 241).

When the crisis periods experienced by the aviation industry in the last 70 years are analyzed, it is seen that there is a rapid recovery after the period of stagnation and regression (Figure 2.4). The COVID-19 crisis, which brought the aviation industry to a standstill in 2020, will one day take its place in aviation history's past instead of present. Airline companies that are prepared for this crisis and took precautions against difficult times on the sunny days will be stronger after this crisis if they act properly. However, if the measures to be taken by companies are not structurally ready during the crisis, it may drag them to the history books.

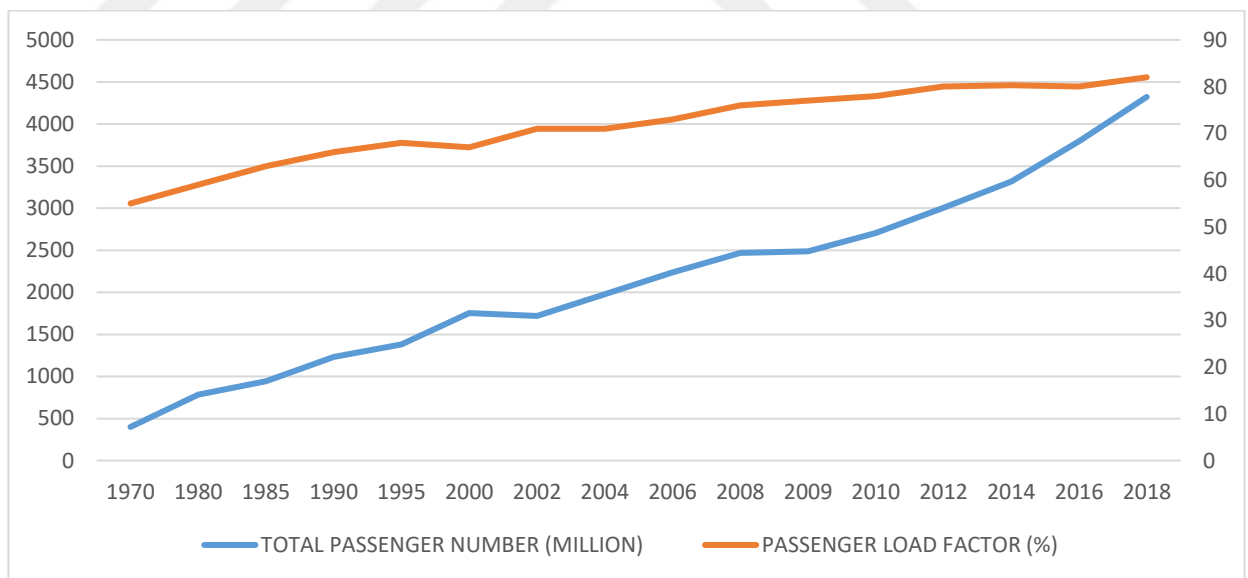
2.2 DEMAND IN AIR TRANSPORTATION

In history (Jan. 1, 1914), the first passenger who demanded air transportation was Abraham C. Pehil, the former mayor of St. Petersburg, Florida. His 21 mile (34 kilometers) St. Petersburg -Tampa flight took only 23 minutes. Their aircraft was actually kind of a "flying boat" designed by Thomas Benoist. If C. Pehil had preferred the steamship instead of the airline for his transportation need, the journey could take 2 hours or by train between 4 and

12 hours.¹ As of the first take-off, it was seen that airline transportation contained some advantages compared to other travel methods.

As the time passed; globalization, technology, and increase in world population have made the aviation industry an accessible and in-demand industry by more people. Passenger demand for the commercial aviation industry has continued to rise over the last fifty years. Although the sector faced significant crises over time, its post-crisis growth momentum has continued. The last reports of World Bank data show that about forty million registered carrier departures had took off in 2018 and more than 4.2 billion passengers were carried by air². Figure 2.2 shows the number of passenger and load factors by year, the two most important factors in handling the number of passengers as of 1970 are the increase in demand for airlines with jet-age and the deregulation efforts of the states. In addition, the 1970s were the first period when the aviation sector seriously encountered the concept of crisis.

Figure 2.3: Passenger numbers and load factors by year



Source: ICAO, 2019

¹<https://www.space.com/16657-worlds-first-commercial-airline-the-greatest-moments-in-flight.html>
[Accessed 3 Nov. 2020].

² <https://data.worldbank.org/indicator/NV.SRV.TOTL.ZS>.
[Accessed 8 Nov. 2020].

There are important milestones in the rapid increase in passenger demand over time. The Chicago Convention, which promised freedom to the global aviation industry in the sky is one of these critical eras. The Convention made several key contributions to the development of domestic and, especially, international civil aviation and support the industry's stunning growth in time.

With this important step, today's airline passengers have a great flight network options for reaching anywhere in the world (Belobaba et al. 2009; p. 22).

Although the Chicago Convention offers states freedom in the sky, the economic regulations of the countries have prevented the airlines from reaching their true potential until the last decades of the 20th century. Liberalization is associated with the opening up of sectors of the economy to market forces and is often referred to as deregulation. Companies wishing to enter the aviation market before deregulation either has faced strict rules or had to manage their operation under high-risk conditions. With the removal of economic restrictions, more companies entered the aviation market and the quality offered to passengers increased significantly due to market competition (Lykotrafiti 2014, p. 94).

Companies that have entered the aviation market after liberalization also implemented different business models. This business model, which offers cheaper airline travel, has enabled a wider population to choose the airline with its new target audience and price strategy. The demand for air travel has increased significantly, thanks to the successful business plan of low-cost airlines (Demirsoy 2012, pp. 34-36).

Another breaking point is the development of technology in the aviation industry. Between 1954 and 1963, also known as the jet era, there were significant structural changes in the aircrafts that were carrying passengers to the skies. The use of jet-engined aircraft for civil aviation flights reshaped aviation in those years. With the replacement of propeller-driven aircraft by internal combustion jet engines, flight range, altitude, and flight speed increased significantly. Thus, air travel has become a faster and more comfortable way of

transportation. This development was also the first step towards to intercontinental nonstop flights. Another advantage of the new generation aircraft for airlines was the reduction in travel costs per passenger. The economic benefits of aircraft have provided many opportunities for both passengers and airline companies, reduced costs of airline travel have increased demand for air travel (Iatrou 2014, p. 126).

When the travel demands of billions of passengers traveling by air in recent years are analyzed, it is seen that different variables are motivating them to fly. Passengers' demand to travel by air can be divided into two main variables; for business and leisure purposes (Bieger et al. 2007, pp. 32-33).

The travel expectations of these two different demand groups also differ as well as travel purposes. For example, business travelers may be more sensitive about the time they spend while traveling compared to leisure travelers (Dresner 2006, p. 32).

2.3 FACTORS AFFECTING DEMAND IN AIR TRANSPORTATION

With globalization and population growth, travel preferences have diversified and the importance of airline passenger transportation has increased. With the expansion of the airline industry and the increasing number of passengers, this industry has become more open to variables. Analyzing the variables in airline passenger demand and making predictions are important for airlines that want to improve their fleet or airports that want to expand their facilities. For each region, the drivers of the demand for air travel are varied. It may depend not only on the economic and social history of the country or its geographical position and scale but also on some significant incidents, such as economic downturns or deregulations, that could reduce or raise demand (Demirsoy 2012, p. 53). Many factors affect the propensity of passengers to choose the airline for their transportation needs. These factors are examined under two main types. Some of these factors are in the scope of the control of airline industry players while some are not (Valdes 2015, p. 75). Service quality is one of the most important drivers affecting the travel preferences of passengers. When airline companies offer a quality

service that meets the expectations of passengers, the number of passengers, and the demand change in direct proportion.

The operational causes of airline companies that directly affect the travel demands of the passengers have been stated as service facilities on-board, travel safety, ticketing convenience, and total travel time (Belobaba et al. 2009, pp. 57-58). Factors that are within the scope of the control of airline companies are divided into two subdivisions, direct and indirect effects.

2.3.1. Factors Directly Affecting the Demand in Air Transportation

External demand shocks include acts of terrorism, pandemic risks, natural disasters, airline accidents, and oil crises. Along with globalization, crises in a particular region of the world has triggered demand shrinkage in other countries. For instance, although SARS Pandemic was experienced in Asian countries, passengers in the rest of the world also avoided traveling. Another example is the 9/11 terrorist attack. The action that took place in the USA also affected the travel demand for leisure passengers traveling to Jamaica. Passenger demand is also directly affected by global downturns that can exist both in the concerned market and in the rest of the world. For this reason, crises effect not only domestic passenger numbers but also international passenger numbers. For example, the Asian Economic Crisis of 1997, resulted in a decrease in GDP across many countries in the region and suppressed demand for both outbound and inbound air travel in Indonesia. These restrictions are not only coming from external countries but countries' aviation authorities can also affect the demand for the airline with the rules they set. Airline transportation is an unrivaled method of transportation for long-distance flights, especially for passengers who are time-sensitive and want to reach difficult to reach points. However, alternative transportation methods such as high-speed rails in short and medium-range travels may affect the demand for the airline (Ishutkina and Hansman 2009, p. 104).

2.3.2. Factors Indirectly Affecting the Demand in Air Transportation

Apart from the factors which directly affect air transportation demand some factors indirectly affect air transportation demand. These variables are Economic Liberalization, Exchange Rate Fluctuations, Political and Macroeconomic Stability, Growing Consumer Demand, and change in Management Practices.

Liberalization steps in the global economy constitute the most important breaking points of the aviation industry. Thanks to the liberalization decisions taken following the deregulation decisions, the aviation industry has a freer world. In this way, liberalization has led to substantial economic and passenger demand growth. Liberalization decisions have led to significant increases in traffic data in aviation history. Among the factors affecting this growth as a result of liberalization; airline companies' increasing seat capacities, removing restrictions on ticket prices, increasing flight frequency, and adding new destinations to the flight network of airline companies are the main factors (Oum et. Al. 2010; 374). Maillebiau and Hansen, in order to examine the impact of Liberalization on growth in air travel demand, have looked into the flights between U.S. and five European countries: UK, France, West Germany, Netherlands, and Italy. Researchers have estimated that traffic growth from liberalization was 56 percent with an average benefit of \$585 per passenger. (1995, 14)

Both the political structures of the countries and international sanctions affect the demand for air travel on a local and global scale. Therefore, institutional and political reform decisions made by countries are another factor that indirectly affects air passenger demand. China, South Africa, Vietnam and Libya were isolated from the global economy until the 1980s. While aviation was in a weaker position until China took the decision to globalize its economic model, air travel demand in the country increased with the institutional and political reforms. Similarly, with the transition to the market-oriented economy model in Vietnam in 1986, cooperation with ASEAN (Association of Southeast Asian Nations) was realized and the aviation sector grew. Besides the countries' own reforms, crises in international relations also affect airline demand. Libya and South Africa could not develop

in the field of aviation due to the sanctions from different countries for many years. In the case of Libya, these sanctions also restricted modernization of the national carrier's fleet and hence directly affected the capacity of Libya's airlines. (Ishutkina and Hansman 2009, p. 106)

Connecting all over the world, the airline industry is exposed to exchange rate fluctuations due to its international nature. The demand for air travel is affected because the value gain or loss in a country's currency against other currencies also changes ticket prices. For example, due to depreciation experienced in the Turkish Lira against US dollar and Euro, Turkey became a cheaper travel point for people living in Europe and America. Therefore, this may create more demand for cheaper travel to Turkey. On the other hand, it may be more difficult for Turkish Citizens to travel abroad. (IATA, 2015)

Growth in the economies of the countries also affects the ability of citizens to travel by air. For example, during the last 30 years China, India, Turkey and Indonesia along with economic growth, have seen increased demand for domestic and international flights. With the deregulation of the aviation sector in Turkey in 2003, it has experienced faster growth. Low-Cost Carriers commencing their activities in Turkey after 2003 has contributed to an increase in demand for air travel. As the development in national economies increases the demand for air travel, political and macroeconomic instability may suppress both the economic and air transportation system developments. (Ishutkina and Hansman 2009, p. 108)

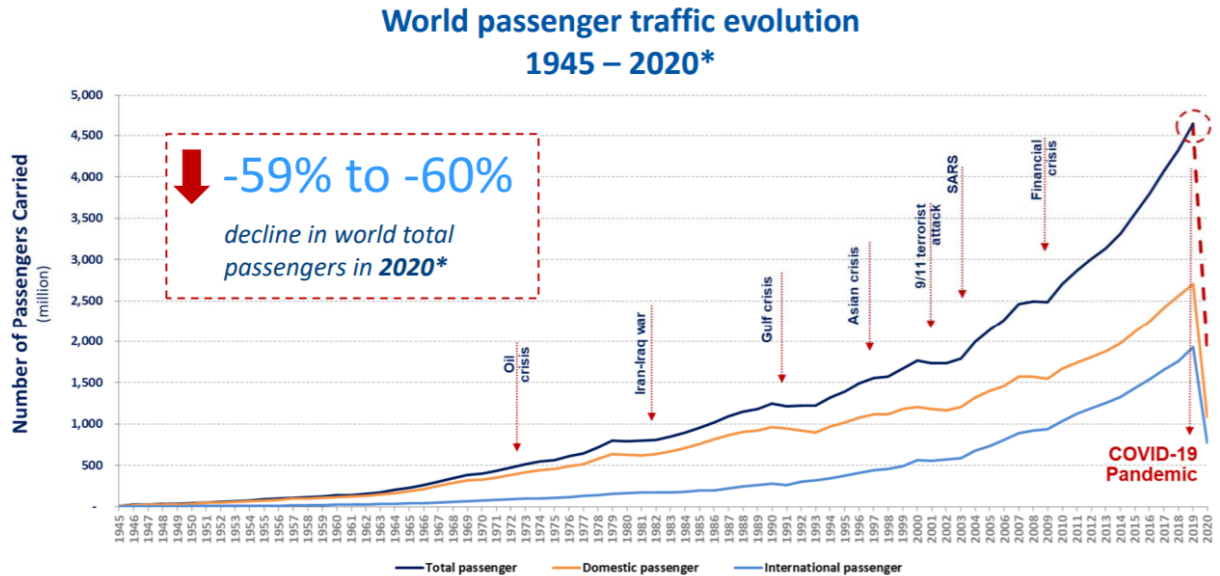
2.4. EFFECTS OF GLOBAL CRISES ON AIR TRANSPORTATION

Developing economies, globalization, and the increase in the world population have been effective in the diversification of the global crises. It is an accepted idea that global crises have extended more frequently and over a wide geography. The dimensions of global crises are categorized as; the economic dimension, the political dimension, the social dimension, the cultural dimension, the ideological dimension, and the ecological dimension (Fotopoulos 2009).

