

**IBN HALDUN UNIVERSITY
SCHOOL OF GRADUATE STUDIES
DEPARTMENT OF AIR TRANSPORT MANAGEMENT**

MASTER THESIS

**THE IMPACT OF CARGO AND ANCILLARY
REVENUES ON NET PROFIT FOR FULL-SERVICE
CARRIER AIRLINES**

ONUR BAŞ

**THESIS SUPERVISOR
PROF. TAMER AKSOY**

ISTANBUL, 2022

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REVENUES ON NET PROFIT FOR FULL-SERVICE
CARRIER AIRLINES**

by

ONUR BAŞ

**A thesis submitted to the School of Graduate Studies in partial
fulfillment of the requirements for the degree of Master of Science in
Air Transport Management**

THESIS SUPERVISOR

PROF. TAMER AKSOY

ISTANBUL, 2022

APPROVAL PAGE

This is to certify that we have read this thesis and that, in our opinion, it is fully adequate, in scope and quality, as a thesis for the degree of Master of Science in Air Transport Management.

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This confirms that this thesis complies with all the standards set by the School of Graduate Studies of Ibn Haldun University.

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I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and behavior, I have fully cited and referenced all material and results that are not original to this work.

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ÖZ

KARGO VE YAN GELİRLERİN TAM HİZMET SAĞLAYAN HAVAYOLLARI
NET KARLILIĞINA ETKİSİ

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Hava taşımacılığı, günümüzde insanların çoğunluğu tarafından giderek daha yaygın kullanılan bir araç haline gelmiş ve sürekli büyüyen bir endüstri olmuştur. Aynı zamanda artan rekabet, ekonomik, politik ve doğal olaylardan hızla etkilenen, yüksek yatırım maliyetleri ve risklere rağmen, karlılığı oldukça düşük bir sektördür. Bu nedenle havayolu şirketleri, düşük karlılık oranları, yüksek risk ve artan rekabet koşulları nedeniyle kapasitelerini daha iyi yönetmek ve sürdürülebilirliğini korumak amacıyla yeni gelirler elde etmek zorunda kalmışlardır.

Yan gelirler, seyahat deneyiminin bir parçası olarak yolculara doğrudan veya dolaylı olarak seyahat öncesinde, seyahat sırasında veya sonrasında yapılan satışlardan elde edilen gelir olarak tanımlanmaktadır. Yan gelirler, havayolu şirketlerinin sattıkları biletler dışında yolcularına sundukları, uçak içi ikram, bagaj ücretleri, sadakat programları, koltuk ücretleri, reklam ve komisyon gelirleri ve uçak içi eğlence sistemleri gibi hizmetlerdir.

Bu çalışmada, tam hizmet veren üç havayolu şirketi örneğinde (Türk Hava Yolları, American Havayolları, Delta Havayolları) havayolu şirketlerinin 2014Q1-2019Q4 dönemi kargo gelirleri, yan gelirleri ve net kârlılık arasındaki ilişkiler incelenmiştir.

Sonuç olarak çalışma, kargo gelirleri, yan gelirler ve net kârlılık arasında bir eşbütünlüşme olduğunu ve hem kargo gelirlerinden net kâra hem de yan gelirlerden net kârlılığa doğru tek yönlü nedensellik ilişkisi olduğunu ortaya koymuştur. Çalışma, kargo gelirleri ve yan gelirler ile net kâr arasında pozitif bir korelasyona işaret etmektedir. Kargo gelirleri ile yan gelirlerin, havayolu şirketlerinin net kâr üzerinde artırıcı yönde olumlu bir etkiye sahip olduğu görülmüştür.

İlaveten, çalışma havacılıkta yan gelirlerin havayolu şirketleri için önemli bir kaynak sağladığını; ayrıca iki ABD havayolu şirketinin (American Havayolları, Delta Havayolları) kargo ve yan gelirler açısından dünyada en yüksek gelire sahip ilk üç şirket arasında yer aldığını; ve Türk Havayolları yan gelirlerinin ise diğer iki şirkete göre daha düşük olduğunu göstermiştir.

Öte yandan çalışma, Türk Havayolları kargo gelirlerinin net kârlılığa katkısının diğer iki Amerikan havayolu şirketinden çok daha yüksek olduğunu göstermiştir.

Anahtar Kelimeler: Finansal Muhasebe, Finansal Yönetim, Havacılık, Kargo Gelirleri, Net Kar, Yan Gelirler.

ABSTRACT

THE IMPACT OF CARGO AND ANCILLARY REVENUES ON NET PROFIT FOR FULL-SERVICE CARRIER AIRLINES

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Air transport has become an increasingly common tool used by most people today and has been a constantly growing industry. On the other hand, it is a sector with low profitability despite high investment costs and risks, which are quickly affected by increasing competition, economic, political, and natural events. That's why airline companies have had to manage their capacities better and generate new revenues due to low profitability rates, high risk, and increasing competition conditions.

Ancillary Revenue is defined as the income earned as part of the travel experience through sales made to passengers directly or indirectly before, during, or after the trip. Ancillary revenues are what airline companies offer to their passengers other than the tickets they have sold, services such as inflight catering, baggage fees, loyalty programs, seat fees, advertising and commission revenues, and in-flight entertainment systems.

In this study, the relationships between cargo revenues, ancillary revenues, and net profitability of airline companies for the period 2014Q1-2019Q4 were examined in the examples of three full-service airline companies (Turkish Airlines, American Airlines, and Delta Air Lines).

The study revealed that there is cointegration between cargo revenues, ancillary revenues, and net profit, and there are one-way causality relationships from both cargo revenues to net profit and from ancillary revenues to net profit. The study also indicated a positive correlation between cargo and ancillary revenues, and net profit. In other words, cargo revenues and ancillary revenues have a positive effect on the net profit of airline companies.

In addition, the study found that aviation ancillary revenues provide an essential resource for airline companies; furthermore, two American companies are among the top three companies with the highest incomes in the world in terms of Cargo and Ancillary Revenues; also showed that Turkish Airlines' ancillary revenues are lower than those of these two American companies.

On the other hand, the study showed that the contribution of Turkish Airlines' cargo revenues to net profit is much higher than the other two companies.

Keywords: Ancillary Revenues, Aviation, Cargo Revenues, Financial Accounting, Financial Management, Net Profit.

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LIST OF SYMBOLS AND ABBREVIATIONS

CTK	Cargo Tonne Kilometers
EASA	European Union Aviation Safety Agency
FTK	Freight Tonne Kilometer
IATA	International Air Transport Association
ICAO	The International Civil Aviation Organization
JAA	Joint Aviation Authorities
RPK	Revenue Passenger Kilometers
RTK	Revenue Tonne Kilometers
THY	Turkish Airlines

CHAPTER I

INTRODUCTION

The aviation industry is a sector with low profitability despite high investment costs and risks, which are quickly affected by increasing competition and economic, political, and natural events. Airline companies have had to manage their capacities better and generate new revenues due to low profitability rates, high risk, and increasing competition conditions. Even though the most crucial source of income for companies is undoubtedly passenger revenues, cargo revenues and ancillary revenues have become more critical for airline companies. In other words, for airline companies to survive today in tight competition conditions, it is vital that they must gain ancillary revenues in addition to their primary income. Cargo revenues and other ancillary revenues constitute an essential source of income for airline companies.

For this reason, airline companies use revenue management systems to manage their revenues and capacities more accurately. Ancillary revenues, one of the revenue items of airline companies, are managed through revenue management systems to increase profitability. Revenue management aims to increase revenues and competitiveness correctly by using cargo and ancillary revenues.

As a result of the sale of products and services offered free of charge to passengers by companies applying the traditional airline business model for a separate fee to increase the revenues of the companies using the low-cost/low-cost airline business model, ancillary revenues have occurred. Sources of ancillary revenues are what airline companies offer to their passengers other than the tickets they have sold, services such as in-flight catering, baggage fees, loyalty programs, seat fees, advertising revenues, commission revenues, and in-flight entertainment systems.

In line with this, revealing the relationships between cargo revenues, ancillary revenues, and net profit of the airline companies is a must for the right decision-making process.

In this study, the relationships between cargo revenues, ancillary revenues, and net profitability of airline companies for the period 2014Q1-2019Q4 will be examined in the examples of three full-service airline companies (Turkish Airlines, American Airlines, and Delta Air Lines).

It is thought that there may be a direct relationship between the ancillary and cargo revenues and the profitability of the airline companies. In addition, the fact that these two types of gains can contribute to the passenger revenues, which is the main factor in the profitability of the airline companies, and thus affect the net profit of the company indirectly, is an issue that needs to be researched. So, in this study, the objectives were determined follows:

- i) To reveal the short-term relationships between ancillary revenues, cargo revenues, and airline companies' net profit, to see if these variables cause each other, in the examples of three full-service airline companies (Turkish Airlines, American Airlines, and Delta Air Lines).
- ii) To reveal the long-term relationships between ancillary revenues, cargo revenues, and airline companies' net profit to see if these variables move together in the long term.

As far as it is known, there is no direct empirical study addressing the effects of cargo and ancillary revenues on net profit for airlines. The study is considered to be a first in its subjects in this context.

Methodologically, a logarithmic econometric model will be used in which cargo revenues and ancillary revenues are included as independent variables and net profit as the dependent variables. The data used will be collected from the annual reports on the official websites of related airline companies and The International Air Transport Association (IATA), and Sorensen&Lucas (2020).

EViews 10 and STATA-15 versions, which are the most modern econometric analysis programs that can be used to control the stationarity, will be used in the analysis of the

data. In addition to econometric analyzes and general statistics, Cross Section dependency tests, CADF second generation unit root tests, Delta slope homogeneity tests, Panel cointegration analysis, Westerlund Panel cointegration tests, Dumitrescu Hurlin Panel Causality tests, and Breusch Pagan LM Tests will also be performed.

The text of the study consists of 5 chapters in terms of organization. In Chapter 1, basic concepts and theoretical background were made broadly. In addition to ancillary revenues, cargo revenues, and conceptual knowledge, related studies were examined. Chapter 2 covers the definition of civil aviation, its historical development, and the sectors of civil aviation both in the world and in Turkey. Also, the authorities in civil aviation were examined. Chapter 3 of the study focuses on business models, revenue management, ancillary revenues, and cargo revenues in the civil aviation sector. Chapter 4 was determined as the research methodology and analysis part. In this part, the relationships between cargo revenues, ancillary revenues, and net profit of the airline companies for the period of 2014Q1-2019Q4 for three full-service carrier airline companies: Turkish Airlines, American Airlines, and Delta Air Lines, were examined with econometric models and tests in connection with an application. The last chapter ends with the conclusion of the study, the recommendations, and the references list.

CHAPTER II

BASIC CONCEPTS AND THEORETICAL BACKGROUND

2.1. Ancillary Revenues and Conceptual Background

Revenue management, in its most basic form, focuses managers on more careful observation of customers' purchasing behavior and regulating price and product availability to generate higher revenue. Revenue management is a disciplined process that enables companies to use large amounts of customer data to dynamically predict customer behavior at the micro-market level with the support of information technologies. In any case, the goal of revenue management is to sell the right product to the right customer at the right price at the right time thus maximizing revenue from a company's products (Cross, 2011).

Revenue Management is the management of selling goods and services at a pre-determined price to customers in different service sectors (Emeksiz and Akoğlan, 2002).

Revenue Management has an essential place in airline and hotel businesses due to the development of the capacity limit encountered in the service sector. It is a form of management that includes not only the airline and hotel industry but also the rail passenger transport sector, the car rental sector, the health sector, the communication sector, the transportation sector, and the television advertising sector.

Revenue management has the following benefits not only in the service sector but also in many other sectors: Provides forward date pricing, reservations can be kept, prices are known to customers, creates competition in the market, causes to be preferred by

consumers, provide costs decrease, annual profit increases, saves time, give an opportunity to check and control the capacity (Gürel and Kayar, 2016).

Ancillary revenues are defined as the income earned as part of the travel experience through sales made to passengers directly or indirectly before, during, or after the trip (Atik, 2019).

With the emergence of the ancillary revenue concept, airline companies have adopted the idea of selling each service or product piece by piece. Later, these services and products that would create added value were developed and diversified and started to be sold in packages. For example, Germanwings, the low-cost model brand of Lufthansa Airlines, put up for sale ancillary packages by grouping them as silver, gold, and platinum. It has developed many different innovative methods in ancillary revenue applications.

Apart from the classic services such as buying food, drinks, choosing the seat, extra baggage allowance sale, sale of primarily flight-related products from the website, trip flex (the right to have all kinds of hours, cancellations, refunds, and routing up to the last minute in all ticket classes) applications, in-flight and off-air advertisements, baggage handling, and even extraordinary services such as renting for weddings to couples who want to get married during idle times are offered by airlines to provide ancillary revenues (Baran, 2014).

Airline companies that want to establish long relationships with their passengers and provide services not only during the flight but also outside the flight are trying to achieve their goals with frequent flyer programs (loyalty system) and mil-credit cards (Bockelie and Belobaba, 2017).

2.2. Cargo Revenues and Conceptual Background

Air cargo is defined as the transportation of any goods from one place to another by aircraft (Allaz, 1998). The term air cargo is broadly defined to include air freight. All cargos, except passenger baggages carried in the cargo compartment, are the subject of air cargo (O'Connor, 2000).

Air cargo transportation, on the other hand, is defined as packaging, labeling goods other than mail and luggage, preparing the documents properly, and shipping them by

aircraft, especially considering the country and carrier restrictions, depending on ICAO and IATA rules (Öztürk, 1993).

The air cargo sector plays a vital role in the increasing world trade. The volume of the air cargo market has increased by two times every ten years since 1970 (Changa et al., 2007). Recently, the efforts of businesses to reduce storage costs, their desire to shorten the time of movement of their goods in the market, and the short life span of products in many industries (computers, medical products) have revealed the importance of the concept of speed. The spread of e-commerce and the provision of logistics solutions have increased the competitiveness of businesses that want to do business on a global scale, so the demand for international goods has increased, and air cargo transportation has come to the fore for an effective commercial order (Zhang and Zhang, 2002).

Air cargo transportation itself is considered to be a significant sector in itself. It also has a structure that provides input to the production processes of other sectors (Hensher, 2001). Airline passenger transport companies allow passengers to carry a certain amount of cargos in addition to their tickets. Additional fees are charged for loads above the specified amount. These revenues constitute an ancillary income item for airline companies. In addition, cargo loads are carried independently of the passengers on passenger planes. In this way, airline companies earn cargo income in addition to their primary income (CAPA,2020).

2.3. Studies on Ancillary and Cargo Revenues in Aviation

O'Connell and Warnock-Smith (2013) examined passengers' attitudes towards ancillary products. In this context, a questionnaire was applied to the passengers, and the field experts were interviewed. As a result of the study, it was determined that the airport parking lot and registered baggage fees were the most popular and accepted commission-based and unpackaged products for airline companies to sell.

Kılıç (2019) examined the data of 25 airline companies that carry out flight activities in different regions of the world and who disclosed their ancillary revenues and their total revenues between 2010 and 2018. The researcher used the trend analysis/trend percentage analysis method to examine the data. According to the study's results, the researcher found that 23 of the 25 airline companies operating with different business model applications have increased their ancillary revenues. It has been found that an

increase in the ancillary revenues of companies applying other business models is an indication that ancillary revenues are vital revenue item for all airlines, regardless of business model.