When we look at the crises in terms of the aviation industry, it is seen that the crises have affected the airline industry significantly in the last 20 years. The crises experienced in the first years of the 21st century affected the growth process of the airline industry for three years. Passenger demand could not reach the level of September 2001 even in mid-2004 (Doganis 2006, p. 132). The COVID-19 virus, which emerged in the early 2020, is seen as the biggest crisis the aviation industry has experienced in its history. Considering the last 50 years, there are eight different crises affecting the aviation industry on a global scale (IATA 2020).

In October 1973 oil prices increased by 400 percent and oil production decreased 240 percent. The Oil Crisis has affected the balance of supply and demand in the aviation industry, similar to other sectors and it resulted in increased costs for both passengers and companies (Becken 2011, p. 68). In 1981 the war between Iran and Iraq has affected the industry and in 1990-91 another war (Gulf Crisis) occurred. When we came to the 21st century there was a terrorist attack targeting USA that also affected the whole world. The use of passenger planes in this attack significantly and negatively affected the trust in air travel and therefore the demand. While the airline industry was busy managing the effects of the 2001 crisis, a virus in another corner of the world, in Asia, turned plans upside down. Travel demands of passengers lost priority, especially in Asia. Between 2004 and 2007 was a golden age for the airline industry however, a new crisis was coming. The mortgage crisis that emerged in USA deeply affected the entire world economy and, of course, the aviation industry. The aviation industry, which continues to grow after each crisis, caught a relentless disease when we came to 2020; COVID-19. Another virus that emerged in Asia closed the globalizing world inward. There were almost no passenger aircraft left in the air. Airplanes have taken such a long vacation for the first time (ICAO and IATA 2020).

Figure 2.4: World passenger traffic evolution



Source: ICAO, 2020

Understanding how the demand for air travel changes in times of crisis and to what extent global crises affect the aviation industry is important to be prepared for possible future chaos.

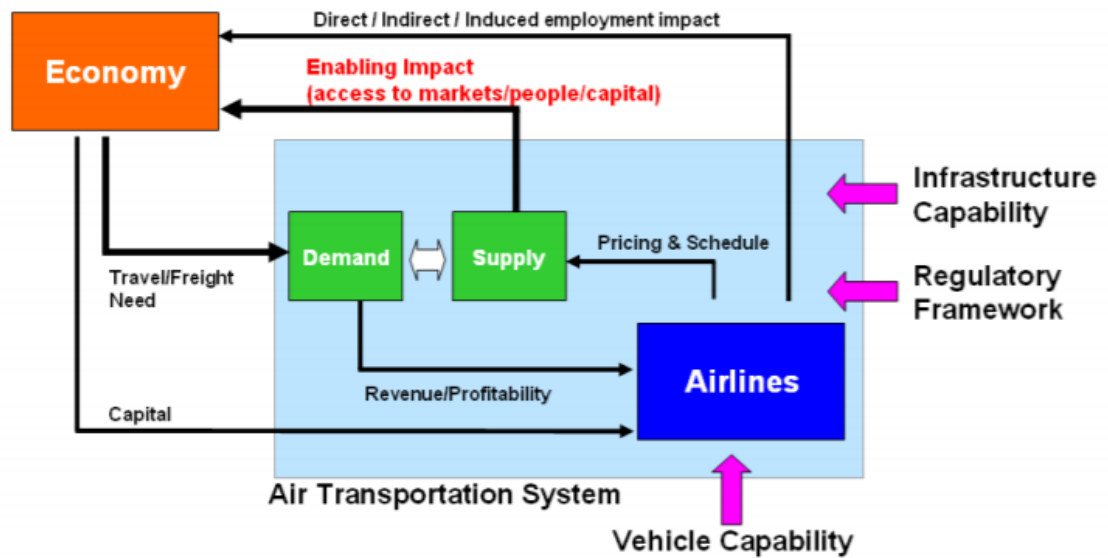
2.5. EFFECTS OF GLOBAL CRISIS ON DEMAND

Air transportation and financial activity are interconnected and have a spontaneous effect on one another. Thus, these financial activities are somewhat stimulated by air transport, and they, in turn, generate demand for air transport services. On the other hand, global or local crises affect the demand for airline transportation directly or indirectly. (Baikgaki 2014) The analysis also says that air airline passenger demand rates are positively related to GDP expansion rates (Chin and Tay 2001, p. 319). Research indicates that a 10 percent increase in a country's global air connectivity (relative to GDP) results in a 0.5 percent increase in long-run GDP per capita. The contribution of the aviation industry to the world economy (GDP) was calculated as \$3.5 trillion in 2018, while its ratio in the total gross domestic product was 4.1 percent (ATAG 2020). While the airline industry itself is an economic

powerhouse, it also affects the economic development of related sectors such as tourism and the aircraft industry (Belobaba et al. 2009, pp. 20-22).

Figure 2.5 designed by Ishutkina and Hansman shows the correlation between the economy and demand in airline industry.

Figure. 2.5: Interaction between economy and air transportation



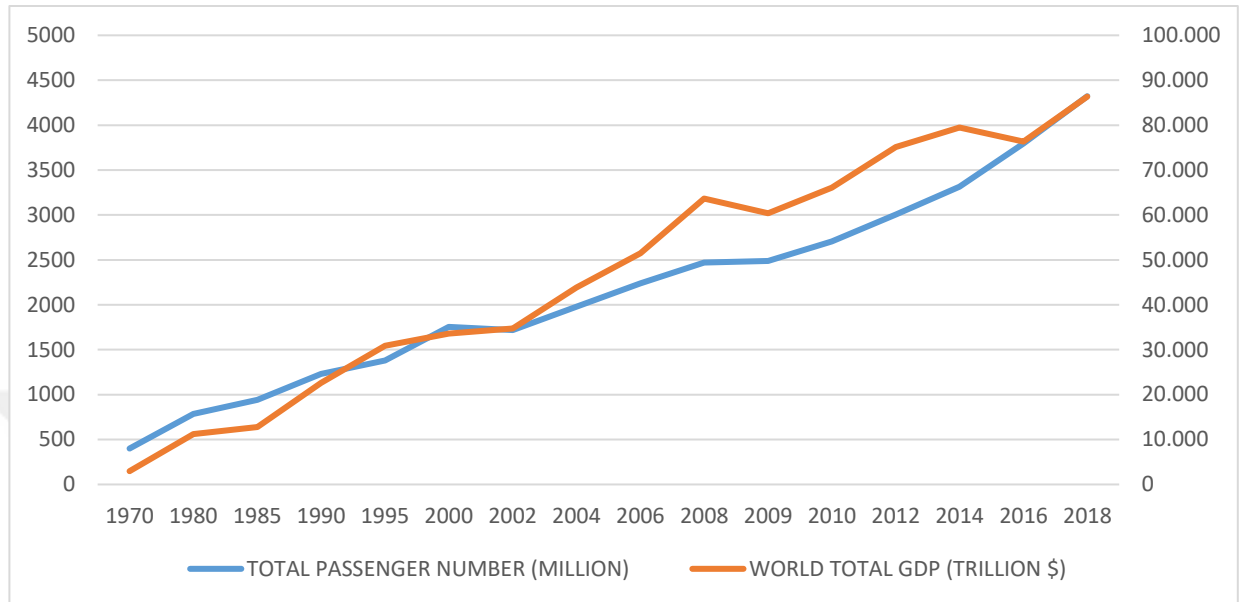
Source: Hansman, R. J., and Ishutkina M. A., 2009, *Analysis of the interaction between air transportation and economic activity*, p. 29

Although there is a significant increase in the commercial airline industry and airline passenger numbers every year, there has been a significant pause or decrease in some periods. When these negative periods are analyzed, it is seen that these periods are also crisis periods due to different factors affecting a certain region or the entirety of the world. The civil aviation industry has been riddled with crises since 1970, some man-made, others caused by nature. An important point about demand cycles in the airline industry is that over the last fifty years, the cyclical downturns have been acquiring more noticeable while the upturns are becoming weaker. (Chin and Tay 2001, p. 322)

As global crises affect all industries, the aviation industry, which is a part of the tourism industry is among the sectors most affected by these crises due to its service network and operational structure. The recent increase in crisis risks such as terror attacks and natural disasters and the damage suffered by the industry reveal this vulnerability (Henderson 2007, p.8).

The commercial airline industry exists in almost every country and contributes to both the local and global economies. Statistics show that the cycles of the airline industry are directly related to the world economic climate (can be seen at figure 2.5). The increase in demand for air travel often slows down as growth in the global economy slows, but there could be a time lag. As fares and tariffs are cut to try to fill vacant seats, a lower-than-anticipated rise in demand for air travel means over-capacity and lower yields. If the economic slowdown is followed by external influences that can negatively influence the airline industry in turn, or triggered by them, so the downturn of the latter is much deeper or longer-lasting. Therefore, when the global economy went into recession in the past due to many reasons for fueling the aviation industry, both were struck by a demand crash. It is also the case that variables affecting the financial performance of the airlines may vary between various regions or markets. As a consequence, the performance of airlines in a given region may sometimes be incompatible with the prevailing economic climate for the industry as a whole (Doganis 2006, pp 4-7)

Figure 2.6: Passenger numbers and world total GDP by year



Source: World Bank and ICAO, 2019

The main factor affecting the revenues of companies in the commercial airline industry is the number of passengers who demand to travel. (Lamb et al., 2020) When crises affect passengers' propensity to travel, companies' financial income and existence tends to be in danger. Authors investigating the effects of crises on air travel in the literature are generally focused on the change in the number of passengers. According to Peter Belobaba (2009, p. 55) passenger demand is the number of people wishing to travel from origin A to destination B during a given time period. Inmaculada Gallego and Xavier Font (2020) looked into SkyScanner web database and researched passenger numbers to reveal the impact of the COVID_19 crisis on airline travel and to analyze the change in demand.

2.6. RECOVERY PHASE

Although the sky evokes freedom, human beings will never be as free as birds there. Rules, conditions, precautions, and limits will always be with those who want to rise to the sky. Human beings, who can fly higher than birds with its own technologies, will be in a cage due to the crises they have created. After the Second World War, the connection of the world

with the sky increased, and the number of people who experienced air travel increased day by day with globalization, technological developments and liberalization steps. The airline industry, whose share in the world economy has increased over time, has experienced various crises over time and has taken a new shape after each crisis.

The tourism industry has experienced many crises and disasters over the last decade including terrorist attacks, political instability, economic recession, biosecurity threats, and natural disasters (Ritchie et al.).

According to many researchers who focus on Crisis lifecycle, one of the most important stages is the recovery phase. Although there are different comments on this issue, there appears to be clear similarities between the lifecycle of a crisis and the strategic management framework. Accordingly, this phase a long-term recovery or resolution phase allowing for evaluation and feedback into future prevention and planning strategies for airline companies (Ritchie 2003, p. 673). Successful implementation of the recovery phase will enable organizations to recover from their crisis in the long run and will protect against possible crises. Preparation for any potential crisis in tourism is a strategic key to recovery, where preparation is seen as an integral part of any crisis recovery phase (Pforr et al. 2008, p. 251).