Akpınar (2019) examined airline ancillary services to create an ancillary service management strategy in low-cost airlines. Data obtained from 17 airline employees who are experts in their fields were extracted and analyzed after each round in the three-round Delphi technique application. As a result of the research, it was observed that the sale of ticket change rights, ticket return rights, and excess baggage rights were the most compelling in-house ancillary services in airline selection, while airport transfer and private passenger lounges were the most effective third-party ancillary services. It has been determined that the passengers will consent to the most effortless ticket change from the in-house ancillary services, and they will be willing to pay a fee for the most straightforward airport transfer and parking services from the third-party ancillary services. It has been observed that the sale of excess baggage allowance by the airline is the most critical in-house ancillary service, while the sale of the car rental and private passenger lounges is the most important ancillary service. While the most convenient in-house ancillary service to be sold with the package was seat sales, the third-party ancillary services were airport transfer. It has been observed that seat selection rights and in-flight entertainment system services are in-house ancillary services that passengers can purchase to increase their travel experience, even if they do not need them, while private passenger lounges and fast passage rights are third-party ancillary services.

Atik (2019) aimed to reveal the effect that ancillary income practices of airlines adopting a low-cost business model have on their financial performance. In this study, the researcher has selected the OLS method to show the effect of side income practices of the airline company adopting the Low-Cost Transportation Business Model on its financial performance. Only two of the activities of the airline companies in Turkey (Turkish Airlines and Pegasus) should be made public, and the two airlines are the only one (Pegasus) reducing the low-cost business model to adopt the data sets limits the number of methods that can be selected. As a result, it has been determined that the increase in occupancy rate positively affects the EBITDA (Earnings Before Interests, Taxes, Depreciation, and Amortization) margin, while the rise in CASK

(Cost of Available Seat Kilometer), which represents the cost per seat, negatively affects the EBITDA margin. However, it has been determined that diversifying the income sources of the airline company in question and concentrating more on ancillary revenues reduces financial performance.

Dongling (2010) studied air cargo revenue management problems in spot markets and long-term markets. First, he considered a single-leg air cargo booking control problem on the spot market. The booking process was modeled as a discrete-time Markov chain, and the airline's decision on accepting/rejecting booking requests was based on a bid-price control policy. To avoid the complexity, the bid prices were derived from maximizing a reward function of the Markov chain. Numerical experiments showed that the proposed model outperformed two existing booking control policies. Second, he studied the capacity allocation problem in a long-term market, in which one airline served forwarders. He proposed a capacity bundling policy (CBP) to mitigate the negative impact of seasonal imbalance between supply and demand and model the problem as a Stackelberg game. Numerical experiments showed that CBP could increase the airline's expected profit and reduce the risk under certain conditions. Last, he integrated the above two models and proposed a conceptual framework for an air cargo revenue management system.

Hao (2014) found that airlines had increasingly depended on ancillary revenues in response to rising fuel costs, decreased yields, and an increasingly competitive environment in his study. He mentioned it was estimated that American airlines collected over \$8 billion in ancillary revenues in 2012, and ancillary revenues posed challenges for airlines, including revenue management and distribution since total revenue maximization required consideration of ancillary revenues and ticket revenues.

Smith, O'Connell, and Maleki (2017) indicated that ancillary airline revenues had increased by 121% from 2010 to 2014 – and the trend was set to continue as carriers were quickly implementing structural changes to accommodate these revenue streams globally. They examined the performance of the two core classifications of ancillary revenues, which were unbundled products and commission-based income. They also investigated the willingness of passengers to pay (WTP) for those services and what type of ancillary items were acceptable at a particular price point. They found that

passengers valued a narrow range of perceived ‘necessity’ products and services such as food and drink, checked baggage, and seat assignment as opposed to perceived ‘optional’ unbundled or commission-based products/services. They also found significant differences in WTP for specific ancillary services based on carrier type (FSC/LCC/Charter), length of flight (long and short haul), and journey purpose (business, leisure, VFR).

Bockelie (2019) developed models with the goal to provide a better understanding of how ancillary services affect the airline industry in his study. He tested his models using PODS (Passenger Origin-Destination Simulator) in many scenarios. In a network with competing airlines and hundreds of flights, his heuristics could increase total revenues by 2-3%. A consistent trend throughout his simulations was that the forecasting and optimization model that maximized total revenues was often not the model that maximized ancillary revenues because models that maximized ancillary revenues did often so to the detriment of ticket revenue.

In the survey conducted by Çetiner et al. (2019) with 160 airline managers and 188 airline passengers in 24 different countries, they stated that managers and passengers should use various ancillary revenues-providing methods in other business models.

In the study of Bockelie and Belobaba (2017), it was revealed that airline companies that want to establish long relationships with their passengers and provide services not only during the flight but also outside the flight are trying to achieve their goals with frequent flyer programs (loyalty system) and mil-credit cards.

In a study by Aksoy and Okan (2021), it was revealed that proactive maintenance scheduling has an increasing effect on airline profitability and a decreasing impact on maintenance costs.

In another study by Bachwich and Wittman (2017), it was revealed that airline companies operating with the low-cost model increased their ancillary income while reducing their ticket prices. It was pointed out that appealing to more customer segments together with the decrease in ticket prices increases the amount of per capita income. For this reason, it has been indicated that low-cost airlines try to compensate for the loss in ticket prices with services and products that create ancillary revenues.

CHAPTER III

CIVIL AVIATION SECTOR

3.1. Definition of Civil Aviation

The definition and classification of civil aviation activities have not been fully clarified, and there is no consensus (Kaya, 2000). The International Civil Aviation Organization, which sets the necessary standards and makes definitions and classifications to ensure the safe and effective conduct of civil aviation activities, can not provide sufficient information on this issue. From this point of view, firstly, the concept of "civil aviation" should be defined. Aviation covers activities directly or indirectly related to flying aircraft that are lighter than air or heavier in the sky. Civil aviation, on the other hand, includes all aviation activities performed without a military purpose (Gerede, 2006).

Civil aviation has a critical characteristic structure in which advanced technology is used, intense competition is experienced, especially globally and economically, and it is one of the sectors that attract the most attention among today's transportation types (Hine, 2000).

Even if the definition and classification have not been made, ICAO specifies the scope of civil aviation activities as follows (Saldıraner, 1992).

- i. Aircraft manufacturing, maintenance, and repair activities,
- ii. Operational activities with aircraft,
- iii. Construction and operation activities of airports,
- iv. Communication, navigation, and air traffic services regulation and operating activities,
- v. Meteorological activities for aviators,

vi. Environmental protection activities.

Developments in the field of civil aviation also show the change in passengers' preferences. It is seen that the passenger who chooses transportation with the airline company takes into account the factors of selecting a safe means of transportation, well-educated staff service, saving time, making use of technology as they wish, allowing many alternatives related to his destination and reducing costs (Sencer and Gürkan, 2009).

3.2. Historical Development of Civil Aviation

3.2.1. Historical Development of Civil Aviation in the World

Flying has always been a close interest of human trials. Although its history dates back a long time, the balloons used in the American Civil War made significant contributions to the field of military aviation. This situation delayed the development of civil aviation activities. The first studies initiated in the field of military aviation were for surveillance and reconnaissance. The fact that balloons are comfortable targets due to their slowness has brought forward the idea of using vehicles that can move faster in the air (Akan, 2017).

The success of the trials of the Orville and Wilbur brothers in the United States of America in 1903 led to the intensification of the work on aircraft in the early stages of military aviation (Erdem, 2010).

In the same period, the use of balloons for travel is considered the first civil aviation activity. States, which are searching for different countries due to their high costs, have focused on studies that will attract the attention of the wider masses. As a result, German Graf Zeppelin's zeppelins, which are named with their own name, have been used in the field of civil aviation since the 1920s. However, since sea transportation is less costly and land transportation is safer, and the passengers do not prefer the zeppelin, it could not meet the expectations requested by society. Zeppelins, which were allowed to be produced by very few countries due to military concerns, were suspended from use as a result of the accident that occurred in 1937, and then their production was stopped entirely.

The accident occurred due to the zeppelin named "Hindenburg" crashing to the ground in New York, USA. The zeppelin accident prevented both the cessation of zeppelin production and the development of the civil aviation sector. Thus, interest in military aviation activities increased again (Arıkan, 1998).

Four different periods can be expressed in the classifications made of the historical development of the aviation sector. The start date does not include the events mentioned above. However, it is known that there are issues expressed in many sources. These four periods related to aviation history are explained below.

The Formation Period (1918-1938): Developments in aviation gained importance after the 1900s to resolve political disputes between states by using military power. The experiments of Orville and Wilbur brothers in 1903 revealed the use of aircraft and were influential in the thoughts of military strategists. With the outbreak of the First World War, airplanes began to be used in the military field. States that entered the war could not use the plane effectively due to aerodynamic problems (Oyman, 1994).

This situation has accelerated the studies on how to use an aircraft more effectively in the military field.

The United States, which initially did not participate in the First World War, saw the use of airplanes on the battlefield at the same time and reflected this on applications in the field of civil aviation. Especially in the USA, which uses the postal and telegraph system effectively, it has started to be used as airline postal services. However, it could not provide the desired benefit. One of the critical developments in this period was the establishment of the International Air Traffic Association (IATA) within the scope of aviation terminology, travel documents, and technical protocols by six European airline companies (Sochor, 1991).

In the 1930s, Juan Trippe founded the Pan American Airline company and realized long-distance air transportation. This development accelerated the developments in the civil aviation sector. However, the economic crisis of 1929 brought the states to search for new colonies, and the political problems between them brought them to the brink of a new war. The sounds of the approaching war directed the states to the developments in military aviation again (Arslan, 2019).

The Growth Period (1938-1958): The Second World War, which has an intercontinental characteristic due to the participation of the USA and China, has been remembered for the intense use of aircraft on the battlefield. The most prominent features of this period are the financial resources allocated for aircraft production in the military field and the human resources required to train pilots to use the aircraft, and the technology competition between the airplane produced by each state. In addition, essential developments in the field of military aviation caused the activities in the field of civil aviation to accelerate again (Akan, 2017).

In 1949, the United Kingdom produced civil aircraft equipped with jet engines with successful trials carried out on Havilland Comet. However, the use of this aircraft in passenger transport in the civil aviation sector was not at the desired level. The most critical development of the growth period was the Chicago Agreement. It is referred to as the "Chicago Convention" or the "International Civil Aviation Convention." This treaty shows the basics of how to apply airline transportation today on a global scale (Unmack, 1999).

Also, the treaty contributed to the determination of basic principles in the civil aviation sector by making joint decisions on issues such as adequate passenger capacity, flight time and frequency, management of airports and aircraft, control of transport systems, and freedom of flight (Cento, 2009).

With the agreement, instead of setting international law rules in this field, a concept was created of "air service agreements" between the two countries. These bilateral agreements are briefly called ASAs (Air Service Agreements) (Findlay, 2003).

Maturity Period (1958-1978): After the start of Boeing's scheduled flights, a battle for technological superiority began between rival airlines in the civil aviation industry. The developments pioneered by Boeing, both with the increase in passenger capacity and the increase in the number of flights, led to a paradigm change in this area during the maturity period. Increasing passenger demand and commercial earnings enabled airlines to invest more in this area. In this period, the innovations made by Boeing were followed by Lockheed firm (Oyman, 1994).

The company, which aimed to stay in the air for a longer time and reach the desired place faster with the developments it made, mainly on the aircraft engine, had to

change its production lines after the OPEC crisis that emerged in the 1970s. The main reason for this situation was the negative perception in the public opinion of the protests made by environmentalist organizations citing the noise as the reason after the crisis. To change this perception, the manufacturers of the period focused on the production of motors that would prevent noise and minimize the damage to the environment. In addition, this period is characterized by more limited competition due to the states having more shares in the sector (Akan, 2017).

Liberalization Period (1978-): The liberalization period has taken an important step with the Airline Liberalization Law, which was established by the legal regulations of the USA in 1978. In this period, the dominance of states in the civil aviation sector was broken, and private companies entering the industry with serious investments caused an increase in competition (Sarıbaş and Tekiner, 2015).

Although the previous steps of the USA in the civil aviation sector provided this country with a position advantage, Europe's speed in technology transfer and the fact that the European Union formation and a large number of its member states turned into an advantage paved the way for it to have a substantial share in the developments in this field in a short time. With the idea of "Single European Airspace," the European Union's initiatives that both find solutions to national security concerns and provide technology superiority in international competition have enabled them to produce standard policies within the civil aviation system based on common values.

With the civil aviation policies implemented by the European Union since 1993, important developments have been experienced, especially in three areas. These are; Increasing the competition between the airline companies owned by private enterprises, increasing the passenger capacity, and increasing the passenger demand for airline transportation by increasing the flights via different airports, reducing the flight cost, and increasing the number of lines as a result of accelerating the infrastructure works (Akan, 2017).

3.2.2. Historical Development of Civil Aviation in Turkey

The first air operation was held in Turkey in 1912 in a small area near Ataturk Airport and two hangars in Sefaköy. In 1925, the foundations of Turkish civil aviation were

laid with the "Turkish Aviation Association (Türk Tayyare Cemiyeti)," which later became the Turkish Aeronautical Association (Türk Hava Kurumu).

On 28th of January 1925, Vecihi K-IV, the first Turkish-made aircraft, was manufactured by Vecihi Hürkuş, and the first flight was performed. With the agreement signed between the German aircraft manufacturing company and the Turkish Government in 1925, a modern aircraft factory was established in Kayseri. In 1932, Vecihi Hürkuş opened the first Turkish Civil Aviation School named "Vecihi Civil Aircraft School (Vecihi Sivil Tayyare Mektebi)" in Istanbul.

In 1933, "State Administration of Airlines (Havayolları Devlet İşletme İdaresi)" was established under the Ministry of National Defense. This organization was tasked with making civil air transport in Turkey and building roads. Civil air transport was first carried out this year with a small fleet of 5 aircraft under the name of "Turkish Air Mail (Türk Hava Postaları)" (Yılmaz, 2020).

In the same period, private initiatives started, and Nuri Demirağ opened an aircraft factory in Beşiktaş, Istanbul, an aircraft-engine factory and sky school in Sivas Divriği, and an airport and Sky School in Yeşilköy, Istanbul. Turkey in the aviation industry in public and private sector was ranked third in Europe in the 1940s. While the Turkish Aeronautical Association produces aircraft and engines in its factories in Kayseri and Ankara Etimesgut, Nuri Demirağ manufactured the first Turkish-type passenger aircraft with the participation of only local workers and engineers. In 1938, a Nu / D-38 type passenger plane was chosen as the first in the category of "European Class A" passenger plane (Saldıraner, 1992).

Turkey was a part of "the Chicago Convention on International Civil Aviation Agreement" in 1945 and became a part of the founding members of the International Civil Aviation Organization that formed the basis of civil aviation (ICAO). On 12 February 1947, the first international flight was carried out to Athens by State Airlines ("Devlet Hava Yolları," now known as THY). In 1949, the "Airports Office (Hava Meydanları Bürosu)" established under the Ministry of Public Works became operational (Korul and Küçükönel, 2017).

In 1954, the "Civil Aviation Department" was established under the Ministry of Transport. In 1955, the European Civil Aviation Conference-ECAC was established.

In this organization that established the rules and requirements of international civil aviation in Europe, Turkey was among the founding members. In accordance with a law enacted in 1956, the State Airports Authority was established. It has been given the task of providing flight security procedures and operating airports (Korul and Küçükönel, 2017).

In the same year, Turkish Airlines went into restructuring (Saldıraner, 1992). In 1958, "Hava Hizmetleri AŞ." and by a private initiative, "Çelebi Hava Servisi A.Ş." was established. The purpose of these companies to provide ground and catering services to domestic and foreign airline companies (Korul and Küçükönel, 2017).