When the crises experienced by the aviation industry in the 21st century are examined, it is seen that crises have brought new rules and shaped the concept of travel. Although the 9/11 terrorist attack is one of the most painful memories for aviation history, today's aviation security gives confidence with the measures taken in the recovery phase of this crisis. After the 9/11 attack, many changes occurred at different stages of air travel. The measures were taken also revealed some conditions that would affect the passengers' demand to travel by air, for example, passengers had to arrive at the airports earlier due to security checks. New measures such as baggage screening and passenger screening were implemented after this crisis. A study by Garrick Blalock, Vrinda Kadiyali and Daniel H. Simon revealed that the new measures implemented in the U.S. resulted in a 6 percent reduction in the number of

passengers and stated that air travel demand was indirectly affected (Blalock et. Al. 2007, pp. 731-755).

The COVID-19 crisis that broke out in 2019 and turned into colossal chaos in 2020 continues to threaten the airline industry and companies in 2021. Countries applied travel restrictions as temporary measures in the crisis management process, and then allowed passengers to travel only with protective face masks. As in previous years, lessons to be learned in the recovery phase of this crisis will shape the future of aviation history.



3. AIRLINE PRODUCT AND AIRLINE MARKETING STRATEGIES

3.1. AIRLINE BUSINESS AND ITS CHARACTERISTICS

Human beings are always excited to have access to both uniquely beautiful geographies and economic opportunities beyond borders. In addition to exploring and benefiting from these attraction centers, they also seek to find new technologies and ways for the fastest and most comfortable transportation methods to these destinations. In the 118 years since Wright brothers, who flew powered aircraft for the first time in history (1903), the aviation industry has experienced groundbreaking developments. "Planophore", which flew for the first time that day, traveled 40 meters by staying in the air for 11 seconds, and today its jet-powered grandchildren can travel thousands of kilometers for hours (Iatrou 2014, p. 3).

After this century in the sky, the airline industry has become an important part of the world economy. Being able to stay in the air was once the dream of human beings, but today it has become the most important way to realize many dreams. Airline transportation today provides significant benefits for both financial and social goals of people. In order to achieve these goals, the advantages it provides compared to other transportation methods bring the airline industry to a unique position.

The character of the airline industry today has been formed as a result of the political and social factors experienced over time. The Chicago Convention, which was a turning point after the Second World War, is one of them. Jet-powered aircraft era in the sky and deregulations are other important shapers. Especially the crises in the last 20 years (such as terrorist attacks, pandemics) have been other triggers of the changes in the aviation industry. International law and air transportation is not only an academic topic but also it is a down-to-earth, day-by-day business of operating international scheduled air carriers. As a result of the developments experienced, the aviation industry has a prescriptive character. Each time aircrafts take off to arrive at their cross-country destinations, the use of airspace requires

permission as a necessity regarding the sovereignty rights of States (Bükeç 2019, p. 15). In terms of how the airline raises sales, its product portfolio, value-added services, revenue streams, and target consumers, the new types of market models in the airline industry are presented. All companies operating in these business models act in accordance with certain international rules and disciplines.

As a result of 118 years of travel in the sky and demands for air travel, three different airline business models operate today. These models are; Full-service carriers (FSC), Low-cost carriers (LCC) and Charter carriers (CC) (Papatheodorou and Lei 2006, p.1).

3.1.1 Full-Service Carriers

Flag carrier airlines established by states and privatized after deregulations form the basis of FCC companies. These companies earn their earnings from passengers, cargo and maintenance activities. FCC companies, which include both wide-body and narrow-body aircraft types in their fleets, carry out their operations with a hub-and-spoke network strategy. FCC carriers operate both domestic and international flights to neighboring countries and overseas countries with short, medium and long haul flights. FSC companies' sales channels provide passengers with many options. These options are; the airline's website, the airline's contact center or city / airport office, call center and agencies. Every FSC has a loyalty program to retain the most frequent flyers. The frequent flyers programs (FFP) have become part of a broader strategy called CRM. The general purpose of CRM is to enable carriers to better manage their customers through the introduction of reliable processes and procedures for interacting with those customers. The final aim of the CRM is to enhance the passenger's buying and travelling experience in order to personalize the carriers' services. In this perspective, the CRM is an extra tool to differentiate the airline product. (Cento 2009, p. 19).

3.1.2 Low-Cost Carriers

A low-cost airline (LCC) is a type of airline that focuses on lowering operating costs while sacrificing some of the conventional services and amenities included in the fare, resulting in lower fares and fewer comforts.³ To compensate for revenue lost due to lower ticket prices, the airline may levy additional fees, such as for carry-on luggage. Southwest Airlines pioneered the idea of 'low-cost carriers,' or LCC, in the United States in the early 1970s. In Europe, the Southwest model was applied in 1991 by Ryanair, a conventional carrier in Ireland.

Low-cost carriers aiming to sell more cost-effective tickets to passengers carry out their operations from one or more base airports and prefer to fly to the less preferred airports of the cities they fly to because of low operating costs. In general, the LCC operates with one type of aircraft such as the Boeing 737 series with a configuration of 149 seats. The fleet composition also depends on the fact that they operate on only short- or medium-haul routes.

In this business model, low-cost carriers don't provide lounge services at airports, seat selection, or in-flight service, and don't have a frequent flyer program, so their product isn't unique. Other than ticket sales, low-cost carriers are increasingly generating revenue from other operations. Commissions from hotels and car rental firms, credit card fees, (excess) baggage fees, in-flight food and drink, and advertising space are all common examples. Telephone activities and onboard gambling have the potential to increase this revenue (Cento 2009, p. 20).

³ https://en.wikipedia.org/wiki/Low-cost_carrier
[Accessed 8 March 2021].

3.1.3 Charter Carriers

A charter carrier (CC) is an airline that runs flights outside of regular schedules under a contract with a specific customer. The term "charter flight" has come to mean a flight whose sole purpose is to transport vacationers to tourism destinations. Although charter airlines normally transport passengers who have booked individually or in small groups to beach resorts, historic towns, or cities where a cruise ship is waiting, a single group, such as members of a corporation, a sports team, or the military, may charter an aircraft. In most cases, charter flights are offered as part of a package trip, which covers airfare, lodging, and other services (Cento 2009, p. 22).

3.2. MARKETING STRATEGIES IN AIRLINE BUSINESS

Especially in the last 30 years, passenger demand in the aviation sector has increased significantly due to reasons such as deregulation decisions, development of technology and globalization. Nowadays, passengers who want to travel on a specific day and route, regardless of short or long haul, find many flight options. Which of these options the passenger will choose, becomes clear according to the expectations at the time of purchase and the airline company image in their mind. Airline companies that want to host the passenger planning to travel on a certain route on their plane will be preferred or will be one step behind with the strategic marketing steps they have implemented before the purchase step. At this point, companies that truly understand the needs and desires of the passenger come to the fore.

When it comes to airlines, it is seen that those that are able to anticipate passenger needs and demands are standing and viable. It is a fact that airlines that fail to properly analyze the market and devise marketing strategies as a result will struggle to gain market share. As a result, most airlines will fail, and if problems occur, they will try to find a solution. To begin with, marketing can be described as a process for meeting the needs and demands of consumers and selling a specific product in that direction. In this regard, it's important to

keep in mind that marketing and sale are two distinct ideas. While selling is the final phase of the process, marketing takes a more detailed and long-term approach (Bükeç 2019, pp. 195 - 210).

A good implementation of marketing concepts by an airline involves a comprehensive understanding of existing and future markets for its services. This expertise may provide an overview of the markets in which they are involved, as well as the market analysis tools they must use to obtain the information they need about the marketplace. They must be able to recognize Clients and tell them apart from Buyers. They must divide their markets into divisions and determine the needs of each segment's customers. Finally, and perhaps most critically, they must examine their markets in a competitive rather than stagnant manner, anticipating potential shifts in consumer requirements (Raddy and Singh 2019, p. 41).

For airlines, marketing and sales management play a critical role in strategic decisions such as new destination operations, pricing, and ticketing strategies, alliances, and so on. It is appropriate to consider various criteria when developing a marketing plan in order to proceed in a healthy manner. The components of this plan are grouped under four major headings that are interconnected. These are explained by the 4P concept in the field of business: product, price, promotion, and place. In line with the definitions made in the field of business, the product defined as service or product itself, the price is determined the money for this service, promotion is defined as sales strategy and place is defined as the place. If we take these terms into account in the aviation world, we can designate the product as the seat to be sold, or the cargo area offered. The price here is the most efficient variable. The place is the preferred sales channel. These can be ticket sales points at internet sites, phone lines or airports, which are associated with individual air routes, as well as with agents or tour operators who are intermediary companies (Bükeç 2019, pp. 195 - 210).

The "4Ps" model is a powerful one that captures much of what an airline must do to apply marketing principles and achieve business success. However, it does not give a complete description. Firms should achieve complete knowledge of their existing and prospective

customers as a cornerstone of effective marketing activity. This experience may include data on the market's size, demographics, customer needs, and attitudes. There must also be the ability to predict future market size as well as any potential changes in customer demand. Market research and market analysis are the methods used by airlines to gather this information.

The first step in marketing is to determine which regions and market segments can be profitably served. To do so, a variety of market analysis approaches are used, ranging from desk-based observational evaluations to polls of actual and prospective air service customers. The aim is to achieve a better understanding of various consumer segments' needs, as well as the extent to which those needs are actually unmet. Naturally, this contributes to the development of traffic forecasts that are as accurate and segmented as possible (Doganis 1985, p. 394)

A successful application of marketing principles by an airline requires a careful understanding of existing and potential markets for its services. This experience may include an understanding of the sectors in which they are involved, as well as the market research approaches they could use to obtain the information they need about the marketplace. Airlines are able to differentiate between "Customers" and "Consumers" and divide their markets into segments and determine the needs of each segment's customers. Finally, and perhaps most critically, they analyze their markets in a dynamic rather than static manner, anticipating future changes in customer requirements. People who travel are referred to as "consumers." As a result, they're simple to spot and analyze. They make their presence known by filing flight reports, and questionnaires can be used to analyze their needs and preferences. As a result, those in charge of marketing in the airline industry routinely pay close attention to them. Regrettably, they may not have the authority to make important decisions. Customers are the marketing term for those decision-makers (Shaw 2007, pp. 4-16)

All businesses identify the reasons that their clients consider when making decisions in order to analyze customer decision-making. To do so, the most obvious way is to have them classify the factors in a well-designed and administered market research survey. In order to analyze the customer well, the market segmentation should be prepared strategically. Understanding the travel purpose of passengers traveling by airline is of great importance in shaping the services to be offered to them.

Travelers' behavior is not uniform, and demand should be segmented. Flights at the start and end of working days of the week have the highest demand for business trips. Business travelers book later than leisure travelers and must make last-minute changes to their travel plans. The intent of travel (business or leisure), the purchase timing (early bookings or last-minute bookings), and the purchase location are some of the segmentation key factors (country of purchase, Internet, travel agent or airport ticket office). Specialist markets such as maritime, missionary, racial, and student markets are sold tickets through dedicated agents, allowing for further segmentation. Considering product segmentation, airlines offer some extra services to passengers in order to diversify their products. Those are typically in-flight services, ground services (food and entertainment, fast check-in, VIP waiting lounges, etc.) The passenger's willingness to pay, price elasticity, and quality demand are all influenced by the passenger's intention of travel and personal qualities. Businessmen may be more time-sensitive and less price-elastic, while leisure travelers may be more price-elastic. The price of an airline ticket is determined by the traveler's willingness to pay and the product quality that they crave. The use of booking classes and fences helps carriers to price discriminate, according to the theoretical literature (Cento 2009, pp. 30-36).

Despite the commodity nature of air transportation as a service, image and price are extremely relevant in the aviation industry. The primary aim of aviation marketing in the short term should be to maximize the return per available seat kilometer (by maximizing and optimizing the mix of seat load factor and yield). This can be accomplished through the use of tools such as picture and service branding, pricing, and availability/distribution. In the long run, marketing would contribute to the maximization of customer value and equity in

the form of improved customer benefits and experience quality. In any service sector, loyal clients are a valuable asset. Due to high information and transaction costs, as well as the need to overcome or compensate consumers' perceived quality risks, acquiring new customers is both costly and dangerous. The distinction between perceived comparable costs (as compared to costs of alternatives) and perceived comparable advantages is known as perceived customer value (compared with benefits of alternatives). It is the foundation of long-term consumer loyalty (Wittmer and Bieger 2011, pp 135-140).

3.3. SUPPLY AND DEMAND RESPONSIVENESS IN AIRLINES

Understanding passenger behavior, measuring and characterizing the airline reaction to a change in ticket prices or incomes, and deriving the demand-side information required to make sound supply-side business decisions are all part of airline demand and supply analysis. Demand may be defined as the ability and willingness to buy specific quantities of a good or service at alternative prices in a given time period under *ceteris paribus* conditions. One of the most critical facets of any company is understanding demand theory and the demand function since demand characteristics can dictate the trends and characteristics of sales. Would an increase in passenger demand, for example, result in an increase or decrease in passenger revenue if an airline dropped ticket prices? When do the increased sales caused by low ticket prices begin to hurt passenger yield? What macroeconomic factors will have a positive or negative impact on air travel demand? These and other business-critical decisions will be illuminated by demand analysis.

The law of demand states that, *ceteris paribus*, as price increases, the quantity demand decreases. In other words, quantity demanded has a negative relationship with price. Consider a transcontinental flight from Chicago to Houston to grasp the law of demand's practicality. What is the most a passenger would be able to pay for this round-trip flight? The fact is that at some point, a passenger will consider flying to be too costly and will opt out of the journey. This decision to not fly is a practical application of the law of demand, which states that at a certain price, the quantity demanded for an individual will decrease. A negative relationship

between price and quantity arises for airline companies, but the responsiveness of quantity demand to price changes is much lower. This explicitly shows demand inelasticity at lower ticket prices and serves as the foundation for airline revenue management strategies.

The fact that the demand for air transportation is derived from the demand for consumption or utilization of another good or service is an essential component of air transportation demand analysis. To put it another way, the demand for air travel is driven by factors other than the transportation itself. Individuals do not demand to travel; rather, they demand to travel for the reasons they wish to do so. They choose between different modes of transportation and, later, different airlines if they have chosen to travel.

There are numerous factors that influence the demand for air travel, and the price is not the sole determinant of demand. Some of the factors that affect this demand are: ticket price, competitor's ticket price, passenger income, state of the economy, availability of other modes of transportation, passenger loyalty, in-flight amenities, frequency of service, safety, aircraft type, location of airport random factors, such as volcano ash cloud, SARS, and 9/11 or threat of terrorism. The demand for air travel also has many unique characteristics that present problems for the airline industry. All of the following characteristics shape the demand for air transportation; fluctuations, cyclical, seasonality, directional flow, perishability, schedule wait time, airport access time, flight time, hub connection time, denied boarding time (Vasigh et al. 2013, pp. 110- 135).

The difficulties faced by airline executives in seeking to balance supply and demand have been intensified by the airline industry's high uncertainty and systemic turmoil, in the past. The rapid technical transition that is typical of air travel, as well as the liberalization of economic and consumer access laws during the 1980s and 1990s, have all led to this (Doganis 1985, p. 50).

The first distinguishing feature of air transportation demand is that, unlike many other services or goods, it is continually fluctuating. Individual flight demand is continuously increasing due to various determinants. A second feature of air travel demand is cyclical, which refers to a long-term trend of economic activity peaks and troughs. Such cyclical has long been observed in the national economy. And, given how closely the airline industry is linked to the national and global economies, it's not surprising that it exhibits some cyclical.

One of the key reasons why the airline industry has faced financial difficulties and has profit margins well below many other industries is that its demand fluctuates constantly but its supply is relatively fixed. Lack of flexibility in the supply function makes it very difficult to manage capacity effectively therefore, it is important to understand the factors impacting airline industry supply. Supply refers to an airlines' willingness and ability to provide a specific number of seats at a given price, time period, and market. In the airline industry, supply is the capacity of an airline to transport passengers, a function of offered routes and available aircraft. Supply is usually expressed in available seat miles (ASMs). Some of the factors affecting supply are: the ticket price, price of resource inputs (fuel prices, labor costs, landing fees, aircraft costs maintenance costs), navigation charges, technology, availability of other modes of transportation, government regulations and stochastic factors (weather condition and strikes).

One of the major characteristics of air transportation demand is that demand constantly fluctuates. Because of this, airlines must react to this fluctuation by adjusting the supply to match the passenger demand. In order to accommodate seasonality, airlines need to either pull capacity off existing routes or have idle capacity available to accommodate additional flights. Both of these options have embedded costs, and airlines typically use a mix of both options. While the increased costs of a seasonal schedule can be offset by increased revenues, airlines have greater difficulty adjusting supply on a short-term basis due to the second major characteristic of airline supply, rigidity. The fact that airline companies maintain the balance of supply and demand directly affects their economic assets and success (Vasigh et al. 2013, pp. 110- 135)

3.4. THREATS AND OPPORTUNITIES FOR AIRLINES DURING CRISES

The aviation industry has always been vulnerable to crises due to its character. Especially in the sector, which has grown significantly in the last 20 years, these difficult periods of crisis have become a test for the important players of the sector. How accurately the companies' mark the choices they encounter in these exams is an indication of how successfully they will overcome the crisis periods. The crises experienced also cause us to question the freedom of airline companies in the sky. Measures were taken by states and companies due to crises shape aviation operations and bring new rules.

When we look at the crises that affected the aviation industry in the past, it is seen that they are turning points that affect today's aviation. The first example is the oil embargo in 1973. In this crisis, where oil prices increased by 400 percent, airlines had to reduce their operations significantly. At the end of this negative period, the issue of fuel efficiency has become the agenda of airline companies and aircraft manufacturers. Today, the aviation industry is one of the most efficient of all the energy-intensive industries across the globe. The reasons that contributed to this progress was caused by the 1973 oil crisis. It was important to increase performance. It was possible that the company would have failed if it had not adapted. The industry evolved as a result of the introduction of new technologies, increased air traffic control, and depreciation period.⁴

The 9/11 terrorist attack, which shook the first years of the twenty-first century, caused the concept of security to be questioned again by states, airports and airline companies. Thanks to the new measures taken in different processes of travel after the terrorist crisis, air travel has become much safer than other travel methods today (Blalock et. Al. 2007, pp. 731-755).

⁴ <https://simpleflying.com/1973-oil-crisis-fuel-efficiency/>
[Accessed 8 March 2021].

4. REVIEW OF PREVIOUS STUDIES: EFFECT OF CRISIS ON AIR TRANSPORTATION

The commercial aviation industry, which is one of the fastest-growing sectors of the 21st century, has started to be affected more by the crises because of its growth. During the COVID_19 process which is shown as one of the most difficult crises in world history, the industry is caught off guard by the crisis. When the crises that had the most effect on the aviation industry in the last 20 years are analyzed, it is seen that the crisis situations are analyzed from different angles and ways in the literature.

Emma Xiaoqin Fan (2003) examined the economic impact of the SARS virus, which is a pandemic like COVID-19 and threatens human health, in her article in 2003. Stating that the effect of the virus was felt stronger in Asia where it emerged when compared to other regions. The author also wrote that the demand for airline companies was significantly and negatively affected. Xiaoquin Fan mentioned in his study that the lack of knowledge about the virus has resulted in a chaotic environment and made recommendations to the states that the risks of infectious diseases should be minimized.

Alan Au (2005) analyzed in his/her study that the damage caused by the Sars Pandemic crisis to the Hong Kong tourism industry. The author has shown the number of passengers coming to Hong Kong decreased significantly during the crisis and the number of passengers and tourists returned to the normal level in the post-crisis period. According to the article, the travel purposes of the passengers should be taken into consideration in the evaluation of the post-crisis period and to take source-country-specific measures to manage the negative effect of SARS.

Another writer working on the first pandemic of the 21st century was Annelies Wilder-Smith (2005). Smith has stated in his article that the concepts of pandemic and travel are interlinked.

The author also put forward the travel measures taken during the time of the SARS pandemic and made recommendations for another possible pandemic crisis of the 21st century.

Noel Scott (2009) focused on the post-crisis recovery process of the tourism industry in their article and stated that past crises should be analyzed well and emphasized preparedness for possible future crises. In the study, the author has stated that crises have different structures, and the reasons that negatively affect travel demand should be well understood.

Tracy L. Lamb et. Al. (2020) has investigated the impact of 23 different factors on the travel demand of airline passengers. The main aim of study was to identify the factors which predict what type of airline passenger would be willing to fly throughout and after the COVID-19 pandemic.

The purpose of David Gillen and Ashish Lall (2003) was to identify transmission channels through which negative shocks or crises are transmitted in the airline industry. The authors have stated that the 9–11 terrorist attacks had a negative impact on the passenger numbers of every airline. However, the severity of the impact has varied between the regions. Sue Ling Lai and Whei-Li Lu (2003) have used an interference model to look at the effect of the terrorist attack on passenger demand for airline travel in the US on 11 September 2001. The result has revealed that for 1 and 2 months, domestic and foreign air traffic was substantially affected. Instead of progressive and enduring, the impact trend was therefore sudden and temporary.

Brent W. Ritchie (2005) has stated in his study that the tourism sector is extremely vulnerable to change and crises/disasters. According to the author, in the tourism sector, a strategic, holistic, and proactive approach to crisis management is required.

The short and long-term consequences of economic growth and crises (e.g., 9/11 terrorist attacks, Iraq war, SARS outbreak, and 2008 financial crisis) on air passenger demand were analyzed by Junwook Chi and Jungho Baek (2013). In the article, results have shown that, with economic expansion, air passenger services aim to rise over the long term. But, both in the short and in the long-run, 9/11 terrorist attacks, and the SARS had adverse impacts on air passenger demand.

Thomas Bieger et al. (2007) have examined the factors affecting the travel demand of passengers traveling by air. According to the authors, the expectations of passengers traveling for business and leisure purposes differ.

Xiaoqian Sun et. al. (2020) has revealed that not only the crises have an impact on airline transport, but also airline transport has an impact on crises. The author, who has revealed that international flights bring countries and people together, said in the study that the pandemic has more opportunity to spread due to air transport. Due to this situation, countries closed their air bridges to other countries and this has been one of the factors affecting the demand for air passengers.

A detailed study of air service dynamics during the financial crisis of 2007-2008 was focused by Frédéric Dobruszke and Gilles Van Hammeb (2011). The authors have shown, through a regression analysis, that the shift in the availability of seats at the country level is highly dependent on economic development, confirming the cyclical existence of the air market. According to the report, the global recession has affected the US, Europe and Japan even more than the rest of the world in terms of demand for airlines.

Nuno Fernandes (2020) has focused on economic impact of the COVID-19 pandemic crisis across states and industries. According to his study the fact that the world is more connected and integrated has a great effect on the pandemic being more effective than the crises experienced in the past years. Explaining the differences of the COVID-19 pandemic compared to other crises in his study, the researcher states that the effects of the last crisis are felt more globally and that supply and demand are decreasing at the same time all over

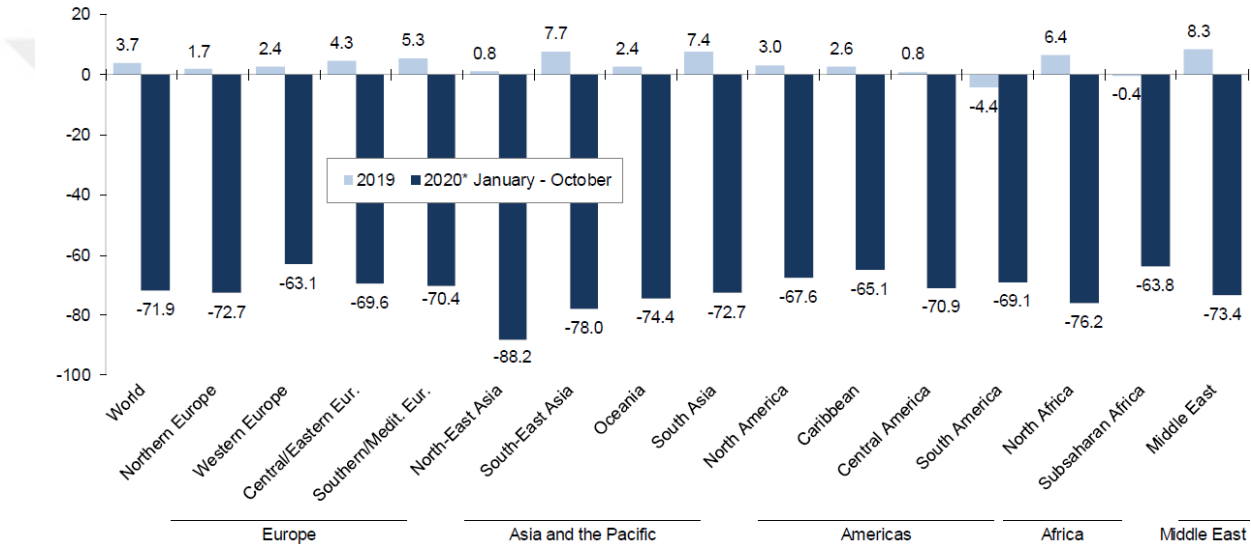
the world. However, as a result of the decrease in the number of seats available, airlines have grounded first a certain part of their fleet and then the entire fleet. Due to the decrease in operations, some companies gave their employees unpaid leave, while others laid off some of their employees.