On 14th of October 1983, the "Turkish Civil Aviation Law" was approved with the number 2920 and entered into force. In 1987, the "General Directorate of Civil Aviation" was rearranged according to the conditions of the period. Turkey, 1 March 1989, aiming to develop the European air traffic management and safety of the European Organization for the Safety of Navigation, has been a member of EUROCONTROL. Investments in the aviation sector in the early 1900s improved existing standards rather than building new conventional airports. In addition, investments continued to increase safety and quality in navigation services, air traffic control, ground handling, and communication. At the end of the 1980s, STOL (Short Distance Take-off and Landing) type small airports started to be established for various segments with the support of local administrations. On 19th of November 1986, a protocol was signed between the Turkish General Staff and the Ministry of Transport to open military airports to civil air transportation. Thus, there are 22 military squares that are open to civilian vehicles (Yılmaz, 2020).

Until the mid-1980s, Turkish air transport did not show an upward trend. During this period, with some exceptions, air transportation activities continued under the THY monopoly, and the state implemented restrictive policies on civil aviation activities. Changes in economic policy in Turkey that occurred in 1983 have affected the civil aviation industry. The "Civil Aviation Law" numbered 2920, entered into force, and the liberalization process in Turkish civil aviation has also started. This law grants the private sector the right to air transport and management for commercial purposes at national and international levels (Battal et al., 2006).

The Turkish Aviation Sector was negatively affected by political and economic developments in the 1990s. These developments are, respectively, the Gulf crisis in 1990 and subsequent hot wars, the 1998 economic crisis in the countries of the Far East, the 2001 economic crisis in Turkey, and then the September 11 terrorist attacks that took place in the United States in 2001. In connection with these events, the Turkish aviation industry has faced three significant challenges. These can be expressed as follows (Korul and Küçükönel, 2017):

- i. The bankruptcy of companies and the decrease of companies in this sector,
- ii. Decrease in employment due to market loss,
- iii. As a result of the decrease in employment, there was a market loss due to a negative impact on the country's economy.

Regulations that have allowed private airlines to make civil aviation domestic flights in Turkey became a turning point in 2003. After 2003, air transport gained a competitive market structure, the quality of the services provided increased, and prices decreased (Saribaş and Tekiner, 2015).

Since 2003, there has been several developments occurred in the civil aviation sector in Turkey. In this context, with Law No. 5431 on the Organization and Duties of the General Directorate of Civil Aviation on 18th of November 2005, the civil aviation industry has reached its current management structure. In 2016 Turkey was elected to membership in the 39. Council of ICAO General Assembly. On 15th of July 2018, the principles regarding the duties, organization, responsibilities, and powers of the General Directorate of Civil Aviation were regulated by Presidential Decree numbered 4 (Yılmaz, 2020).

3.3. Authorities in Civil Aviation

3.3.1. International Civil Aviation Organization

Based on Article 43 of the United Nations establishment decree, ICAO was established on 4th of April 1947 by 52 countries that signed the Chicago Convention (7th of December 1944). In October of the same year, it was accepted as the legal aviation body of the United Nations. It is headquartered in Montreal, Canada. There are also

seven regional offices in Bangkok, Cairo, Dakar, Lima, Mexico City, Paris, and Nairobi (MFA, n.d. 2020).

ICAO, whose primary purpose is to ensure the structuring, growth, and maintenance of the international civil aviation system in a safe, orderly, and economical manner, is still the most comprehensive and highest-level civil aviation organization in the world.

It is possible to summarize the aims and objectives of ICAO as follows (ICAO, 2006; 2010):

- To ensure the safe and regular development of civil aviation in an international context and on a global scale
- To improve flight safety,
- To keep flight and airport security,
- To support the construction and operation of aircraft for peaceful purposes,
- To ensure the development of airlines, airports, and air navigation facilities for more effective international civil aviation,
- To meet the global requirements of safe, regular, and economical air transportation,
- To prevent waste caused by unfair competition,
- To fully protect the rights of the parties,
- To provide equality of opportunity to the countries in international airline management, not to discriminate between the parties,
- To strive for the development and renewal of all matters concerning international civil aviation.

3.3.2. International Air Transport Association

International Air Transport Association (IATA) is an international trade organization of which only airline companies can become members. IATA was established in 1945 in Havana, Cuba, as an inter-airline organization to provide safe, secure, and

economical air transportation. Their headquarters are in Montreal and Geneva. IATA was established with 57 members from 31 countries and currently has 270 members from 140 countries (Kozlu, 2011).

The most important of IATA's goals is to improve airline services and reduce costs. The mission of IATA, which emerged in the 1960s and 1970s, is to minimize the charges for passenger fares, airport use, and air navigation services and to ensure that these charges are taken only for the facilities as required (Sherman, 2000).

Today, there are 81 thousand IATA agencies worldwide and 135 thousand students attending agency training courses provided by IATA. Among the areas where IATA will be most active in the coming years, flight safety, protection of aircraft and areas against terrorism, fuel saving, environmental protection (sound and exhaust gases), efficiency increase, electronic ticketing, and human resources training issues can be listed as the areas which that corporation will be very active (IATA, 2018).

3.3.3. European Union Aviation Safety Agency (EASA)

Established in 2002 by Regulation No. 216/2008 of the European Parliament and the Council, the European Union Aviation Safety Agency (EASA) is an institution of the European Union. It aims to ensure an equal and high level of safety in civil aviation through the implementation of standard safety rules and measures. The organization, headquartered in Cologne, Germany, has 32 members, all of which are from European countries. EASA assumed the responsibilities of the former Joint Aviation Authorities (JAA) system, which ceased operations on 30th of June 2009. However, it is not a legal successor to JAA, as EASA operates directly under the European Union regulation. National civil aviation authorities that are members of EASA have to apply the rules of EASA.

However, the national civil aviation authorities that are members of the JAA did not have any legal obligations to comply with the standards established by the JAA. JAA standards were applied voluntarily for compliance and association. Here is the main difference between EASA and JAA. However, it was not possible to create a new regulatory system "overnight," at the time of its establishment, EASA adopted a large part of the JAA standards system as its legislation. However, later on, EASA

developed the new harmonized system required by the European Union regulation over time with its regular studies (EASA, 2020).

3.4. Civil Aviation Sector

3.4.1. World Civil Aviation Sector

The civil aviation sector statistics for 2018 published by the International Air Transport Association (IATA) reveal how large the civil aviation industry is. The highlights within the scope of subject statistics are as follows (IATA, 2019a);

- As of 2018, the total number of passengers traveling by plane is 4.4 billion. When each flight is evaluated separately (if a passenger is included in more than one flight with a connecting flight), this number is 8.8 billion people. Compared to 2017, there was an increase of 6.9% in the number of passengers.
- Airlines based in the Asia-Pacific region carried the highest number of passengers, with 37.1% in 2018. This ratio is followed by European-origin airlines with 26.2% and American-origin airlines with 22.6%.
- In 2018, savings of 12% were achieved in fuel consumption.
- In 2018, 22,000 cities worldwide were connected by direct flights. Compared to 2017, the number of cities connected by direct flights has increased by 1,300.

It is seen that the individuals who travel the most are British, USA, China, Germany and France citizens respectively. Another important statistic that stands out in the 2018 data on the civil aviation sector is related to the largest airline companies determined under the passenger-kilometer criterion. These companies are as follows (IATA, 2019a);

- American Airlines (330.6 billion dollars)
- Delta Air Lines (330 Billion dollars)
- United Air Lines (329.6 Billion dollars)
- Emirates (302.3 Billion dollars)

- Southwest Airlines (214.6 Billion dollars).

Within the scope of 2018 statistics regarding the civil aviation sector, the busiest airports were also determined within the range of international and domestic flight classification (IATA, 2019a).

Table 3.1. Busiest Airports According to Domestic and International Flights

Flight Type	Airport	Passengers (million)
International Flights	Hong Kong – Taipei Taoyuan	5,4
	Bangkok Suvarnabhumi – Hong Kong	3,4
	Jakarta Soekarno-Hatta – Singapore Changi	3,2
	Seoul Incheon – Osaka Kansai	2,9
	Kuala Lumpur – Singapore Changi	2,8
Domestic Flights	Jeju – Seoul Gimpo	14,5
	Fukuoka – Tokyo Haneda	7,6
	Melbourne – Sydney	7,6
	Sapporo – Tokyo Haneda	7,3
	Pekin Capital – Shanghai	6,4

Source: IATA, 2019.

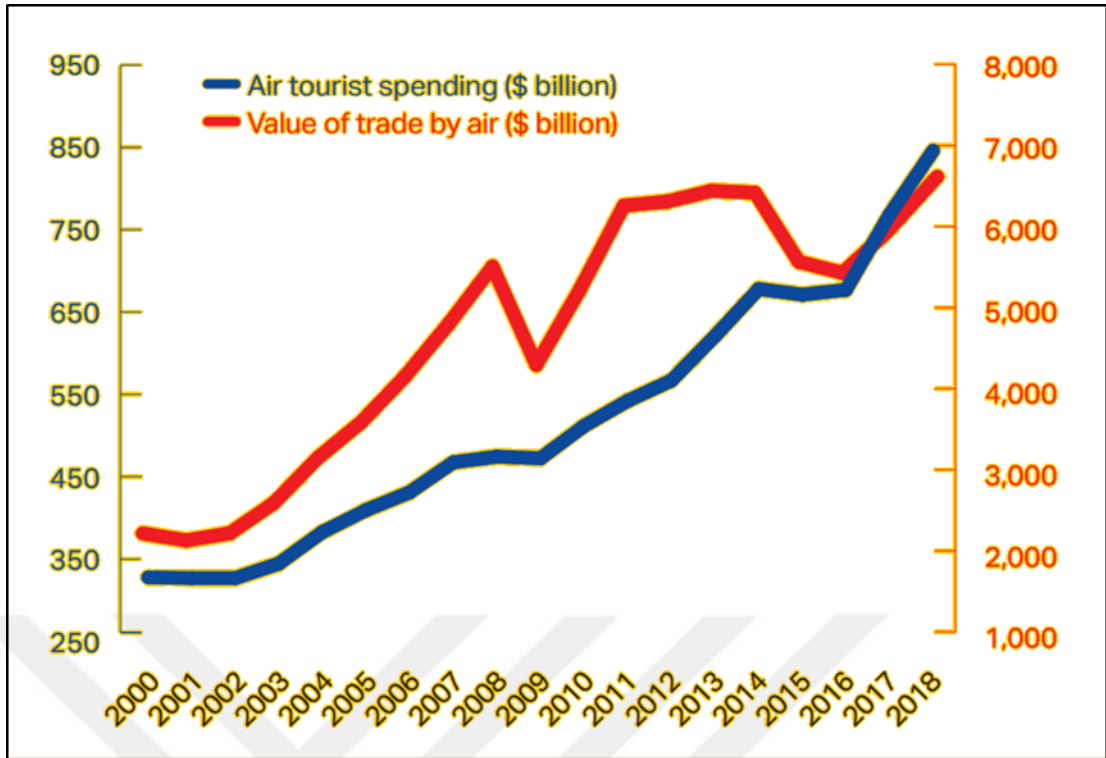


Figure 3.1. Air Tourist Spending and Value of Trade Carried by Air

Source: IATA, 2019b.

Figure 3.1 shows that the spending levels of airline users have increased dramatically in the last 20 years. In this context, while the spending levels of the passengers are approaching 0.85 trillion USD, the commercial capacity of the total airline transportation approaches 7 trillion USD. This proves that the airline industry has significantly improved in the last 20 years. (IATA, 2019b).

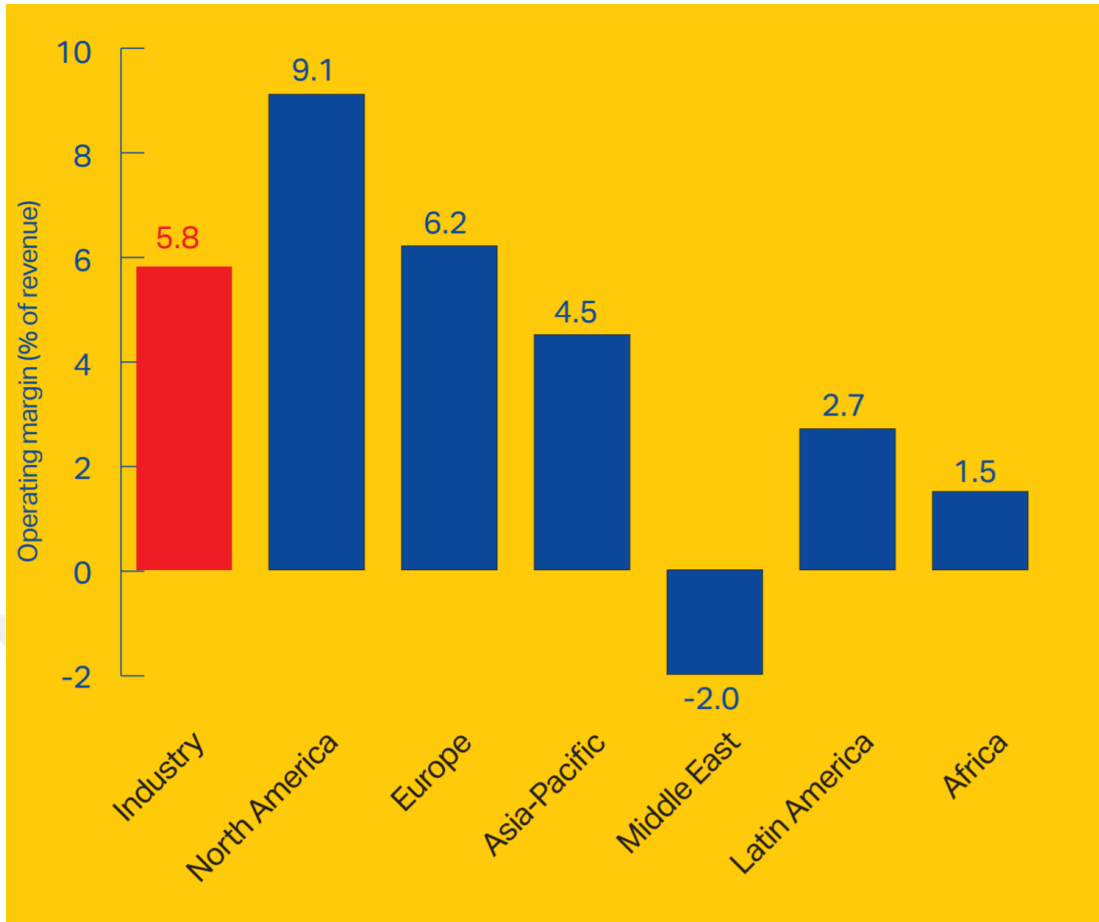


Figure 3.2. Regional Profit Performance

Source: IATA, 2019b.

Considering regional profit performance, it is seen that the highest profitability is achieved in the North American region. On the other hand, while profitability is observed in Europe, Asia-Pacific, Latin America, and areas of Africa, a loss is observed in the Middle East region (IATA, 2019b).