The World Tourism Barometer study, published by UNWTO (World Tourism Organization) in December 2020, conveys important details about the dimensions of the COVID-19 crisis. According to the study, the number of travels for international tourism decreased by 72 percent in the January - October period of 2020 compared to the same period of the previous year. Passengers' confidence in air travel has been affected by the pandemic, which has been an important factor in the fall in demand. According to UNWTO, this decline in the number of international tourists also affected the world economy, and a loss of US \$ 935 billion was experienced in the first ten months of the year compared to the previous year. This figure means about 10 times more losses compared to the loss in the 2009 crisis. In the study published by UNWTO, it is estimated that the loss in international tourism will be 1.1 trillion USD in 2020. This decrease in international tourism means that the world GDP will be approximately 2 percent of total GDP in 2019. Another remarkable detail in UNWTO's study is that during the last months of 2020, international travel demand remained low while domestic travel increased during the pandemic. Domestic demand in some major markets such as Russia and China almost neared pre-COVID-19 levels. International Tourist Arrivals is shown regionally in figure 3.1 compared to the previous year.

According to other data shared by UNWTO based on ICAO and IATA, International Passenger Numbers have been more affected by the COVID-19 crisis than Domestic Passenger Numbers. During the January-October 2020 period, domestic capacity has decreased by 62 percent while international capacity decreased by 38 percent. After the decrease in the travel demand of the passengers, the international passenger load factor has realized with an average of 43 percent. In the relevant report of IATA, the demand for air travel was measured with Revenue Passenger Kilometers (IATA 2020).

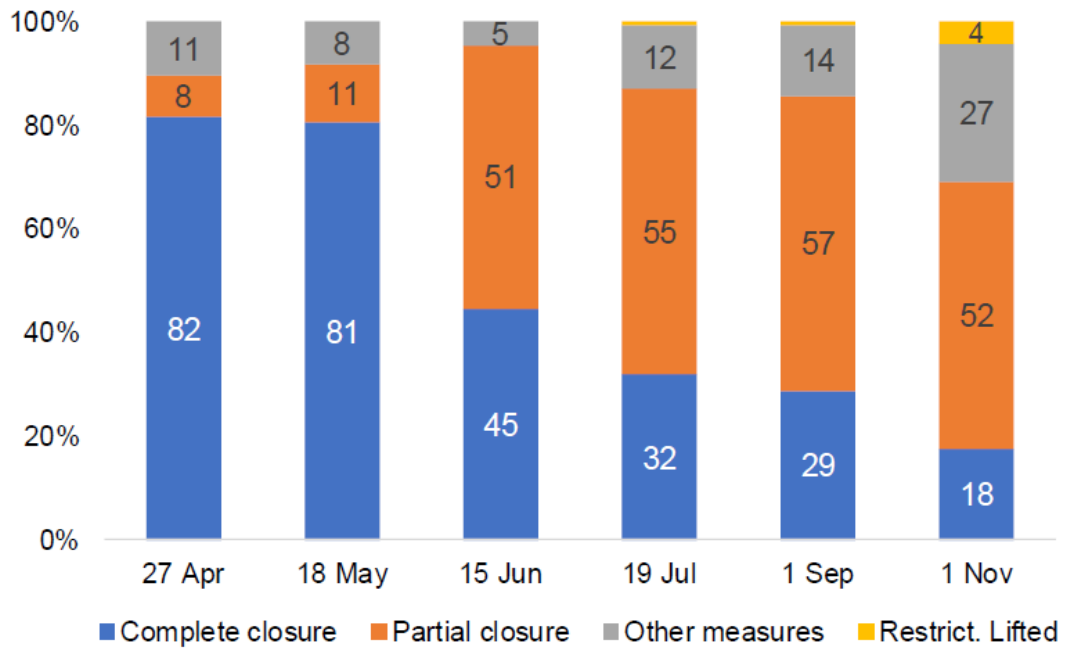
As can be seen in the figure 4.1, international tourist travel for 2020 has declined in all regions of the world. This situation was influenced by the decrease in tourist demand as well as the restrictions of countries like in figure 4.2. After the epidemic was declared a global pandemic, countries had introduced hard travel restrictions and, as can be seen in the figure, these restrictions were eased over time.

Figure 4.1: International tourist arrivals



Source: UNWTO, 2020

Figure 4.2: World Destinations by the type of travel restrictions

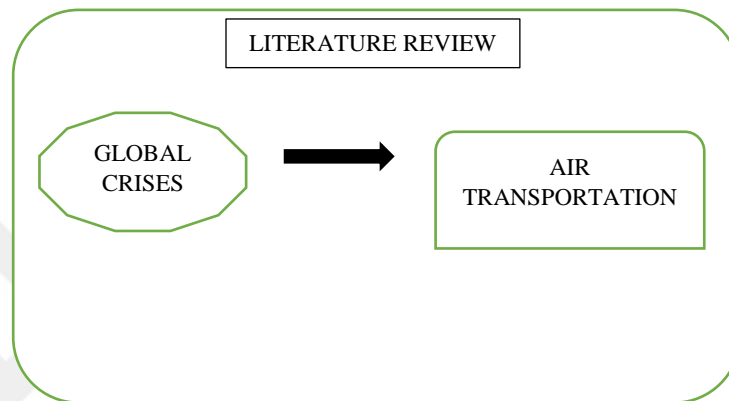


Source: UNWTO, 2020

A study published by International Labor Organizations (ILO) in 2013 revealed that the demand for air travel fluctuated periodically and this demand was affected by the conditions of the particular period such as economic development, political developments, and change in population. It was also stated in the research that passenger satisfaction generally decreased depending on the crisis periods. In the study, it has been emphasized that one of the measures taken by airline companies during crisis periods is to lay off workers. However, even if precautions are taken, airline companies whose financial structure is not strong can go bankrupt due to crises. In the study, 13 airline companies that went down in the United States due to the 2007-2008 crisis are shown as an example.

After examining the effects of global crises on air transportation in the light of the literature, the following conclusions have been reached;

Figure 4.3: Literature review design



- A. Global crises and air transport have a reciprocal effect.
- B. Crises lead to a chaotic atmosphere in air travel, and the anxiety caused by crises has a negative effect on the demands of the passengers who will choose the airline for their travels.
- C. Even if it is in a certain corner of the world, the impact of the global crisis is experienced globally in commercial air transportation.
- D. Supply and demand are decreasing at the same time all over the world.
- E. Airline companies had to lay off some of their employees.
- F. Due to the decrease in passenger demand, airlines have grounded their planes and reduced the number of seats offered.
- G. Global crises have caused economic losses for airline companies.
- H. The demand for air travel decreases significantly during crises.
- I. Global crises affecting the airline industry have a negative impact on passenger satisfaction.
- J. Revenue Passenger Kilometers (RPKs) should be examined in order to see the variation in the travel demand of airline passengers.

5. RESEARCH METHOD

5.1. PURPOSE OF THE RESEARCH

The global economy and the aviation industry have experienced significant growth over the past 50 years in an interlinked manner. Globalization and regulations not only contributed to the growth of the aviation industry but also carried it to a position open to global crises. Especially the global crises in the 21st century have deeply affected the aviation industry, which is a bridge between continents.

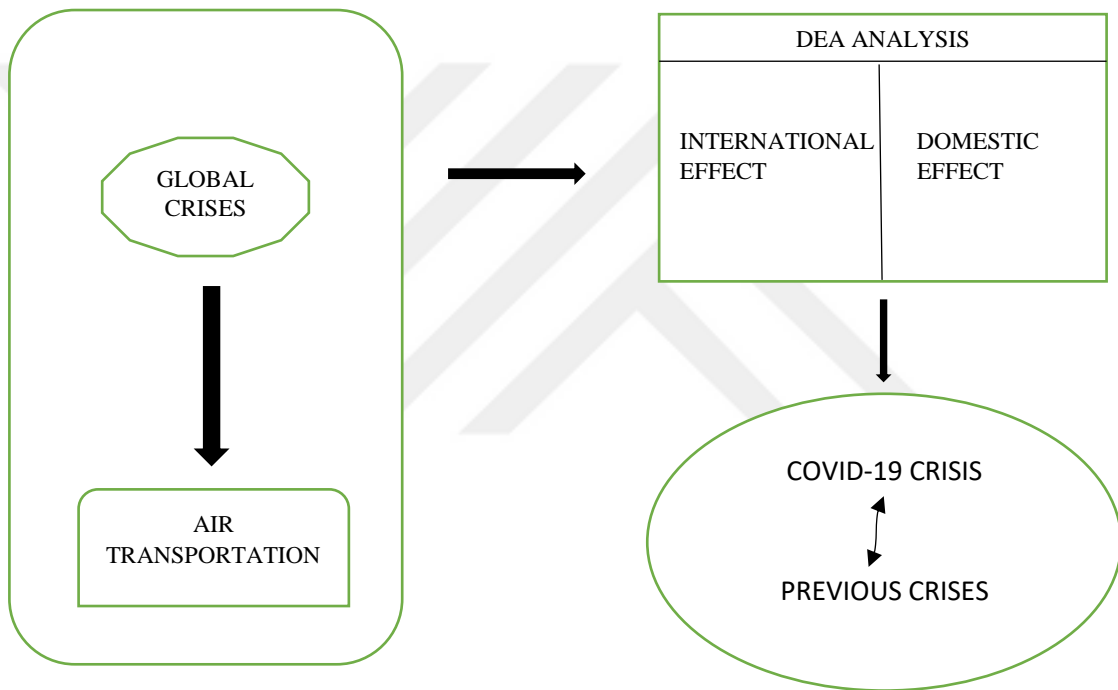
COVID-19 crisis has revealed that commercial aviation is the most vulnerable industry to crises. However, academic studies that focus on the difficulties experienced by the aviation industry during crises have been limited. This study compares the period of COVID-19, the most difficult crisis in aviation history, with other major crises in the context of change in airline passenger demand. The main purpose of the study is to examine the crises affected the passenger demand in the aviation industry in order to produce proposals for strategy formulators of both the airline industry and the airline business considering any possible future crises.

5.2. RESEARCH DESIGN

The main question that has been aimed to be answered in this study is "What are the similarities and differences of the COVID-19 pandemic with other crises in air passenger transportation?" By reaching the answers to this question, it is aimed to present a set of recommendations to the airline industry and states in the context of commercial passenger transportation.

In order to find the right answer to this question, a roadmap was determined and answers were sought for different questions. These titles; The dimensions of global crises, the effects of global crises on air transportation, the changes caused by the crisis in the travel demand of airline passengers, and the similarities and differences of the crises experienced in the aviation sector.

Figure 5.1: Research design



5.3.DATA COLLECTION METHOD

This research analyzes changes in airline passenger demand during crises. The data we needed to collect for the effects of global crises on airline passenger demand were Passenger Numbers, Domestic and International Passenger Numbers, Departures Worldwide, Revenue Passenger Kilometers, Available Seat Kilometers.

In order to determine the changes in airline passenger demand, data published by the leading authorities of the global industry were examined. The main data has been collected from lots of sources. One of them is The International Civil Aviation Organization (ICAO) which was established by the Chicago Convention, adopted on December 7th, 1944. ICAO works with its 193 Member States and several industry groups so the authority has great power when it comes to collecting data around the world. ICAO has followed a more generous way than other authorities in sharing data with the public, especially in the last 20 years. The annual reports shared on the website of the organization contain data that most clearly express how much the aviation industry has developed between 1995 and 2019. In the annual reports, especially the data regarding the year 2007 and after has been the most important source to reach the required information. Transparent data revealed by ICAO in the COVID-19 crisis are also important for the global airline industry. The damage caused by the pandemic to the aviation economy and the forecasts for the future are shared in the file shared every month.

Another source used for data collection are publications of the International Air Transport Association (IATA). IATA represents around 290 airlines and 82 percent of total air traffic, so the organization is an important unifying force for the aviation industry. During the data collection phase, IATA's Annual Reviews, facts and figures, Market Analyzes and Monthly Analyzes shared in certain periods have been examined. In some data published by IATA, graphs the change in passenger demand for air travel had been a valuable resource for the data collection phase. Especially the data shared in international and domestic contexts contributed significantly to the study.

The World Bank data statistics have been evaluated for the economic data used in the study. GDP changes in the history of the global economy have been taken into consideration and compared with the aviation sector passenger demand figures.

Other sources used for data collection also contributed to the quality of the study. For instance, HERMES Air Transport Organization's 100 Years of Commercial Aviation study not only shed light on the early periods of aviation history but also had been guided the compilation of the data in the study. OAG (Official Airline Guide) has been evaluated especially for tracking data in the COVID-19 crisis process.

5.4.DATA ANALYSIS TECHNIQUE

In order to find an answer to the research question, the collected data were analyzed using the Data Envelopment Analysis method. This method has been the preferred method for many researchers for many years in order to obtain an accurate interpretation for academic studies. In this study, the Data Envelopment Analysis method was considered as the most efficient method for the comparison of passenger numbers during crisis periods in which a limited number of data was available. In determining the research analysis method, Data Envelopment Method was chosen due to the limited data. In order to interpret the change in air passenger demand during the crisis in the most accurate way, the most basic figures that can be the reference in this field have been entered in the analysis. These figures are determined as domestic and international annual passenger numbers, capacity offered to passengers by airline companies, annual flight numbers, and revenue passenger kilometers, which are critical for airline companies to evaluate today and foresee tomorrow.

Data Envelopment Analysis has been evaluated in order to accurately compare these figures with each other during crisis periods and to reach the findings that will be the starting point for the suggestion set. While determining the time interval for the analysis, the demand situation in the sector before the crises and the recovery period after the crisis has been considered. In this way, it was aimed to find out how long after the crisis air passenger demand returned to its previous level and to what extent the crisis-affected demand.

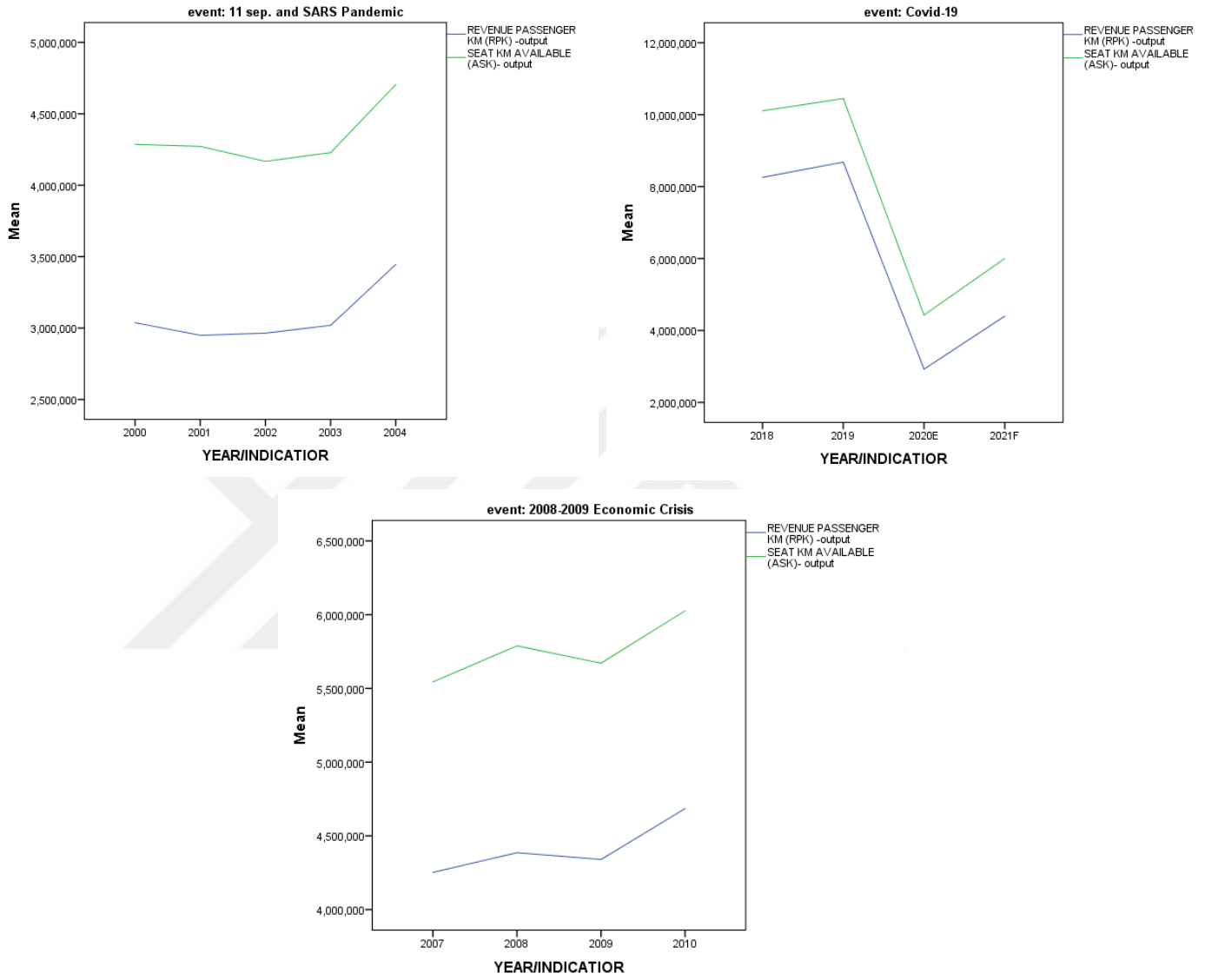
5.5. SAMPLING METHOD

This study includes yearly data which is related to International Passenger Number, Domestic Passenger Number, Departures Worldwide, Revenue Passenger Kilometer, Available Seat Kilometer for three-time period 11 Sep. and SARS Pandemic (2000-2004), 2008-2009 Economic Crisis, COVID-19 (2018-2021F) among the world. The descriptive statistics of the data is shown in Table 5.1.

Table 5.1: Descriptive statistics of the inputs and outputs in between 2011-2019

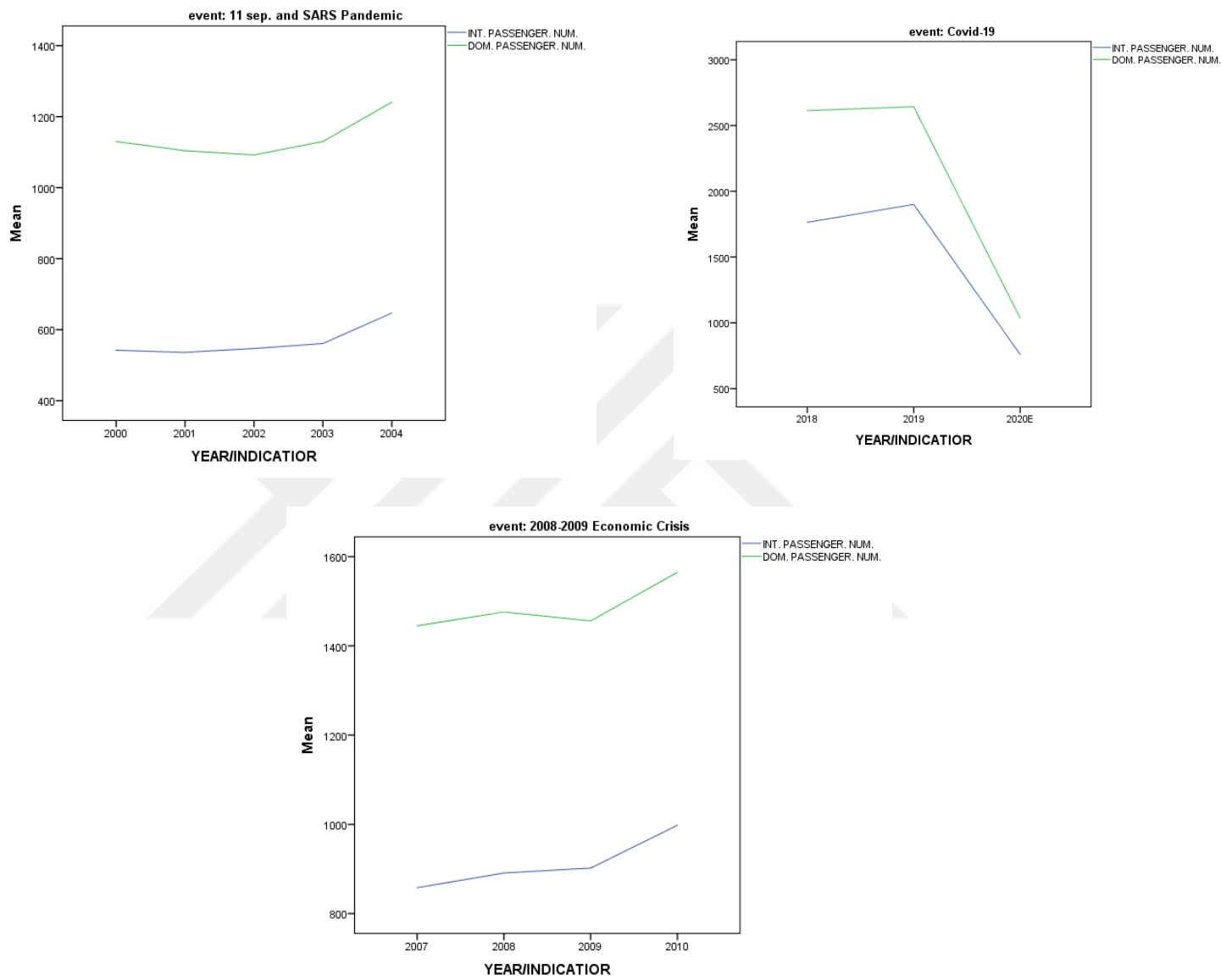
Mean±SD Med (Min- Max)	Inputs			Outputs	
	Int.Passenger Number	Dom.Passenger Number	Departures Worldwide	Revenue Passenger Kilometer	Available Seat Kilometer
11 Sep. and SARS Pandemic (2000-2004)	567±46 547 (536-647)	1139±59 1130 (1092- 1241)	22025±1124 22008 (20817- 23752)	3083202±205704 3019100 (2949550- 3445300)	4331552±213702 4271860 (4167110- 4704730)
2008-2009 Economic Crisis	912±60 897 (858-998)	1486±55 1466 (1445- 1565)	26818±1899 26069 (25498- 29637)	4415762±187757 4362813 (4252520- 4684902)	5757461±204744 5729809 (5544460- 6025765)
COVID-19 (2018- 2021F)	1475±623 1764 (760- 1900)	2097±920 2614 (1035- 2643)	31033±12685 37800 (16400- 38900)	6065500±2845032 6328500 (2925000- 8680000)	7746779±2994576 8054070 (4430256- 10448718)

Figure 5.2: The mean of outputs (yearly)



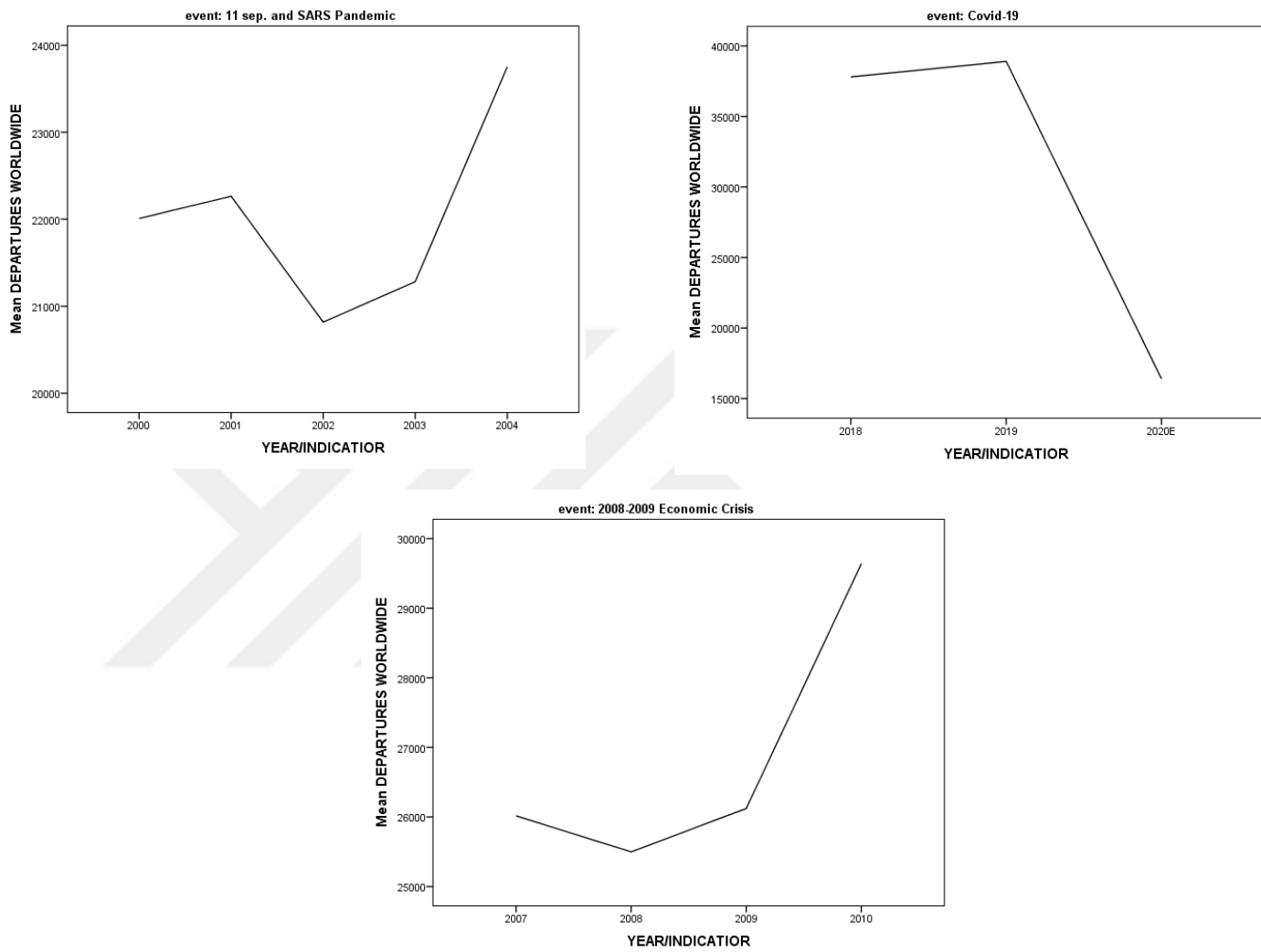
According to Figure 5.2, the mean of RPK and ASK increase in between 2003-2004, 2009-2010.