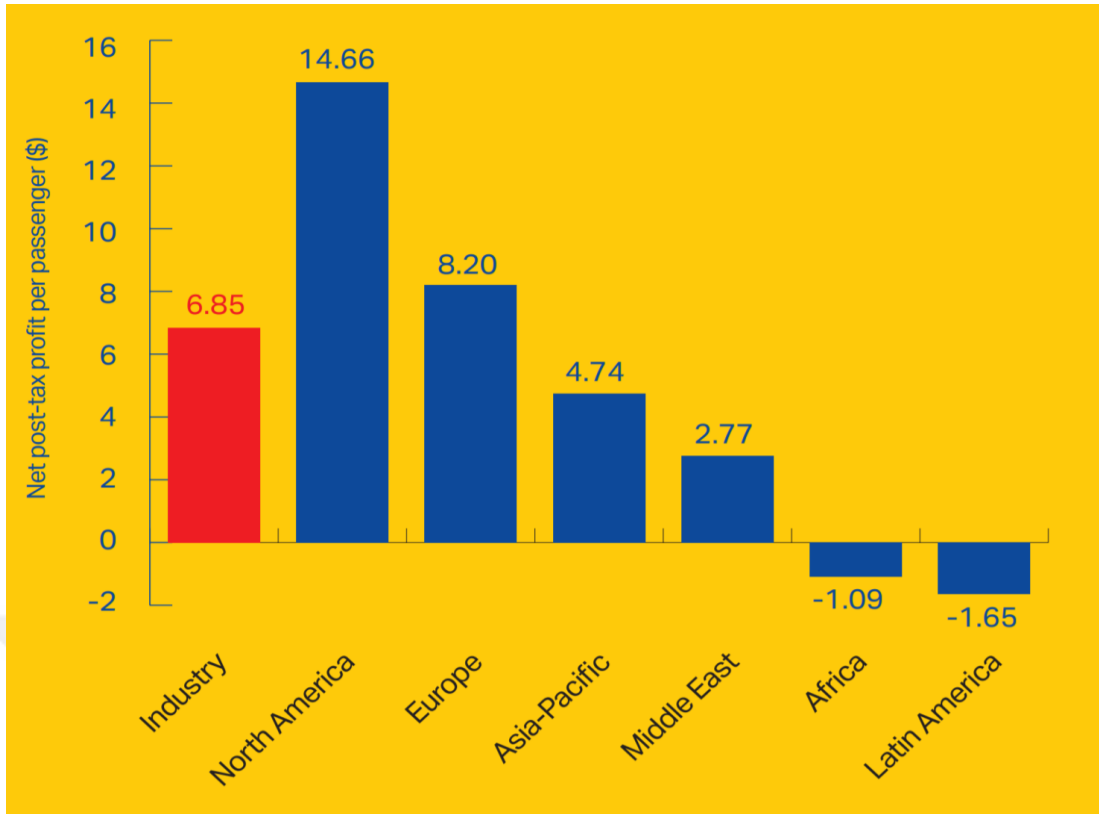


Figure 3.3. Airline Profitability Per Passenger

Source: IATA, 2019b.

As seen in Figure 3.3, the profitability level per passenger in the world airline industry is approximately 7 USD. In terms of profitability per passenger, the North America region is the most profitable region with around 15 USD. Profitability per passenger is also observed in Europe, the Asia-Pacific, and the Middle East regions. On the other hand, a loss is observed in the African and Latin American regions. Although profitability per passenger is not provided in Africa and Latin America, it is understood from Figure 3.2 that the sector is making a profit in total (IATA, 2019b).

3.4.2. Civil Aviation Sector in Turkey

Turkey, in the field of civil aviation in the world, with the growth shown last 17 years and particularly in our region, is making a significant contribution to the development of civil aviation. In many reports published by international aviation organizations, it is seen that our country has developed in recent years and has been in the top ranks in the world aviation industry. According to the ICAO 2018 Year-End Report, Turkey has the following positions in the World (Directorate General Civil Aviation, 2020):

- 12th in the RPK (Revenue Passenger Kilometers) ranking,
- 10th in RTK (Revenue-Tonne Kilometers) ranking,
- 11th in the FTK (Freight-Tonne Kilometer) ranking.

According to the International Airports Council (ACI) 2019 European Air Traffic Report, Istanbul Airport increased the number of passengers by 0.2% compared to the previous year. It was among the five largest airports in Europe with 68.5 million passengers. According to the same report, Antalya Airport ranked 2nd in the category of airports with an annual passenger number of over 25 million, increasing the number of passengers by 12.8% compared to the previous period (ACI EUROPE, 2020).

According to the 2019 Airports Council International (ACI) Airport Connection Report, Turkey, has been ranked 5th in Europe in terms of the number of connections (direct, indirect, airport, and center (hub)), as seen in Table 3.2. In 2019, it increased its direct connections by 2.5%, indirect connections by 13.7%, airport connections by 8.1%, and center connections by 18.1%. Turkey has become the country that has developed the most direct and indirect aviation connections with new routes and new points added to its flight network in the period between 2009-2019. The Directorate General of Civil Aviation has held more than 500 bilateral aviation negotiations in 17 years. Travel increases, and new flight points provided by these negotiations have become operational.

As a result, Turkey has risen to a position with 328 points and airline connections in 126 countries as the end of 2019. Turkey has developed direct connections by 159.9%, indirect connections by 144.5%, airport connections by 151.5%, and hub connections by 386% in the last decade (Directorate General of Civil Aviation, 2020).

Table 3.2. Number of Connections and Growth Rates by Airports

Code	Airport	2019			2013-2019 Growth			2014-2019 Growth			2009-2019 Growth		
		Direct	Indirect	Airport	Direct	Indirect	Airport	Direct	Indirect	Airport	Direct	Indirect	Airport
FRA	Frankfurt	5,098	14,145	19,243	0.0%	1.5%	1.1%	10.1%	3M%	4.8%	13.3%	25.6%	22.1%
AMS	Amsterdam	4,870	11,962	16,832	0.2%	5.1%	3.7%	16.8%	19.6%	18.8%	30.3%	33.9%	32.8%
CDG	Paris Charles de Gaulle	4,760	15,710	20,469	3.2%	4.4%	4.1%	6.4%	16.2%	13.8%	-0.3%	39.7%	27.7%
LHR	London Heathrow	4,682	21,244	25,925	0.3%	2.7%	2.3%	-0.7%	21.0%	16.4%	0.8%	49.8%	37.7%
IST	Istanbul	4,474	5,755	10,229	3.6%	11.3%	7.8%	12.6%	6.7%	9.2%	89.6%	70.4%	78.3%
MUC	Munich	4,051	10,735	14,786	-1.6%	12.8%	8.4%	15.1%	24.7%	21.9%	7.3%	69.3%	46.2%
MAD	Madrid-Barajas	3,977	8,999	12,976	4.2%	6.2%	5.6%	24.5%	24.2%	24.3%	-4.9%	50.6%	27.7%
SVO	Sheremetyevo International Airport	3,740	3,318	7,058	17.1%	-1.6%	7.5%	61.5%	36.0%	48.4%	178.2%	74.0%	117.1%
BCN	Barcelona-El Prat	3,453	7,768	11,221	1.9%	5.5%	4.4%	21.2%	35.5%	30.7%	24.5%	52.8%	42.8%
FCC	Rome Fiumicino	3,289	8,288	11,577	2.6%	2.3%	2.4%	1.0%	25.0%	17.1%	4.6%	43.1%	29.5%
LGW	London Gatwick	2,961	1,721	4,683	0.4%	-1.1%	-0.1%	10.1%	60.7%	24.5%	23.6%	37.1%	28.2%

Table 3.2. (cont.)

VIE	Vienna	2,754	6,23 3	8,987	13.8%	7.8%	9.6%	16.4%	36.9%	29.9%	15.2%	70.2%	48.5%
CPH	Copenhagen	2,630	6,17 9	8.809	-2.3%	-1.0%	-1.4%	8.4%	12.0%	10.9%	16.2%	40.7%	32.4%
PMI	Palma de Mallorca	2,624	2,05 8	4.682	3.9%	12.2%	7.4%	33.6%	94.7%	55.0%	45.5%	218.1%	91.1%
ZRH	Zurich	2,528	8,03 0	10,557	0.3%	0.8%	0.7%	9.3%	14.3%	13.1%	16.2%	47.1%	38.3%
OSL	Oslo	2,494	3,93 8	6.432	-2.8%	-1.6%	-2.1%	4.8%	4.7%	4.7%	23.1%	29.1%	26.7%
ORY	Paris-Orly	2,406	1.13 1	3,537	-1.8%	7.8%	1.1%	1.1%	4.5%	2.2%	10.8%	80.6%	26.4%
ARN	Stockholm-Arlanda	2,402	5,79 2	8.194	-5.2%	1.1%	-0.8%	2.5%	22.8%	16.0%	45.2%	43.0%	43.6%
ATH	Athens	2,377	4,77 0	7.147	7.7%	11.7%	10.3%	63.6%	55.8%	58.4%	18.4%	52.3%	39.1%
DUB	Dublin	2,353	6,39 3	8.746	0.9%	5.8%	4.4%	37.5%	42.5%	41.1%	50.8%	95.8%	81.3%

Source: Directorate General Civil Aviation, 2020.

According to the Connection Report, Istanbul has increased its direct connections by 3.6%, its indirect connections by 11.3%, and its airport connections by 7.8% in the last year. In the previous ten years, it has improved its direct connections by 89.6%, indirect connections by 70.4%, and airport connections by 78.3%.

Istanbul Airport, which is among the top 20 airports in the world according to its center (hub) connection, has grown by 16.9% in 2019 compared to the previous year. It ranked 21st in 2009, and 6th in 2019. Istanbul Airport, among the 20 airports that developed the center connection the most, is in 9th place with a growth of 353% in the last ten years (Directorate General Civil Aviation, 2020).

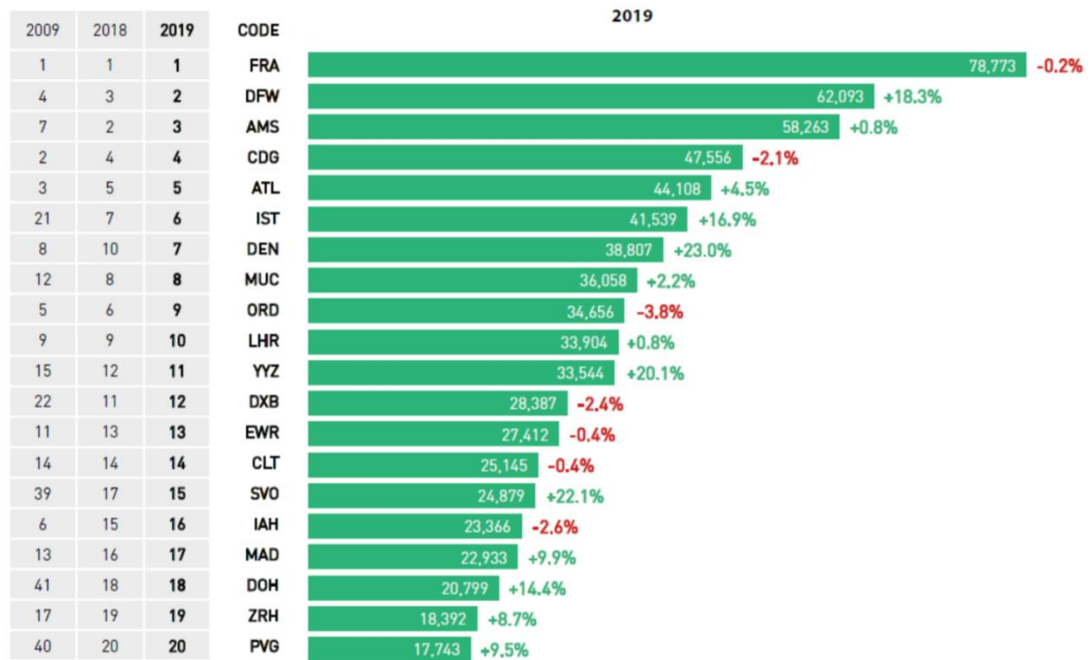


Figure 3.4. Top 20 Airports in the World by Center Connection (2009-2018-2019)

Source: Directorate General Civil Aviation, 2020.

CHAPTER IV

BUSINESS MODELS AND ANCILLARY REVENUES IN AVIATION

4.1. Business Models in Aviation

In the digital age we live in, a wide variety of changes, new trends, developments, models, approaches, and strategies have a profound and multidimensional impact on all strategic business functions and activities, including the business ecosystem (Aksoy and Hacıoglu, 2021).

Parallel to the significant increase in competition, the importance of these new models, approaches, and strategies, which stand out in all areas of the business ecosystem, in ensuring sustainability and increasing financial performance/profitability has grown tremendously (Hacıoglu and Aksoy, 2021).

In the civil aviation sector, which is one of the essential components of the business ecosystem, the airline business model is defined as the way resources are structured differently to reach the target audience (Holloway, 2012).

Until the 1970s, there was no concept such as business models in airlines that were entirely under state control. In 1978, due to the deregulation in the domestic lines of the United States, the trend of liberalization and getting rid of the state monopoly started in the sector. State-owned airlines, whose monopoly positions were weakened as a result of the liberalization trend, had to struggle with their rivals in the private sector.

As a result of increasing competition, airlines that want to regain their market shares and aiming to get new shares from the sector have tended to break many taboos that have been accepted over the years. The airlines that go to revision and differentiation from the airports used to the in-flight catering point have started to differ in the axis of

value and experience offered to the passenger. As a result of this differentiation, new airline business models have started to emerge. (Önen, 2016).

Airline business models have developed over time in the competitive environment that Michael Porter has specified in the competitive strategy model. Michael Porter defines the model as "Generic Competition Strategies," which is seen to come to life in the axis of the tendency of businesses to develop positions against five fundamental forces, which are customers, existing competitors, new investors, replacement goods manufacturers, and suppliers. It is an undeniable fact that Generic Competition Strategies, which are examined under three headings as Cost Leadership Strategy, Differentiation Strategy, and Focusing Strategy, are used in creating new airline business models. (Porter, 1980)

Although Porter emphasizes that businesses should use only one of these strategies to achieve success, it appears that some airlines use more than one Generic Competition Strategy simultaneously. (Johnson et al., 2014).

In this context, in this part of the study, airline business models will be examined under the headings of low-cost carriers, hybrid carriers, and full-service carriers (conventional carriers).

4.1.1. Low-Cost Carriers

Low-Cost Carriers are airline companies that can offer services at lower prices by giving up some of the services adopted by traditional airline companies to reduce their costs. Among the reasons for the difference in cost with conventional airlines, it is shown that they use direct distribution channels. They generally have a uniform fleet, and get high efficiency from this fleet (Hanlon, 2007).

As the unit cost decreases when the number of seat increases, low-cost carriers ignore comfort in the cabin configuration. They prefer a dense seat arrangement with a shorter knee distance. It is known that having a uniform fleet reduces the training costs of flight and technical personnel and the number of ground support equipment and spare parts stock (Belobaba, 2009).

At the same time, as a result of the intense use of a single type of aircraft, a great experience and knowledge accumulate on that aircraft over time. Thus, the airline

company can be more successful in finding solutions to technical problems that may arise. On the other hand, it can implement more flexible programs for assigning aircraft and teams to different routes in extraordinary situations. In this way, low-cost carriers can use the fleet effectively, minimizing the time the airplane stays on the ground and reducing their unit costs (Alamdari and Fagan, 2005).

The low-cost airline business model has only economy class, seat spacing at the lowest possible values, and free food and drink facilities are not provided. Generally, eating and drinking take place with the payment of an additional fee, and an extra income is obtained by the airline (Koch, 2010).

The global pioneer of the low-cost airline business model is Southwest Airlines. In Europe, it was first applied by Irish Ryanair. Pegasus Airlines, after being bought by Esas Holding, started scheduled flights in 2005 and has been a pioneer of this business model in Turkey (Pegasus, 2021).

In this model, the focus is on cost, and the main thing is to transport passengers from one place to another cost-efficiently (Koch, 2010).

Kitchen areas are limited as low-cost airlines generally do not have free food and beverage services. Some use secondary airports to shorten turnaround times and extend the time the aircraft is in the air. In order to reduce cost and make unloading faster, instead of using passenger bridges at the terminal, they prefer to get on and off passengers from the front and rear doors on the apron (Budd and Ison, 2017).

Other cost reduction strategies include keeping advertising and promotional messages short and simple, and not using intermediaries such as travel agencies or global ticketing systems as much as possible due to commissions (Budd and Ison, 2017).

An airline that adopts this business model has a lower cost structure than others and demands lower prices from its passengers than others. Such a carrier may be an independent regional airline, part or subsidiary of a major airline, or in some cases, the charter arm of an airline group (ICAO, 2016).

- Regional airlines: Regional airlines connect smaller regions away from the main traffic flow. Nowadays, regional airlines are increasingly being integrated

into the full-service airline system. This integration takes place in purchasing and regional business partners (Koch, 2010).

- Charter airlines: Charter airlines are airlines that operate non-scheduled flights. They usually carry passengers to Mediterranean countries as part of a tour package. Seasonal effects are significant in the operations of these airlines (Koch, 2010).
- Business aviation (Air taxi): Business aviation (or air taxi) is carried out by small jet planes, propeller planes, or helicopters on demand. Air taxis provide customers with advantages such as time-saving, flexibility, comfort, security, and privacy (Wensveen, 2007).

4.1.2. Hybrid Carriers

In response to the success of low-cost airlines, traditional airlines, or in other words, full-service carriers, started to pull ticket prices to the same point as low-cost airlines. As a result of this change in ticket prices, passengers can get more service for the same price. This situation negatively affected the market shares of low-cost airlines temporarily (Çetiner et al., 2019).

Several low-cost airlines, trying to catch up with their old power in decreasing market shares, created a new business model by bringing their business models closer to full-service carriers. In the new hybrid business model, while tickets are provided to passengers at an affordable price as in the low-cost carriers, services that increase customer satisfaction are provided as in full-service airlines (Klophaus et al., 2012).

With its relatively low-ticket price and enriched service offer value proposition, hybrid carrier appeals to passengers who give equal importance to cost and travel experience. These airlines follow mixed strategies for standardization in their aircraft fleet, in-flight catering, flight network, and ancillary revenues. The fleet structure of hybrid airlines consists of mixed aircraft.

While some of the aircraft in its fleet have the same type and cabin layout as in low-cost airlines, some of its fleets can consist of wide-body aircraft capable of long-haul flights. Airplane seat layout plans (LOPA) are designed with fewer seats than low-cost airlines, especially for passengers who value comfort and are also price sensitive.

Thanks to this change in seat layout plans, additional comfort can be provided to passengers by increasing the seat pitch between the seats (Çetiner et al., 2019).

4.1.3. Full-Service Carriers

Traditional carriers (Network Carriers-Legacy Carriers) are the oldest and most well-known business model of the commercial airline transportation industry that provides full service. With its wide flight network, large aircraft fleets, quality catering, and comfort understanding, the players with the highest market share in the commercial air transport sector are airlines that adopt the relevant business model.

Although they are generally the flag carrier airline company (national state airline), they are companies that can operate under private sector ownership, especially after the 1980s, with the effect of the regulations in the sector (Bamber et al. 2009).

For this reason, for these companies, which are called traditional (legacy) airlines, the names of full-service or network airlines are also used in the relevant literature. These companies have a complex hub & spoke flight network structure. In the hub & spoke flight network structure, the low passenger potential of the surrounding airports is concentrated in the main airports. Passengers whose destination is another city transfer here. In this way, operations can be carried out from the main airport, which is a transit center, to other large cities by taking advantage of the economy of density.

Again, by providing the line density between the center and smaller surrounding airports thanks to the transfer passengers, narrow-body jets can be used with high occupancy on these lines. To add a new destination for an airline with a large hub & spoke network structure, it is enough to have a few people demand from there to a part of the cities in the network. Thus, the number of city pairs flown with the hub & spoke flight structure of traditional carriers increases, and the number of points they serve increases. (Sarılğan, 2007).

Since there are many cities with different demand potentials and distances from the center on the wide flight network, traditional airlines need to use aircraft with different load and range capacities. Therefore, their fleets can include a wide variety of aircraft, from small-capacity regional jets used to transport a small number of passengers in surrounding cities to large wide-body aircraft flying on lines connecting the central

airport to the world's major cities. On the other hand, it is observed that traditional carriers prefer to cooperate with regional airlines and benefit from their fleets rather than adding regional jets to their fleets. (Tenant, 2017).

At the same time, since they want to appeal to passengers from all segments of society (students, passengers flying for a holiday and visiting purposes, business people) and carry people from different countries and cultures, the configuration of the aircraft may change on a line basis according to the product variety and service quality to be offered on a line.

Traditional airlines aim to excel in service perception rather than compete with their competitors in terms of price. For this reason, they aim to continuously improve their products to meet customer satisfaction. To be successful in this customer-oriented approach, arrangements focused on the comfort of the passenger, such as the width of the seats, the length of the knee distance between the consecutive seats, and the variety of catering, are at the forefront. These companies have been the pioneers of the revenue management system. With their dynamic pricing policy, they try to balance the average unit price (yield) and occupancy rate, especially in economy class, and not to widen the price difference with low-cost airlines (Adiloğlu-Yalçınkaya, 2019).

Due to the comfort-oriented product variety, traditional airlines can request comprehensive aircraft customization from the manufacturer when they order a new aircraft. The manufacturer can arrange the cabin configuration in line with these demands.

4.2. Revenue Management in Civil Aviation Sector

4.2.1. Definition of Revenue Management

Revenue management, in its most basic form, focuses managers on more careful observation of customers' purchasing behavior and regulating price and product availability to generate higher income. Revenue management is a disciplined process that enables companies to use large amounts of customer data to dynamically predict customer behavior at the micro-market level with the support of information technologies. In any case, the goal of revenue management is to sell the right product

to the right customer at the right price at the right time thus maximizing income from a company's products (Cross, 2011).

Revenue Management is the management of selling goods and services at a pre-determined price to customers in different service sectors (Emeksiz and Akođlan, 2002).

Pfeifer defined revenue management as "the process of allocating discounted prices to scheduled flights with the aim of balancing demand and increasing revenue." Larsen, while agreeing with this definition, divided revenue management into two different functions and clarified the meaning of revenue management in the airline industry as the management of overbooking and discounts.

Revenue management is a concept that integrates demand management, reservation, and capacity management. It is a method that generates the highest income from available capacity by integrating managerial, financial, and marketing strategies, pricing, capacity allocation, and overcapacity reservation tactics. (Hacıođlu, 2011)

Revenue Management has an essential place in airline and hotel businesses due to the development of the capacity limit encountered in the service sector. It is a form of management that includes not only the airline and hotel industry but also the rail passenger transport sector, the car rental sector, the health sector, the communication sector, the transportation sector, and the television advertising sector. Revenue management has the following benefits not only in the service sector but also in many other industries (Gürel and Kayar, 2016):

- Provides forward date pricing.
- Reservations can be kept.
- Prices are known to customers.
- Creates competition in the market.
- Causes to be preferred by consumers.
- Provide costs decrease, annual profit increases.

- Saves time.
- Provide the opportunity to check and control the capacity.

4.2.2. Revenue Management in Civil Aviation

The revenue management approach in the airline industry started with the liberalization law in 1978. With this law, the civil aviation board of the United States loosened the control of tightly regulated airline prices based on standardized price and profitability targets (Talluri and van Ryzin, 2006).

Revenue management has emerged as a tactic for dealing with the tough pricing wars, with new low-cost competitors emerging due to liberalization. The revenue management approach has become a subject that attracts the attention of academics and business people in the period following the 1990s. In terms of air transport, the revenue management approach, which has the potential to produce solutions to survive the relative lowness of global profit rates in the sector, as well as the competitive environment created by increasing business models, has become used by all stakeholders of the aviation industry at different levels (Cross, 2011).

Revenue management refers to managing demand with computer support, using alternatives of price or product availability based on demand models to maximize profit or income. This term originated in the airline industry because of the low variable costs, high fixed costs, and the difficulty of maximizing profits. Revenue management techniques are not limited to revenue optimization but are used to maximize profit. Revenue management is an application that uses advanced computer systems that generate demand forecasts for sales and automatically process other relevant data (Strauss et al., 2018).

In many industries, especially the airline industry, revenue management is the tactics and strategies used to divide reservation limits between different fare levels. For revenue management to be implemented, the following conditions must be met (Philips, 2005) :

- The seller must sell a fixed stock of variable capacity.

- Customers make a reservation before departure from the determined capacity.
- The seller maintains fare classes with fixed prices.
- The seller can change the availability of the fare classes over time.

The revenue management system uses reservation records and market information to learn about customer behavior and predict demand. Using this information, controls efficient choices to increase income in the booking process. The control of fare classes with their prices is dynamic pricing (Morales and Wang, 2010).

Integrating inventory and price management to maximize the profitability of a company can be defined as revenue management. For combined air carriers, revenue management is the management of passenger seat fees and cargo rates (Kasilingam, 1997).

Revenue management is the science of predicting real-time customer demand at the micro-market level and optimizing the price and availability of products.

The demand for products and services changes in a short time. For companies to make profitable transactions, they need to adapt quickly to changes that occur in a short time in demand (Methapatara and Wynter, 2010).

Airlines need to dynamically manage their inventory from the start of the booking process (usually one year before departure) to the day of departure after determining their pricing plans and fare structures. It may be ideal for certain classes to be closed or open during the booking process, which the airline can use to re-evaluate its optimization depending on the booking patterns at each control stage (Hao, 2014).

Revenue management in Turkey started under the guidance of Turkish Airlines and was tried to be applied to other firms. It has been adopted by the price-responsive customers since providing a price advantage.

In Turkey, especially at the beginning of the 1980's revenue management which was developed as a solution against decreasing profits and income of the companies in an

intense competition environment, has become an essential system in airline companies. (Hacıoğlu, 2011)

4.3. Ancillary Revenues in Civil Aviation

4.3.1. Ancillary Revenue Resources

Ancillary revenues are defined as the income earned as part of the travel experience through sales made to passengers directly or indirectly before, during, or after the trip. Figure 4.1 shows the ancillary revenue areas of airline companies in general (Atik, 2019).

- i. **A la carte features:** These features are services and products that the passenger can order before or during travel. If this ever-growing list is listed under general headings, it consists of food and beverages sold during the trip, excess baggage and control fees, credit card commissions during sales, priority check-in and seat selection fees, on-board internet, and other entertainment tools.
- ii. **Commission-Based Products:** These products consist of commissions obtained by airline companies from the sale of accommodation, car rental, and travel insurance. Commission-based products are offered for sale on the airline's website. However, the sales of these products can be given to passengers duty-free and on board. The study by Connella and Smith (2013) showed that the most accepted commission-based and segregated products for airline companies to sell, respectively, are parking and baggage fees.
- iii. **Advertisements:** These revenues consist of the advertising revenues received from the traveling passengers. It consists of the payments obtained from the advertisements received in the magazines distributed on the airplane, advertising messages received on the airplane, loading bridges, door areas, airport halls, and consumer products distributed on a sample and commission basis.
- iv. **Passenger programs:** These programs consist of miles or bonus sales to program partners. Partners are hotel chains, car rental companies, joint credit cards, online shopping centers, retailers, and companies that provide

communication services. In this way, ancillary income is obtained by selling miles or bonus directly to program members.

- v. **Ticket Fee or Product Package:** Airline companies can determine part of the price as product packages or ticket fares. It consists of revenues obtained by providing services such as checked baggage, pre-boarding, and extra footrest place.

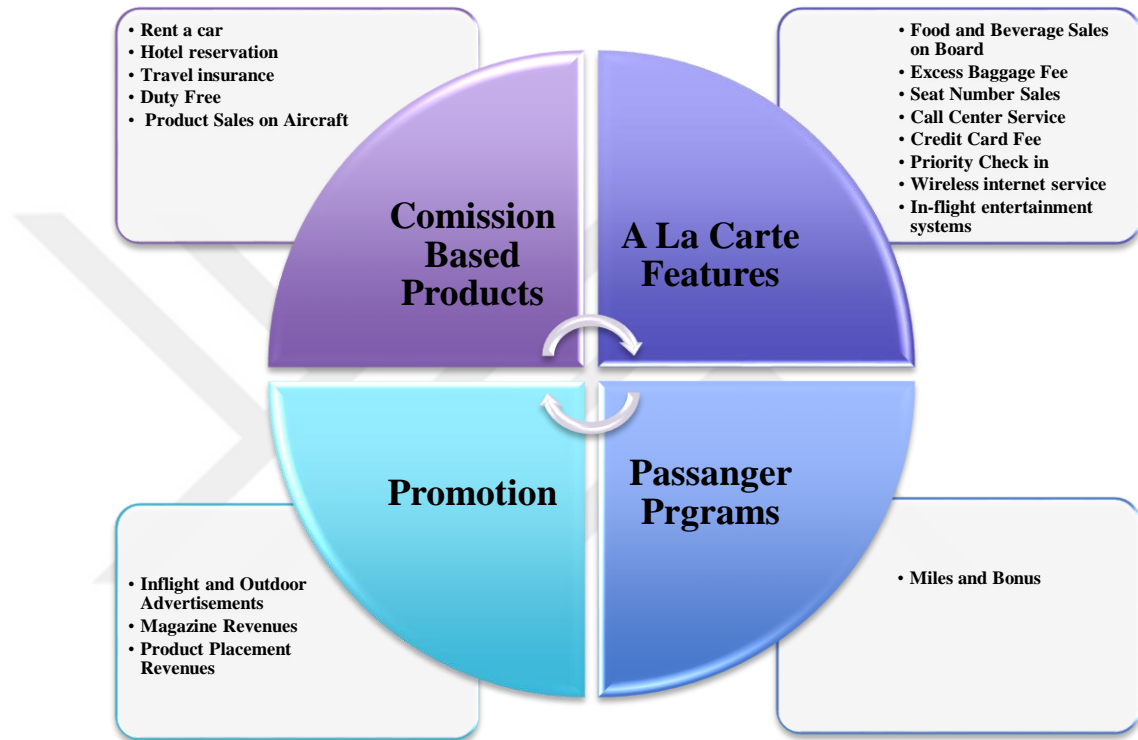


Figure 4.1. Ancillary Revenues in Aviation

Source: Atik, 2019.

Although ancillary revenue practices are limited to commission-based products, A la carte services, advertisements, and passenger programs applied to customers, this rapidly spreading concept can change. In the survey conducted by Çetiner (2019) with 160 airline managers and 188 airline passengers in 24 different countries, they stated that managers and passengers should use various ancillary revenue-providing methods in different business models.

With the emergence of the ancillary revenue concept, airline companies have adopted the idea of selling each service or product piece by piece. Later, these services and products that would create added value were developed and diversified and started to

be sold in packages. For example, Germanwings, the low-cost model brand of Lufthansa airlines, put up for sale ancillary packages by grouping them as silver, gold, and platinum. It has developed many different innovative methods in ancillary revenue applications. Apart from the classic services such as buying food, drinks, choosing the seat, extra baggage allowance sale, sale of especially flight-related products from the website, trip flex (the right to have all kinds of hours, cancellations, refunds, and routing up to the last minute in all ticket classes) applications, in-flight and off-air advertisements, baggage handling, and even extraordinary services such as renting for weddings to couples who want to get married during idle times are offered by airlines to provide ancillary revenues (Baran, 2014).

Airline companies that want to establish long relationships with their passengers and provide services not only during the flight but also outside the flight are trying to achieve their goals with frequent flyer programs (loyalty system) and mil-credit cards (Bockelie and Belobaba, 2017).

Aviation authorities such as IATA (International Air Transport Association) and ATPCO (Airline Tariff Publishing Company) are trying to set a standard for ancillary revenue definitions worldwide. Therefore, according to the ancillary revenue standards set by these authorities, airlines can develop their own practices, and the value of ancillary revenues for airline companies is gradually increasing (Atik, 2019).

Airline companies operating with the low-cost model increase their ancillary revenues by reducing their ticket prices. The fact that more customer segments are addressed with the decrease in ticket prices increases the amount of ancillary revenues per person. Therefore, low-cost airlines try to compensate for the loss in ticket prices with services and products that generate ancillary revenues (Bachwich and Wittman, 2017).