Figure 5.3: The mean of international and domestic passenger numbers (yearly)



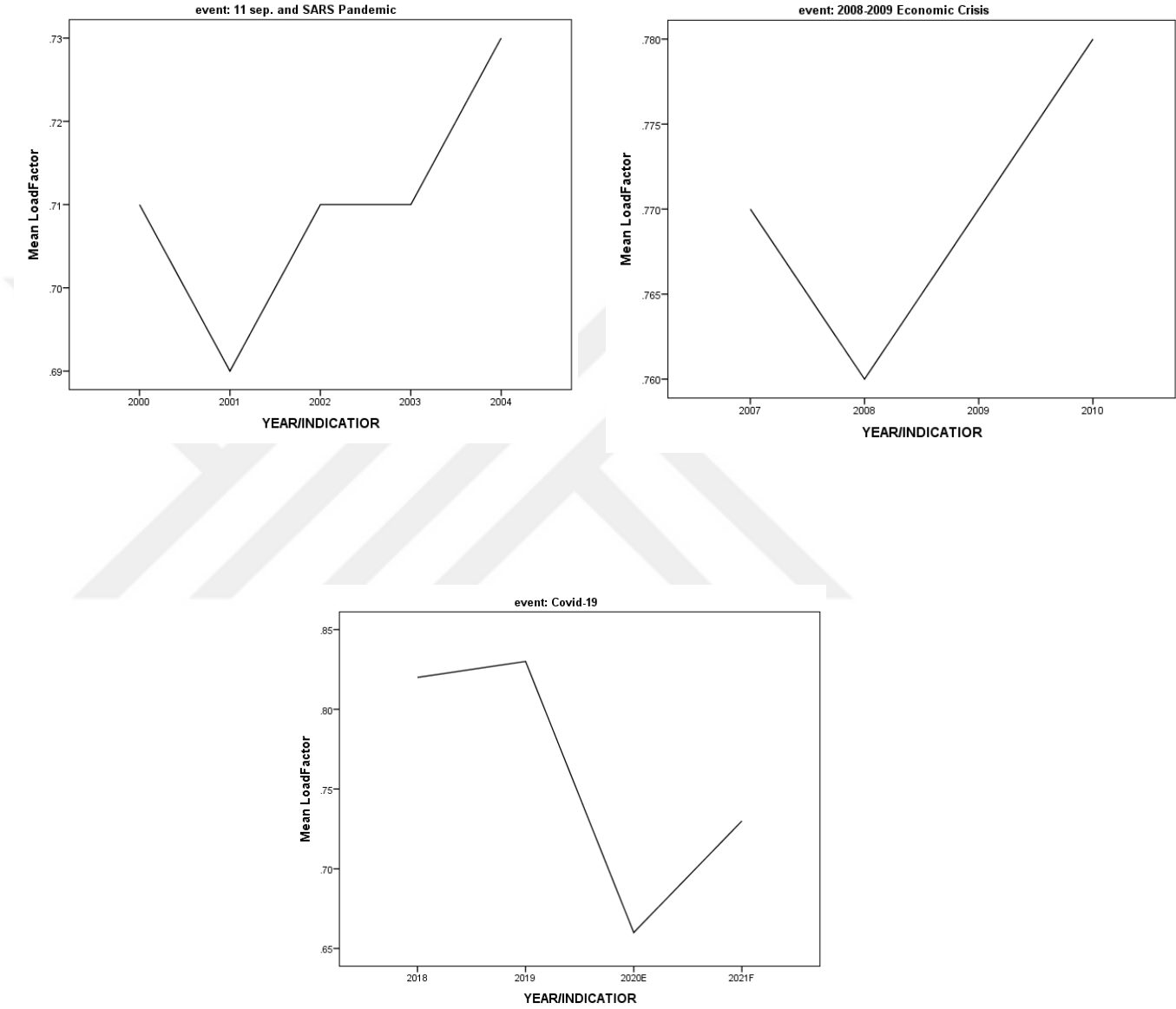
According to Figure 5.3, the mean of international and domestic passenger numbers increase in between 2003-2004, 2009-2010.

Figure 5.4: The mean of departures worldwide (yearly)



According to Figure 5.4, the mean of departures worldwide increases in between 2003-2004, 2009-2010.

Figure 5.5: The mean of load factor (yearly)



According to Figure 5.5, the mean of load factor increases in between 2003-2004, 2008-2010.

The Spearman's correlation analysis is utilized to investigate the relationships between inputs and outputs (Table 5.2).

Table 5.2: Correlation analysis between inputs and outputs

r; p			Input		
			Int.Passenger Number	Dom.Passenger Number	Departures Worldwide
11 Sep. and SARS Pandemic (2000-2004)	Output	Available Seat Kilometer	0,200; 0,747	0,821; 0,089	0,900; 0,037
		Revenue Passenger Kilometer	0,700; 0,188	0,872; 0,054	0,400; 0,505
2008-2009 Economic Crisis	Output	Available Seat Kilometer	0,800; 0,200	1,000; -	0,400; 0,600
		Revenue Passenger Kilometer	0,800; 0,200	1,000; -	0,400; 0,600
COVID-19	Output	Available Seat Kilometer	1,000; -	1,000; -	1,000; -
		Revenue Passenger Kilometer	1,000; -	1,000; -	1,000; -

In overall, it is found that there is positive strong statistically significant correlation between inputs and outputs. For this reason, these variables can be included into DEA.

5.6. RESULTS OF DATA ANALYSIS

DEA is a nonparametric approach to measure efficiency. DEA includes a linear programming solving problem for each decision-making unit (DMU). In DEA, technical efficiency (TE) can be measured under two assumptions: constant return-to-scale (RTS) and variable return-to-scale (VRS).

The TE measure corresponding to CRS assumption represents overall technical efficiency (OTE) which measures inefficiencies due to the input/output configuration and as well as the size of operations. The efficiency measure corresponding to VRS assumption represents pure technical efficiency (PTE) which measures inefficiencies due to only managerial underperformance (Kumar&Gulati, 2008). In this study, input oriented Charnes-Cooper-Rhodes (CCR-I) and Banker- Charnes, Cooper (BCC-I) model are utilized to obtain efficiency measures under CRS and VRS assumptions. Input oriented models are used when it is intended to produce the most output with the least input (Charnes et.al., 1978). CCR models are used in the calculation of relative total activities under the assumption of constant return by scale, that is, based on the assumption that all DMUs operate at an optimal scale. However, in real life, there are systems with variable returns to scale. In 1984, Banker, Charnes and Cooper developed the BCC model, known by the initials of their names, to determine the efficiency of systems with scale-based returns (Banker et. al., 1984). The CCR-I and BCC-I models are given Table 3.

Table 5.3: CCR-I and BCC-I Models

CCR-I	BCC-I
$\min \theta_k$ $\sum_{j=1}^n \lambda_{jk} X_{ij} \leq \theta_k X_{ik}$ $\sum_{j=1}^n \lambda_{jk} Y_{rj} \geq Y_{rk}$ $\lambda_{jk} \geq 0, \text{ if CRS}$ $\sum_{j=1}^n \lambda_{jk} = 1, \text{ if VRS}$	$\max \sum_{r=1}^s u_r Y_{rk} - u_k$ $\sum_{r=1}^s u_r Y_{rj} - \sum_{i=1}^m v_i X_{ij} - u_k \leq 0$ $\sum_{i=1}^m v_i X_{ik} = 1$ $u_r, v_i \geq \varepsilon > 0$

where n is the number of DMUs, s is the number of outputs, X_{ij} is the j th DMU of i th input and Y_{rj} is the j th DMU of r th output. θ_k is the k th DMU of efficiency score under $\theta_k^* = 1$ condition. u_r is the k th DMU weight of r th output, v_i is the k th DMU weight of i th input. ε is the positive very small number. λ_{jk} is the k th benchmark of the j th DMU. MaxDEA software is used for DEA.

DEA Results

The DMUs are the years that includes the event of 11 Sep. and SARS Pandemic (2000-2004), 2008-2009 Economic Crisis, COVID-19. It is found that the time period which has efficiency score lower than 1 are evaluated as inefficient whereas the events with efficiency score equals to 1 is determined as efficient.

As a result of CCR-I model with CRS, 6 of 12 selected years are found to be effective. 2000, 2001, 2008, 2018, 2019 and 2020 are found effective for CCR-I model. According to Table

4, BCC-I model with VRS, 8 of 12 selected years are found to be effective. 2000, 2001, 2002, 2008, 2009, 2018, 2019 and 2020 are found effective for BCC-I model. If a DMU is fully efficient according to the BCC model and inefficient according to the CCR model, it can be said that the DMU works efficiently locally, but not generally. Therefore, 2000, 2001, 2002, 2008, 2009, 2018, 2019 and 2020 are found efficient locally but not generally.

Table 5.4: Comparison of efficiency score

			CCR-I		BCC-I	
Period	No	DMU	Efficiency Score	Benchmark (Lambda)	Efficiency Score	Benchmark (Lambda)
11 Sep. and SARS Pandemic	1	2000	1,000000	2000(1,000000)	1,000000	2000(1,000000)
	2	2001	1,000000	2001(1,000000)	1,000000	2001(1,000000)
	3	2002	0,999201184	2000(0,873861); 2018(0,020059); 2020(0,049403)	1,000000	2002(1,000000)
	4	2003	0,990452293	2000(0,882066); 2018(0,028101); 2020(0,036833)	0,992296045	2000(0,131656); 2002(0,859851); 2018(0,008493)
	5	2004	0,994352317	2000(0,901645); 2019(0,081397)	0,995897011	2000(0,738987); 2002(0,186334); 2019(0,074679)
2008-2009 Economic Crisis	6	2007	0,99061428	2000(0,597561); 2001(0,068093); 2019(0,257669)	0,996857638	2002(0,686915); 2009(0,115531); 2019(0,197554)
	7	2008	1,000000	2008(1,000000)	1,000000	2008(1,000000)

	8	2009	0,990989859	2008(0,844895); 2019(0,066654); 2020(0,018986)	1,000000	2009(1,000000)
	9	2010	0,978656757	2008(0,732494); 2019(0,164604); 2020(0,014868)	0,989894574	2009(0,873134); 2019(0,091166); 2020(0,035700)
COVID - 19	10	2018	1,000000	2018(1,000000)	1,000000	2018(1,000000)
	11	2019	1,000000	2019(1,000000)	1,000000	2019(1,000000)
	12	2020	1,000000	2020(1,000000)	1,000000	2020 (1,000000)

6. FINDINGS

During the study, the literature that researched the crises that affected the aviation industry were examined. The common opinion stated in these studies is that the airline industry has been negatively affected by global crises. The airline travel industry, which has grown significantly in the last 20 years, has shown a stagnant graphic or failed performance compared to previous years during the crisis periods that emerged for different reasons. The factors affecting the travel demands of passengers traveling by airline have negative consequences in times of crisis, causing difficulties for airline companies on a regional or global scale. In this process, some airline companies could not survive, while others managed the crisis correctly and shown growth in post-crisis times. For airlines and governments, it is important to understand the travel expectations of the airline passenger in times of crisis and to see the factors that affect the demand in the market, both for determining the services provided and for the proper adjustment of the number of seats offered. The most important aim of this study is to compare the crises affecting the airline industry in the last 20 years in

the context of changes in the demand of passengers. Findings revealed when travel statistics are examined give important clues about the demand of passengers in airline passenger transportation. Comments that can be made when examining different crisis periods are as follows.

When the changes in air travel habits in times of crisis are analyzed, it is seen that the demand for international and domestic travel is not affected in the same way in every crisis. In four crises in three different periods, the demands of passengers for domestic and international travel differ. While the number of both international and domestic passengers decreased in 2001, when the 9/11 terrorist attacks took place, compared to the previous year, the impact of the SARS pandemic in 2003 was not negative on a global scale. As stated in the literature, although the impact of the SARS crisis remained regional, the rapid rise in 2004 shows that the first pandemic of the 21st century has slowed global growth in 2003. In the financial crisis in 2008, which affected the global economy, the impact of the crisis on the number of passengers who demanded to travel by air was seen in the following year, 2009. When the number of passengers in 2009 was analyzed, it was observed that while the passenger demand for domestic flights decreased compared to the previous year, there was no decrease in the demand for international flights. In 2009, when the total number of passengers decreased, the number of international passengers has increased.

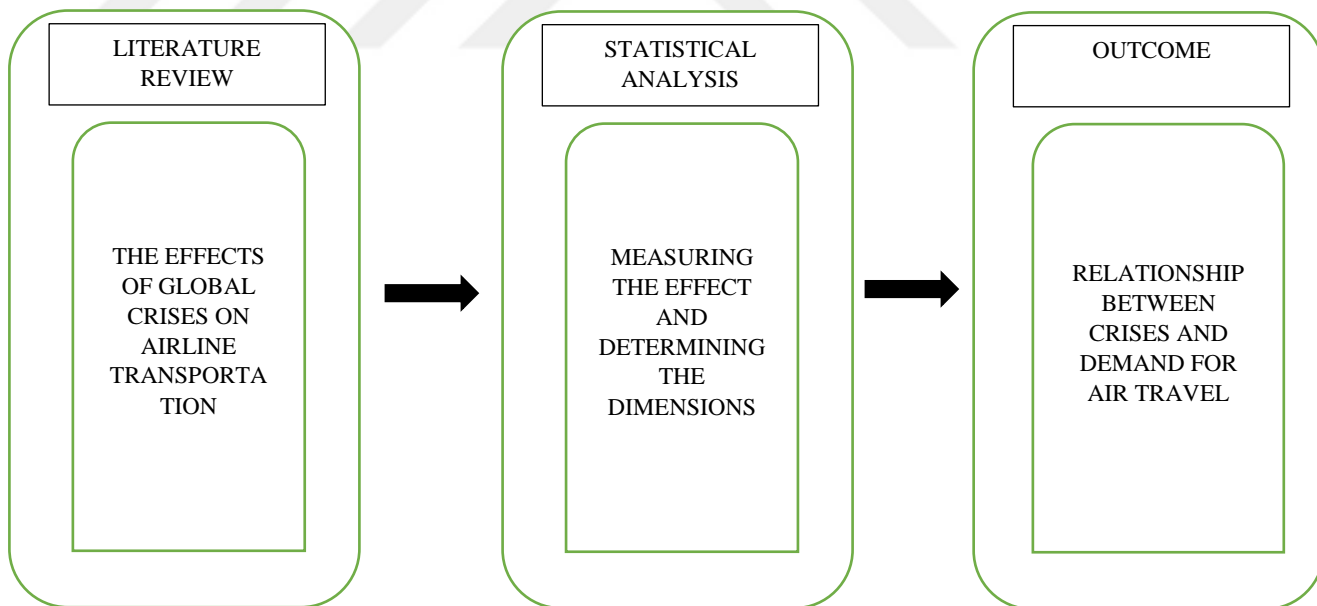
In the COVID-19 pandemic, which showed its impact on the aviation industry in 2020, the decrease in demand for air travel was unprecedented in history. While examining the passenger figures in 2020, the figures estimated by the aviation authorities have been evaluated in the analysis. If this forecast is realized, the number of domestic passengers will decrease to 1998, the number of international passengers to 2006 and the total number of passengers to 2004 levels. When the literature, the data shared by the industry authorities in 2020, and the analysis performed in this study are evaluated together, the demand for domestic air travel tends to recover as of the second half of 2020, but the demand for international flights remained weaker at the same time. This situation differs from previous crises. One of the most important reasons for this situation can be attributed to the countries

closing their doors to the citizens of other countries. There was no such situation that affected the total number of passengers during the crises in 2001, 2003, and 2008. It can be interpreted that this change in the number of passengers was shaped by different factors such as the year of the crisis, the flight route, and the cause of the crisis. When the Revenue Passenger Kilometers (RPKs) and Available Seat Kilometers (ASKs) results were examined within the scope of the analysis, it was concluded that the seat capacity offered by the airline companies to the market could be flexible depending on the change in RPK (the meaning of passenger demand). In the previous parts of the study, it has been stated in the light of the literature that the airline industry is vulnerable to crises due to its operational structure. This result reveals that the airline companies in the sector can reduce the capacity supplied due to the decrease in passenger demand and that instant measures can be taken against crises. During the COVID-19 crisis, unlike other crises, the negative effect of demand on supply as well as the effect of supply on demand were seen. Countries imposing domestic and international travel bans in order to prevent the spread of the virus has led to a decrease in flight opportunities offered to passengers.

Another result that emerges from the analysis is that the time when crises affects the demand for air travel the most may not be the year of the crisis. The terrorist attack in September 2001 quickly affected the demand for air travel, and there was a decrease in passenger numbers in the same year compared to the previous year. The COVID-19 pandemic, which has emerged in the first months of 2020, had a similar rapid impact and caused air travel to come to a halt in the same year. However, the demand for both domestic and international flights increased in 2008, which is also known as the Great Depression and when the economic crisis started, compared to the previous year. However, the negative impact of the crisis on the demand for air travel became evident in 2009, and the total number of passengers and the number of domestic passengers decreased compared to 2008. Based on this result, it is concluded that crises do not affect passenger demand in the same way in every crisis. It is observed that the number of flights across the world during the three different crisis periods analyzed also depreciated with passenger demand. At this point, it is seen that airline companies determine the number of flights by analyzing the travel habits of passengers.

When examined between 2000-2004 and 2007-2010, it is seen that the flight occupancy rates decreased by 1-2 points, while the COVID-19 crisis in 2020 experienced this decrease more dramatically, and the decrease in the occupancy rates was around seventeen points in percentage. This situation reveals that the crisis experienced in 2020 has more dramatic consequences for airline companies. The findings bring to light in the analysis of the study show that the changes in the demands of the passengers differ in times of crisis affecting the airline industry. The effects of the three analyzed crisis periods were also felt differently, since their emergence times and triggering reasons were different. As a result of the research analysis, it was seen that the outputs of the period in which the COVID-19 crisis was experienced were efficient. The reason for this surprising result is the decline of the aviation industry and the absence of a major crisis in the aviation industry for more than 10 years before the COVID-19 pandemic.

Figure 6.1: Design of analysis



7. CONCLUSION

This study, which analyses the changes in the travel demands of airline passengers in times of global crisis, sheds light on the difficult times of the industry. The results have revealed regarding the travel habits of the passengers, who are considered as the leading actors of the airline industry, during crisis periods are critical for understanding yesterday and planning the future. Although it has become one of the most important industries of the 21st century, the aviation industry, which is referred to by limited academic research, has gained another guide with this study. In addition to compiling the studies in the literature, the research, in which sectoral data is analyzed, is an important guide for airlines, aviation sector authorities, states, investors who are considering investing in this field, and those who plan a career.

Some limitations encountered during the research process significantly affected both the efficiency of the study and the time spent. The most important limitation is that the international organizations, which set the principles in the airline passenger transport sector, act frugally in sharing the sectoral data they obtain. The airline industry has developed significantly in the last 20 years, thus accessing the year 2000 and later data is important for academic studies in this field. However, the limited sharing of the pre-2006 data has narrowed the borders of the study. Another limitation was the inability to reach important organizations in the aviation industry, some questions sent via e-mail have received no response.

Despite all the limitations, studies in this area will reveal important findings both in sectoral and academic terms in the future. Regional evaluation of passenger demand in times of crisis is one of these suggestions. Another study may be on the investigation of factors affecting the normalization process after crisis periods.

REFERENCES

Books

Belobaba P. Odoni A. and Barnhart C., 2009. *The Global Airline Industry*. Wiley Publication, United Kingdom

Demirsoy, Ç., (2012). *Analysis of Stimulated Domestic Air Transport Demand in Turkey; What Are The Main Drivers?.* Thesis for the M.A. Degree. Rotterdam: Erasmus University Rotterdam

Hansman, R. J., and Ishutkina M. A., (2009) *Analysis of the interaction between air transportation and economic activity: a worldwide perspective*. Doctoral Dissertation. Cambridge: Massachusetts Institute of Technology.

Doganis, R. 2006. *The airline business*. Second Edition. New York: Routledge

Baikgaki, O.A. (2014). The determinants of domestic air passenger demand in the Republic of South Africa. *Thesis for the M.A. Degree*. Mafikeng Campus: North-West University

Henderson, J. C. 2007. *Tourism Crises, Causes, Consequences and Management*. Butterworth–Heinemann: Burlington

Milašinović, S. & Kešetović, Z., 2008. Crisis And Crisis Management – A Contribution To A Conceptual & Terminological Delimitation. *Scientific review article, Megatrend Review*, 5. p. 167-187

Wittmer A., Bieger T., 2011 Marketing in Aviation. In: Wittmer A., Bieger T., Müller R. (eds) *Aviation Systems*. Springer Texts in Business and Economics. Springer, Berlin, Heidelberg.

Shaw, S. 2007. *Airline marketing and management*. 6. Hampshire: Ashgate Publishing Limited

Vasigh B., Fleming K. And Tacker T., 2013. *Introduction to air transport economics*. 2. Edition. Burlington: Ashgate Publishing Limited

Cento, A., 2009. *The airline industry-challenges in the 21st century.*, Physica-Verlag: Heidelberg

Bükeç C. M., 2019. *Airline business and economics.* İstanbul: Beta

Periodicals

Lykotrafiti, A., 2015 *Liberalisation of international civil aviation – charting the legal flightpath, Transport Policy.* (43), pp. 85–95

Bieger, T., Wittmer, A., and Laesser, C., 2007. What is driving the continued growth in demand for air travel? Customer value of air transport. *Journal of Air Transport Management* (13) pp. 31–36.

Dresner, M., 2006. Leisure versus business passengers: Similarities, differences, and implications. *Journal of Air Transport Management.* (12), pp. 28–32.

Valdes, V., 2015. Determinants of air travel demand in Middle Income Countries. *Journal of Air Transport Management.* (42), pp. 75–84.

Legg, A. M. and Sweeny, K. 2012. Crisis Management. *Encyclopedia of Human Behavior.* Second Edition. California. pp. 618-622

Fotopoulos, T., 2009. The multi-dimensional crisis and inclusive democracy. *The International Journal of Inclusive Democracy.* 3

McMullan, C. 1997. *Crisis: When Does a Molehill Become a Mountain?. Disaster Prevention and Management* 6, (1), 4-10

Bundy, J., Pfarrer, D.M., Short, E.C. and Coombs, W.T. 2016. Crises and Crisis Management: Integration, Interpretation, and Research Development. *Journal of Management.* 43 (6), pp.1661-1692

B.W. Ritchie. 2003. Chaos, crises and disasters: a strategic approach to crisis management in the tourism industry. *Tourism Management* 25 (2004), pp. 669–683.

Becken, S. 2011. Oil, the global economy and tourism, *Tourism Review,* 66 (3) pp. 65-72.

Chin, A. T. H. and Tay, J. H. 2001. *Developments in air transport: implications on investment decisions, profitability and survival of Asian airlines. Journal of Air Transport Management.* (7), pp. 319–330.

Pfarr, C and Hosie P. *Crisis Management in Tourism, Journal of Travel & Tourism Marketing*, 23:2-4, 249-264. (2008).

Gallego, I. and Font X. 2020. Changes in air passenger demand as a result of the COVID-19 crisis: using Big Data to inform tourism policy. *Journal of Sustainable Tourism.* pp. 1-10.

Kumar, S., Gulati, R. (2008). An Examination of Technical, Pure Technical, and Scale Efficiencies in Indian Public Sector Banks using Data Envelopment Analysis. *Eurasian Journal of Business and Economics*, 1 (2): 33-69.

R. D. Banker, A. Charnes, W. W. Cooper, Some Models for Estimating Technical and Scale Inefficiencies in Data Envelopment Analysis. *Management Science*, 30, 9, 1078-1092, (1984).

Charnes, W. Cooper, E. Rhodes, Measuring the Efficiency of Decision-Making Units. *European Journal of Operations Research*. 2, 429-444, (1978)

Pearson, C.M. and Clair, J.A. Reframing Crisis Management. *Academy of Management Review*, 23, 59-76, (1998)

Blalock, G. Kadiyali, V. and Simon, D. H. The Impact of Post-9/11 Airport Security Measures on the Demand for Air Travel *The Journal of Law & Economics* Vol. 50, No. 4 (November 2007), pp. 731-755

Papatheodorou, A. and Lei Z., 2006. Leisure travel in Europe and airline business models: A study of regional airports in Great Britain. *Journal of Air Transport Management.* (12), p. 1.

Other Publications

Air Transport Action Group (ATAG). 2020. Aviation Benefits Beyond Borders. September. Geneva: Switzerland

International Civil Aviation Organization (ICAO). 2020. Effects of Novel Coronavirus (COVID-19) on Civil Aviation: Economic Impact Analysis. December. Montreal; Canada

Iatrou, K., 2013. *100 Years of Commercial Aviation*. Hermes – Air Transport Organisation

Mair, J., Ritchie, B.W. & Walters, G. (in press). Towards a research agenda for post-disaster and post-crisis recovery strategies for tourist destinations: a narrative review. *Current Issues in Tourism*

Reddy, B., V., 2019, *Aviation Marketing*, Hyderabad, Nalsar University, <http://nalsarpro.org/Portals/23/Courses/MA%20-%20ALATM/Learning%20Resource/2.3.12.Aviation%20Marketing%20Module.pdf> [accessed 24 March 2021]