For example, in Turkey, one of the airlines to adopt the low-cost model of Pegasus, lowering ticket prices to reach more segments provide a competitive advantage compared to competitors increasing their ancillary revenues (Öncü et al., 2010).

4.3.2. Ancillary Revenues of Carriers

Annual reports on ancillary revenues in the aviation industry are published by Ideaworks Company LLC. In this context, ancillary revenues of the airline companies,

given in the latest 2020 report, are presented in the table below. In this context, it is observed that the highest ancillary revenues were obtained by three American Airlines (American Airlines, United Airlines, and Delta Air Lines). On the other hand, the company that increased its ancillary revenues the most in 2019 compared to 2018 was Alaska Air Group with 47% (Sorensen and Lucas, 2020)

Table 4.1. Ancillary Revenues of Airline Companies (2018-2019)

Rank	Top 10 Airlines Carrier	Total Ancillary Revenue		2019 Change
		2018	2019	
1	American Airlines	\$7,245,000,000	\$7,413,000,000	+2%
2	United	\$5,802,000,000	\$6,580,000,000	+13%
3	Delta Air Lines	\$5,570,000,000	\$6,198,000,000	+11%
4	Southwest (FF)	\$4,049,000,000	\$4,498,000,000	+11%
5	Ryanair Group	\$2,801,536,938	\$3,311,255,802	+18%
6	Air Canada	\$1,452,733,488	\$2,549,719,104	+76%
7	Alaska Air Group	\$1,388,000,000	\$2,033,560,500	+47%
8	Lufthansa Network Airlines	\$1,952,518,333	\$1,933,431,476	-1%
9	International Airlines Group	\$1,701,544,393	\$1,932,190,010	+14%
10	Emirates	\$120,898,570	\$1,927,297,481	+1,494%
	Totals	\$32,083,231,722	\$38,376,454,37	20%
<i>2018 and 2019 carrier results were based upon 12-month financial period disclosures for each year. (FF) 80% or more of the carrier's ancillary revenues are produced by its frequent flyer program.</i>				

Source: Sorensen and Lucas, 2020.

In the Ideaworks Company LLC ancillary revenue 2020 report, it was stated that there would be a decrease in ancillary revenues due to the decline in passengers due to the Coronavirus pandemic in 2020. In the report published in August 2020, the ancillary revenues for 2020 were estimated as shown in the table below. Accordingly, it is estimated that there will be a loss of over 50% from the ancillary revenues of airline

companies. In particular, it was stated that Air Canada (73%), Lufthansa (61%), and Emirates (60%) would experience much more losses than their competitors.

Table 4.2. Ancillary Revenues of Airline Companies (2019-projected 2020)

Top 10 Airlines — 2019 Actual and 2020 Projected			Ancillary Revenue	2020 Change
Rank	Carrier	2019	2020	
1	American	\$7,413,000,000	\$3,881,316,754	-48%
2	United	\$6,580,000,000	\$3,387,653,171	-49%
3	Delta	\$6,198,000,000	\$2,917,882,417	-53%
4	Southwest (FF)	\$4,498,000,000	\$2,937,897,849	-35%
5	Ryanair Group	\$3,311,255,802	\$1,633,172,490	-51%
6	Air Canada	\$2,549,719,104	\$681,442,560	-73%
7	Alaska Air Group	\$2,033,560,500	\$1,141,875,458	-44%
8	Lufthansa Network Airlines	\$1,933,431,476	\$755,084,909	-61%
9	International Airlines Group	\$1,932,190,010	\$802,245,292	-58%
10	Emirates	\$1,927,297,481	\$778,629,528	-60%
	Totals	\$46,622,331,429	\$23,684,505,838	-49%
<i>Projection is based upon 2019 results for the airline adjusted for passenger traffic for 2020. Traffic data is calculated for each airline based upon Cirium Core schedules (data filed 31st of August 2020)</i>				

Source: Sorensen and Lucas, 2020.

It is seen that there has been a significant and regular increase in the aviation sector's ancillary revenues over the years. Ancillary revenues, which was over USD 22 billion in 2010, reached approximately USD 110 billion in 2019. On the other hand, while ancillary revenues constituted 4.8% of the total income in 2010, this rate increased to 12.2% in 2019 (Cartrawler, 2019).

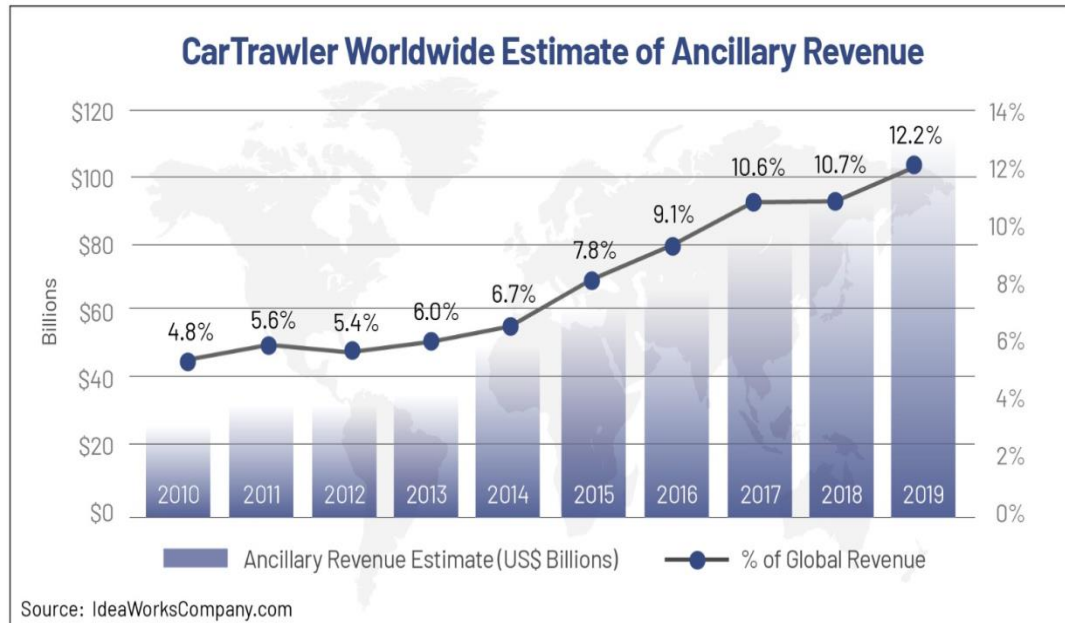


Figure 4.2. Ancillary Revenues by Years (2010-2019)

Source: Cartrawler, 2019.

The ranking of airlines in terms of ancillary revenues is given in Cartrawler 2020 report. Accordingly, the ancillary revenues of 81 companies were analyzed. In this context, it is seen that Spirit, Allegiant, Wizz Air, Viva Aerobus, and Frontier airlines stand out in terms of the ratio of ancillary revenues to total income. The percentage of ancillary revenues of these companies to their total income is more than 40%. Even Spirit and Allegiant’s ancillary revenues are almost half of their total income. In terms of amount, the airline that earned the most per passenger from ancillary revenues in 2019 is Allegiant, with USD 56.98. Spirit (\$ 52.14), Air Canada (\$ 49.47), and Frontier (\$ 48.22) are the other companies with the highest ancillary revenues per passenger (Cartrawler, 2019).

Ancillary Revenue as a % of Total Revenue - 2019
Airlines ranked 1 through 40

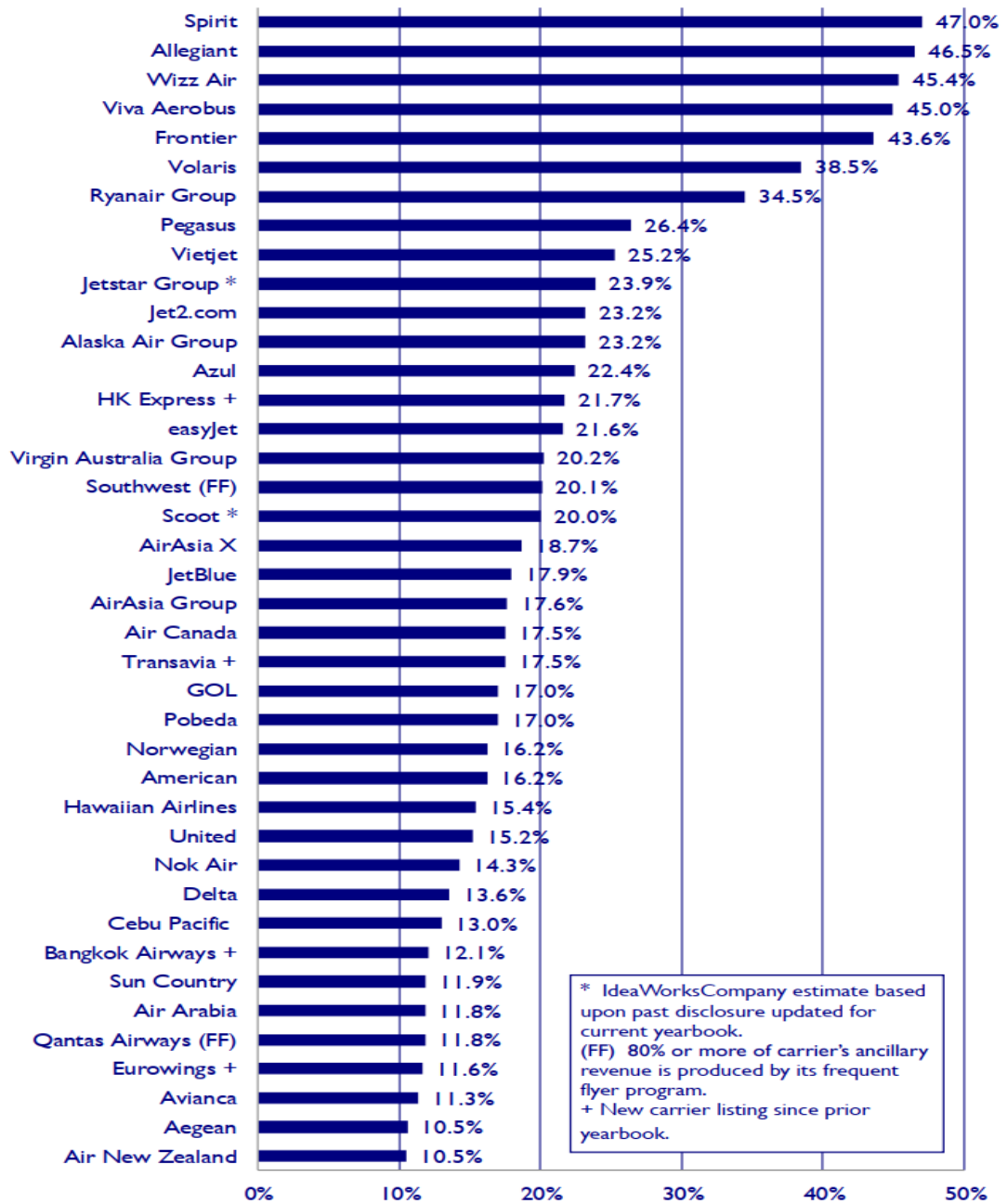


Figure 4.3. Ancillary Revenues as a % of Total Revenue – 2019.

Source: Sorensen and Lucas, 2020.

Pegasus Airlines, operating in our country, has also become one of the leading companies in terms of the ratio of ancillary revenues to total income. Pegasus, on the other hand, generated ancillary income of US \$ 17.02 per passenger in 2019. Pegasus generated a total of US \$ 518.9 million in side income in 2019 (Cartrawler, 2019).

Ancillary revenue levels according to the types of airline companies are presented in the table below. Accordingly, low-cost airlines earned a total ancillary revenue of USD 13 billion, while traditional airlines earned a total ancillary income of USD 44 billion. Both types of airline companies earned their ancillary revenues from a la carte services (Cartrawler, 2019).

**Table 4.3. Worldwide Estimate of Ancillary Revenue —
by Carrier Type for 2019**

Airline Category	Total Ancillary Revenue	Frequent Flyer & Commission Based	A la Carte Activity
US Major Airlines	\$29.1 billion	\$19.8 billion	\$9.3 billion
Ancillary Revenue Champs	\$23.2 billion	\$1.2 billion	\$22.0 billion
Low-Cost Carriers	\$13.2 billion	\$0.6 billion	\$12.6 billion
Traditional Airlines	\$44.0 billion	\$12.3 billion	\$31.7 billion
Global Totals	\$109.5 billion	\$33.9 billion	\$75.6 billion

Source: Cartrawler, 2019.

4.4. Cargo Revenues

Air cargo is the transportation of any goods from one place to another by aircraft (Allaz, 1998). The term air cargo is broadly defined to include air freight. All cargo, except for the passenger baggage carried in the cargo compartment, is the subject of air cargo (O'Connor, 2000).

Air cargo transportation, on the other hand, is defined as packaging, labeling goods other than mail and luggage, preparing the documents properly, and shipping them by aircraft, especially considering the country and carrier restrictions, depending on ICAO and IATA rules (Öztürk, 1993).

The air cargo sector plays an essential role in the increasing world trade. The volume of the air cargo market has increased by two times every ten years since 1970 (Changa et al., 2007).

Recently, the efforts of businesses to reduce storage costs, their desire to shorten the time of movement of their goods in the market, and the short life span of products in many industries (computers, medical products) have revealed the importance of the concept of speed. The spread of e-commerce and the provision of logistics solutions have increased the competitiveness of businesses that want to do business on a global scale, so the demand for international goods has increased, and air cargo transportation has come to the fore for an effective commercial order (Zhang and Zhang, 2002).

Air cargo transportation itself is considered to be a significant sector in itself. It also has a structure that provides input to the production processes of other sectors (Hensher, 2001).

Airline passenger transport companies allow passengers to carry a certain amount of cargo in addition to their tickets. Additional fees are charged for loads above the specified amount. These revenues constitute an ancillary income item for airline companies. In addition, cargo loads are carried independently of the passengers on passenger planes. In this way, airline companies earn cargo income in addition to their primary income. Especially in the process that started with the COVID-19 pandemic process that began in late 2019, airline passenger transportation was severely interrupted. In this process, it has been observed that airline companies concentrate on

cargo transportation. According to IATA reports, air cargo flights will likely to have 36% of all airline revenue in 2020. It has also been forecasted by IATA that air freight will have a third of airline revenue during 2021. Air Canada's air cargo revenue during the 2nd quarter of 2020 surpassed passenger revenue for the first time ever, reaching C\$269 million (\$207 million), yet shrank to C\$216 million during the third quarter (Risen, 2020). In this period, cargo revenues of China Airlines were up by 153% in May 2020, and cargo revenues of EVA Air were up by 161% (CAPA, 2020).

Table 4.4 shows the rate of extra baggage fees in the side income of some airline companies. Accordingly, it is observed that the additional baggage fee is up to 85% of the ancillary income (Sun Country Airlines). On the other hand, it is observed that this rate remains as low as 18% for American Airlines, one of the major airlines (Sorensen and Lucas, 2020).

Table 4.4. Percentage of Extra Baggage Fee Revenues of Some Airlines

Airline Company	Total Revenue	Ancillary Revenue (AR)	Extra Baggage Fees/AR (%)
AirAsia X	\$1,062,730,177	\$198,455,655	40
American Airlines	\$45,768,000,000	\$7,413,000,000	18
Frontier	\$2,508,349,000	\$1,094,043,000	42
Hawaiian Airlines	\$2,832,228,000	\$436,838,000	20
Spirit	\$3,830,536,000	\$1,800,826,000	41
Sun Country	\$701,383,340	\$83,303,540	85
Air Astana	\$898,729,000	\$6,475,000	88

Table 4.4. (cont.)

Airline Company	Total Revenue	Ancillary Revenue (AR)	Extra Baggage Fees/AR (%)
Jeju Air	\$1,182,967,068	\$102,811,760	21
Jin Air	\$782,435,317	\$51,233,954	15

Source: Sorensen and Lucas, 2020.

With the decrease in passenger traffic in Turkish Airlines with the Covid-19 outbreak in 2020, passenger revenues decreased by 66% compared to 2019, and declined to 3.8 billion USD. THY compensated some of the loss in passenger income by focusing on exports and cargo. Cargo revenues increased by 61% in 2020, reaching the US \$ 2.7 billion. Passenger revenues, on the other hand, decreased by 66% and remained at the US \$ 3.8 billion. Total income decreased by 49.1% compared to the previous year and was realized as 6.7 billion US dollars. While passenger revenues in 2020 constituted 56% of the total income, the share of cargo revenues reached 40%, with a record increase in this period (THY, 2020).

Turkish Airlines reaped \$1.8 billion in total income in the first quarter of 2021, and the cargo revenue of Turkish Airlines, which is 46% of the total income.

Cargo revenue of the carrier posted a 77% increase compared to the same period in 2020 (Biçer, 2021).

The following table shows the traffic data for THY. It is observed that the cargo and postal revenues of the company have doubled in the last five years. It is seen that the extra baggage load was 6,677 tons in 2016, and this load reached 11,725 tons in 2019. However, it is observed that the extra baggage load has decreased by half, with the passenger traffic decreasing by approximately 1/3 in 2020 (THY, 2021).

Table 4.5. THY Traffic Data, 2020

THY Traffic Data	2020	2019	2018	2017	2016
Passenger (000)	27.950	74.276	75168	68.617	62.759
Available Seats-Km (million)	74.960	187.696	182.031	173.073	170.092
Paid Passenger-Km (million)	53.249	153186	149.169	136.947	126.815
Passenger Load Factor (%)	71,0	81,6	81,9	791	74,6
Flying Point	324	321	310	303	298
Number of Landings	240.339	507.314	511.064	483.312	475.303
Km Flow (000) Distance	472.205	926.177	866.630	826.048	825.561
Cargo + Mail (tons)	1.487.233	1.543.028	1.412.423	1.122.697	887164
Excess Baggage (tons)	7.281	11.725	7717	6.904	6.677

Source: THY, 2020.

The chart below clearly shows the increase in THY's cargo revenues in its total revenues. It is understood that the decrease in passenger revenues in 2020, when the pandemic effect is particularly intense, prompted the company to increase cargo revenues.

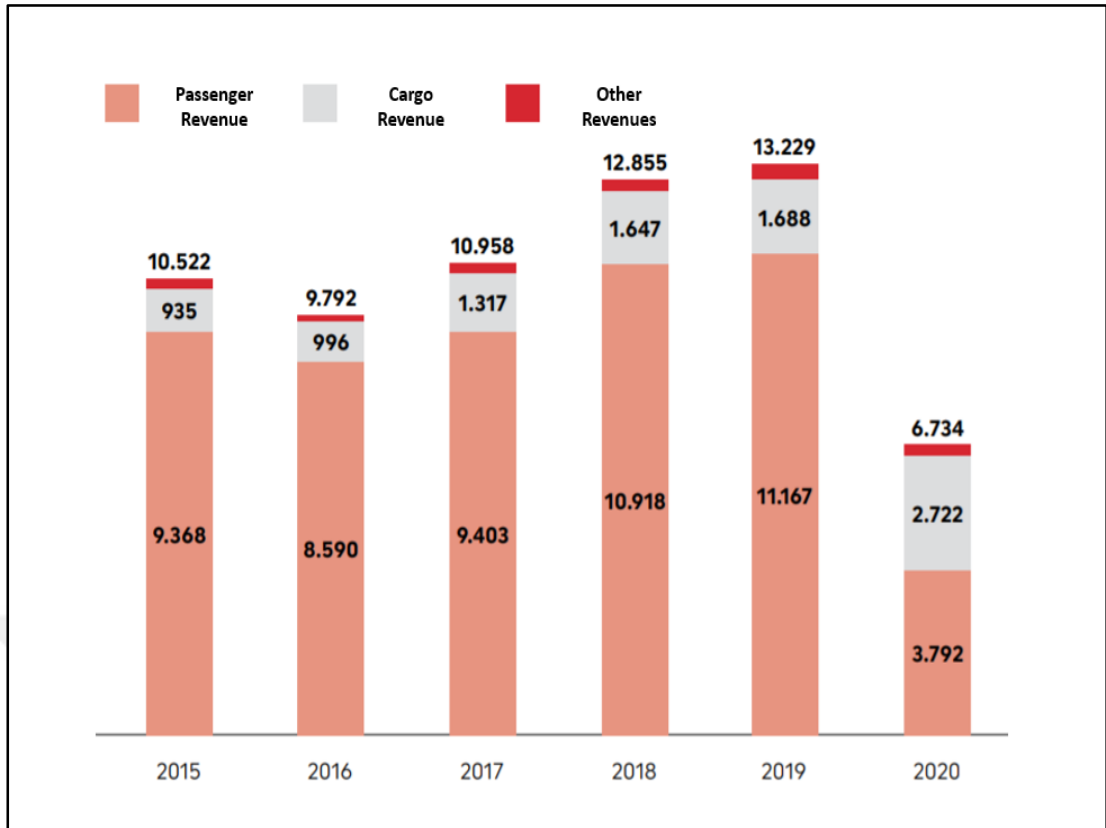


Figure 4.4. Cargo Revenues of THY, 2015-2020

Source: THY, 2020.

Turkish Airlines has become one of the top 10 airlines in the world with this cargo load. Apart from air cargo companies (such as FedEx and UPS), it is seen that the leading airline company in terms of cargo load is Qatar Airways. On the other hand, it is seen that Emirates and Cathay Pacific Airways companies have a significant cargo capacity (IATA, 2020).

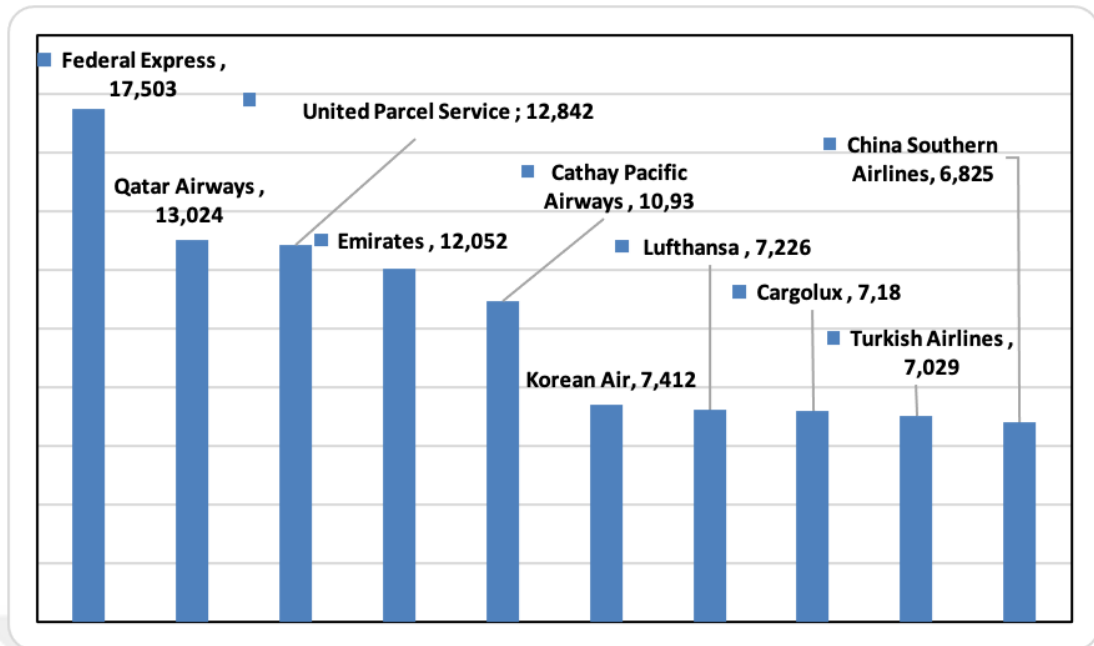


Figure 4.5. Top Airlines by Cargo Tonne-Kilometers (CTKs)

Source: IATA, 2020.

In this process, it is seen that companies even allocate passenger aircraft for cargo transportation. An example of this is Lufthansa using the passenger plane as a cargo plane. Lufthansa has been operating cargo flights to Munich via 4 Airbus A350 passenger aircraft and flying similar missions with 6 Airbus A330 planes based in Frankfurt. With these ten passenger airliners, Lufthansa has created additional air freight capacity and expanded the Lufthansa Cargo fleet, which has 17 freight-only aircraft (Aviation Business News, 2020).



Figure 4.6. Lufthansa Passenger Planes Used for Cargo Operations During COVID-19

Source: IATA, 2020.

4.4.1. Related Studies

O'Connell and Warnock-Smith (2013) examined passengers' attitudes towards ancillary products. In this context, a questionnaire was applied to the passengers, and the field experts were interviewed. As a result of the study, it was determined that the airport parking lot and registered baggage fees were the most popular commission-based and unpackaged products.

Kılıç (2019) examined the data of 25 airline companies that carry out flight activities in different regions of the world and who disclosed their ancillary revenues and their total revenues between 2010 and 2018. The researcher used the trend analysis/trend percentage analysis method to examine the data. According to the study's results, the researcher found that 23 of the 25 airline companies operating with different business model applications have increased their ancillary revenues. It has been found that an increase in the ancillary revenues of companies applying different business models is an indication that ancillary revenues are important revenue items for all airlines, regardless of business model.

Akpınar (2019) examined airline ancillary services to create an ancillary service management strategy in low-cost airlines. Data from 17 airline employees who are experts in their fields were extracted and analyzed after each round in the three-round Delphi technique application. As a result of the research, it was observed that the sale of ticket change rights, ticket return rights, and excess baggage rights were the most effective in-house ancillary services in airline selection, while airport transfer and private passenger lounges were the most effective third-party ancillary services. It has been determined that the passengers will consent to the easiest ticket change from the in-house ancillary services, and they will be willing to pay a fee for the easiest airport transfer and parking services from the third-party ancillary services. It has been observed that the sale of excess baggage allowance by the airline is the most important in-house ancillary service, while the sale of the car rental and private passenger lounges is the most important ancillary service. While the most convenient in-house ancillary service to be sold with the package was seat sales, the third-party ancillary services were airport transfer. It has been observed that seat selection rights and in-flight entertainment system services are in-house ancillary services that passengers can purchase to increase their travel experience, even if they do not need them, while private passenger lounges and fast passage rights are third-party ancillary services.

Atik (2019) aimed to reveal the effect that ancillary income practices of airlines adopting a low-cost business model have on their financial performance. In this study, the researcher has selected the OLS method to show the effect of side income practices of the airline company adopting the Low-Cost Transportation Business Model on its financial performance. Only two of the activities of the airline companies in Turkey (Turkish Airlines and Pegasus) should be made public, and the two airlines are the only one (Pegasus) reducing the low-cost business model to adopt the data sets limits the number of methods that can be selected. As a result, it has been determined that the increase in occupancy rate positively affects the EBITDA (Earnings Before Interests, Taxes, Depreciation, and Amortization) margin, while the rise in CASK (Cost of Available Seat Kilometer), which represents the cost per seat, negatively affects the EBITDA margin. However, it has been determined that diversifying the income sources of the airline company in question and concentrating more on ancillary revenues reduces financial performance.

CHAPTER V

RESEARCH AND AN APPLICATION

5.1. Aim of the Research

For airline companies to survive today in tight competition conditions, it is important that they gain ancillary revenues in addition to their primary income. In this context, cargo and other ancillary revenues constitute an essential source of profit for airline companies. In this research, it was aimed to see the effects of cargo revenues and ancillary revenues on the net profit of the airline companies for the period of 2014Q1-2019Q4 for three full-service carrier airline companies: Turkish Airlines, American Airlines, and Delta Air Lines.

5.2. Significance of the Research

Both in Turkish and foreign literature, no specific research about airline companies' cargo revenues and ancillary revenues made with the econometric model was found. As far as it is known, this study is the first and the unique one in which the effects of airline companies' cargo revenues and ancillary revenues on the net profit were examined with the ultimate econometric test techniques. So, for this reason, it is hoped that this research will contribute to the literature.

5.3. Research Limitations

Within the scope of the research, over 50 airline companies' data were examined. However, except for the three ones (Turkish Airlines, American Airlines, and Delta Air Lines) used in this research, not enough data could be found. So, the study was limited to the data of those three airline companies.

Besides, the research is limited to the variables of cargo revenues, ancillary revenues, and net profit of the chosen three airline companies.

5.4. Research Model

The equation formed for the research is seen in Equation 4.1. In the equation, cargo revenues and ancillary revenues are determined as independent variables, and net profit is defined as the dependent variables.

$$\Delta \ln_{\text{net_profit}} = \beta_0 + \beta_1 \Delta \ln_{\text{cargo_rev}} + \beta_2 \Delta \ln_{\text{anc_rev}} \quad (4.1.)$$

In the equation, “ Δ ” indicates that the first level difference of the related variable is used, and “ \ln ” indicates that logarithmic transformation is applied.

5.5. Data Collection

Data were obtained from the related airline company’s annual reports on its official website: <https://investor.turkishairlines.com/en/financial-and-operational/annual-reports>, <https://ir.delta.com/financials/default.aspx>, and <https://americanairlines.gcs-web.com/financial-results/financial-aal> (Access Date: 19th of April 2021).

5.6. Data Analysis

Classical estimation models were used in empirical econometric studies until 1980. It was noticed in the 1980s that classical estimation models performed with non-stationary data gave erroneous results and caused spurious regression (Yavuz, 2004).

The data used in this research are time series data. For this reason, since the SPSS program, which does not allow testing the stationarity of the data, will not give accurate results in the analyzes to be carried out, analyzes were carried out with EViews 10 and STATA 15, which are the most modern econometric analysis programs that can be used to control the stationarity.

First, the graphs and the descriptive statistics for the research variables of the three selected airline companies were presented. Then econometric analyzes such as cross-section dependent tests, second generation unit root tests, delta slope homogeneity tests, co-integration tests, and casualty tests were made.

5.7. Research Data

Descriptive statistics for the research variables and their graphs are presented below.

Descriptive statistics for cargo revenues of three full-service carrier airline companies between the period 2014Q1-2019Q4 were presented in Table 5.1.

Table 5.1. Descriptive Statistics for Cargo Revenues of the 3 Full-Service Carrier Airline Companies Between the Period of 2014Q1-2019Q4
(Million Dollars)

Airline Company	Min.	Max.	Mean	Std. Dev.
Turkish Airlines	211	471	311.63	85.95
American Airlines	152	264	210.79	31.02
Delta Air Lines	127	244	196.58	28.19

As can be seen in Table 5.1, between the period 2014Q1-2019Q4; the mean of Turkish Airlines' cargo revenues was 311.63 million dollars; the lowest value of cargo revenues was 211 million dollars (2016Q1), and the highest value of cargo revenues was 471 million dollars (2019Q3); the mean of American Airlines' cargo revenues is 210.79 million dollars; the lowest value of cargo revenues is 152 million dollars (2016Q4), and the highest value of cargo revenues is 264 million dollars (2018Q2); the mean of Delta Air's cargo revenues is 196.58 million dollars; the lowest value of cargo revenues is 127 million dollars (2017Q4), and the highest value of cargo revenues is 244 million dollars (2014Q2).

The graph of cargo revenues of the three full-service carrier airline companies between the period 2014Q1-2019Q4 was presented in Figure 5.1.

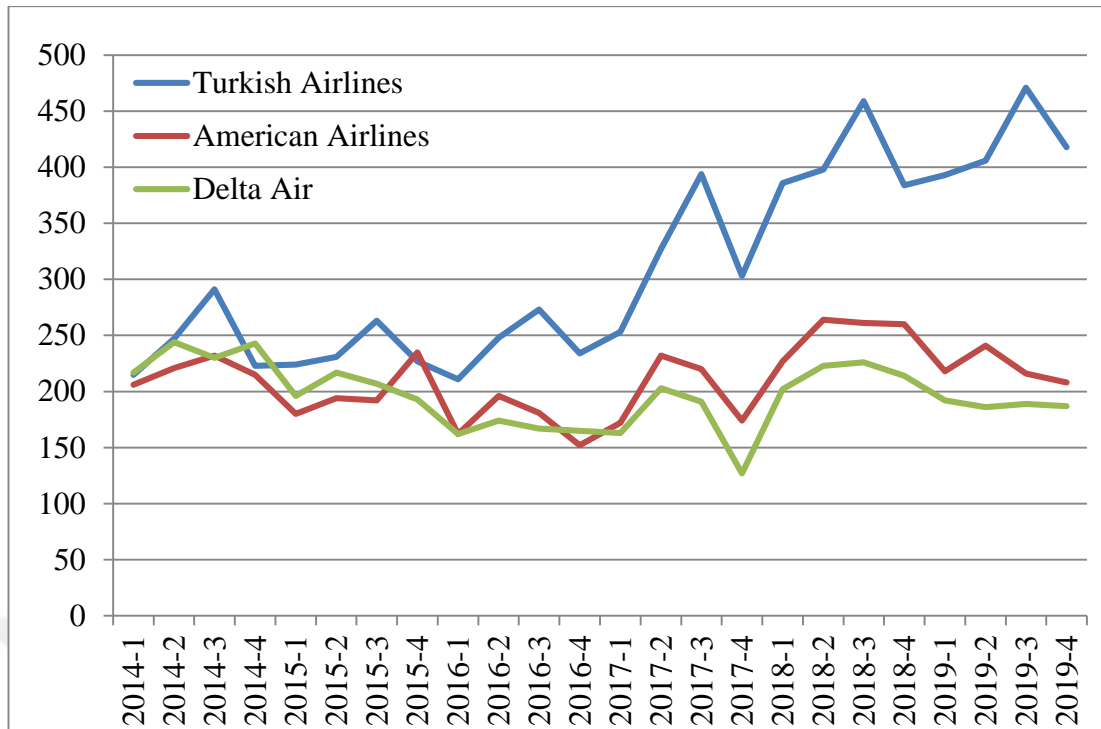


Figure 5.1. Cargo Revenues of the 3 Full-Service Carrier Airline Companies Between the Period of 2014Q1-2019Q4 (Million Dollars)

When Figure 5.1. is examined, a perfect seasonality is observed for Turkish Airlines. It is seen that the cargo revenues in the third quarter of the year are clearly higher than the other quarters. Although there is no such seasonality for American Airlines and Delta Air Lines, it is seen that the cargo revenues of these two airlines generally reach the highest value in the 2nd and 3rd quarters of the year. In general, cargo revenues of Turkish Airlines have shown an increasing trend, especially since 2016Q4, while cargo revenues of American Airlines and Delta Air Lines are observed to be more stable.

Descriptive statistics for ancillary revenues of three full-service carrier airline companies between 2014Q1-2019Q4 were presented in Table 5.2.

Table 5.2. Descriptive Statistics for Ancillary Revenues of the 3 Full-Service Carrier Airline Companies Between the Period of 2014Q1-2019Q4 (Million Dollars)

Airline Company	Min.	Max.	Mean	Std. Dev.
Turkish Airlines	53	168	96.83	34.32
American Airlines	694	1349	1053.67	249.06
Delta Air Lines	760	1361	1084.75	177.27

As can be seen in Table 5.2, between the period 2014Q1-2019Q4; the mean of Turkish Airlines' ancillary revenues was 96.83 million dollars; the lowest value of ancillary revenues was 53 million dollars (2015Q2), and the highest value of ancillary revenues was 168 million dollars (2017Q4); the mean of American Airlines' ancillary revenues is 1053.67 million dollars; the lowest value of ancillary revenues is 694 million dollars (2018Q1), and the highest value of ancillary revenues is 1349 million dollars (2017Q4); the mean of Delta Air's ancillary revenues is 1084.75 million dollars; the lowest value of ancillary revenues is 760 million dollars (2017Q1), and the highest value of ancillary revenues is 1361 million dollars (2015Q2).

The graph of ancillary revenues of the three full-service carrier airline companies between the period 2014Q1-2019Q4 was presented in Figure 5.2.

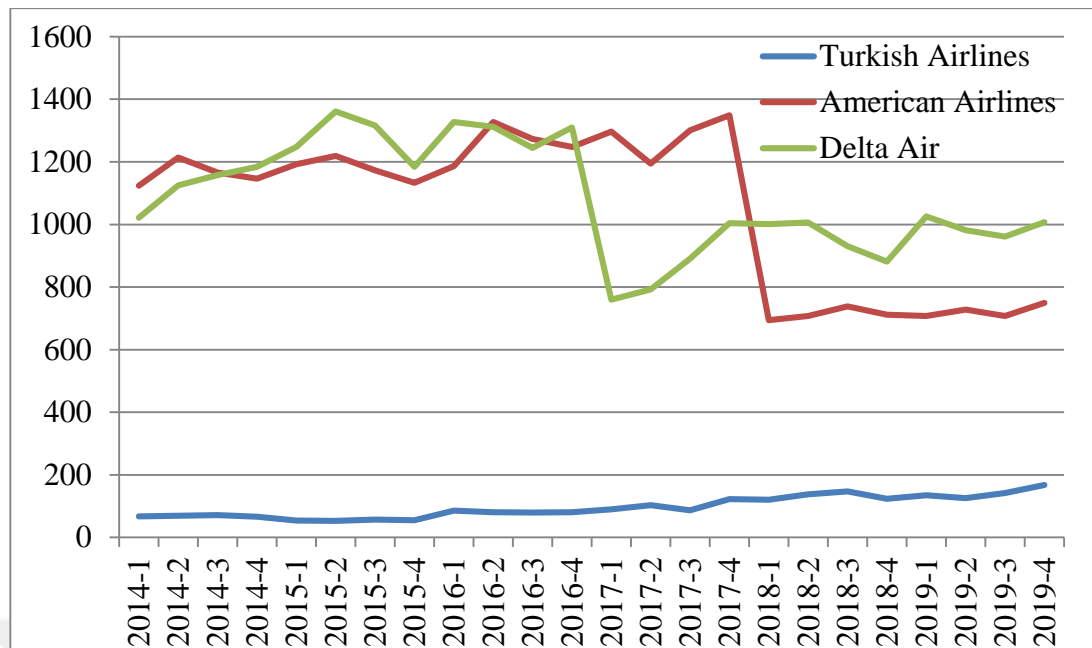


Figure 5.2. Ancillary Revenues of the 3 Full-Service Carrier Airline Companies Between the Period of 2014Q1-2019Q4 (Million Dollars)

When Figure 5.2 is examined, the first striking point is that the ancillary revenues of Turkish Airlines are much lower than those of American Airlines and Delta Air Lines. Ancillary revenues of Turkish Airlines are very low and have a stable course. A sharp decrease after 2016Q4 for Delta Air Lines and a sharp decrease after 2017Q4 for American Airlines are clearly visible. Descriptive statistics for net profits of three full-service carrier airline companies between the period 2014Q1-2019Q4 were presented in Table 5.3.

Table 5.3. Descriptive Statistics for Net Profits of the 3 Full-Service Carrier Airline Companies Between the Period of 2014Q1-2019Q4 (Million Dollars)

Airline Company	Min.	Max.	Mean	Std. Dev.
Turkish Airlines	117	1281	520.58	343.95
American Airlines	159	3281	757.75	673.13
Delta Air Lines	213	1546	953.67	394.74

As can be seen in Table 5.3, between the period 2014Q1-2019Q4; the mean of Turkish Airlines' net profits was 520.58 million dollars; the lowest value of net profits was 117

million dollars (2017Q1), and the highest value of net profits was 1281 million dollars (2018Q3); the mean of American Airlines' net profits is 757.75 million dollars; the lowest value of net profits is 159 million dollars (2019Q1), and the highest value of net profits is 3281 million dollars (2015Q4); the mean of Delta Air's net profits is 953.67 million dollars; the lowest value of net profits is 213 million dollars (2014Q1), and the highest value of net profits is 1546 million dollars (2016Q2).

The graph of net profits of the three full-service carrier airline companies between the period 2014Q1-2019Q4 was presented in Figure 5.3.

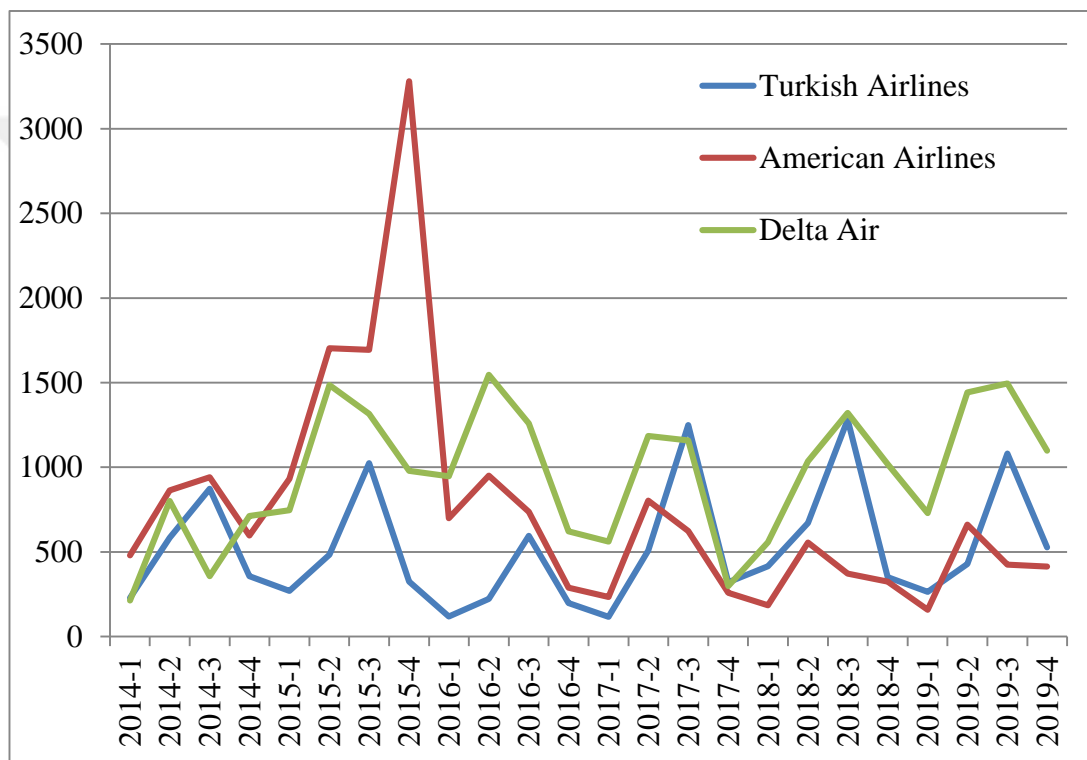


Figure 5.3. Net Profits of the 3 Full-Service Carrier Airline Companies Between the Period of 2014Q1-2019Q4 (Million Dollars)

When Figure 5.3 is examined, like in cargo revenues, a perfect seasonality is observed for Turkish Airlines. It is seen that the net profits in the third quarter of the year are clearly higher than the other quarters. Like in cargo revenues, although there is no such seasonality for American Airlines and Delta Air Lines, it is seen that the net profits of these two airlines generally reach the highest value in the 2nd and 3rd quarters of the year. In general, the net profits of Turkish Airlines and Delta Air Lines are observed to be stable except for some soft increases and decreases during some periods. But it

can be said that Delta Air's net profits that they have a weak decrease trend except for the severe increase between 2015Q1-2015Q4 and a severe decrease between 2015Q4-2016Q1.

5.8. Findings and Discussions

5.8.1. Cross Section Dependency, Unit Root, and Delta Tests Results

The cross-section dependency test plays a role in deciding which generation root unit tests will be used in econometric analyzes for panel data sets. If there are no cross-section dependency in the variable, first-generation root unit tests; if there is a cross-section dependency in the variable, second generation root unit tests are preferred (Dođru, 2014).

To decide which unit root test (First generation or second generation unit root test) to apply; first the cross-section dependency of the research data was checked. Because the time dimension (T=6 years and 24 quarters) is higher than the cross-section dimension (N=3 airline companies), Breusch Pagan LM test was chosen as the cross section dependence test (Breusch and Pagan, 1980). The results of Breusch Pagan LM tests are presented in Table 5.4.

Table 5.4. Breusch Pagan LM Tests Results

	Test Stat.	Prob. (p)
cargo_rev	19.06705	0.0003
anc_rev	9.838856	0.0200
net_profit	15.832919	0.0012

As can be seen in Table 5.4, the results of the Breusch Pagan LM tests results show that there are cross-section dependencies for all three research variables ($p < 0.05$).

The unit root test is used to determine whether a variable is stationary or not. Tests with variables with a unit root lead to erroneous results. Therefore, unit root tests are of great importance for the accuracy of the analysis (Yavuz, 2004).

After the determination of cross-section dependencies, it was decided to use CADF second-generation unit root tests to check for the existence of unit root in the research variables (Hansen, 1995).

Table 5.5. CADF Second Generation Unit Root Tests Results

	t-bar	cv10	cv5	cv1	Z[t-bar]	Prob. (p)
cargo_rev	-0.611	-2.210	-2.330	-2.570	2.051	0.980
$\Delta \ln_cargo_rev$	-3.557	-2.210	-2.330	-2.570	-3.209	0.001
anc_rev	-1.756	-2.210	-2.330	-2.570	0.006	0.502
$\Delta \ln_anc_rev$	-3.445	-2.210	-2.330	-2.570	-3.008	0.001
net_profit	-1.565	-2.210	-2.330	-2.570	0.329	0.486
$\Delta \ln_net_profit$	-4.550	-2.210	-2.330	-2.570	-4.982	0.000

As can be seen in Table 5.5, all three variables are not stationary at level ($p > 0.05$), but they become stationary after logarithmic transformation and the first difference applied ($p < 0.05$).

The homogeneity test determines whether the other cross-sections are affected equally by the change in one of the cross-sections. From this point of view, it is expected that slope coefficients will be heterogeneous for airline companies with different economic structures, while they will be homogeneous for airline companies with similar economic structures (Günay et al., 2008).

For testing the homogeneity of the slope coefficients, the Delta test was made. The results of the Delta test are presented in Table 5.6. As can be seen in Table 5.6, the slope coefficients aren't homogeneous. In other words, they are heterogeneous ($p < 0.05$).

Table 5.6. The Results of the Delta Test

Delta Tilde		Delta Tilde Adjusted	
Test Stat.	Prob. (p)	Test Stat.	Prob. (p)
4.133	0.000	4.547	0.000

5.8.2. Panel Cointegration Analysis Results

The co-integration analysis is an analysis that examines whether there are long-term equilibrium relationships among the variables. Despite permanent shocks, there may be a long-run equilibrium relationship between variables. Panel co-integration tests are more powerful than time series co-integration tests (Selim et al., 2014). To test the long-term relationships between research variables, a panel co-integration test was made. All the three research variables get stationary at the first level, so the panel co-integration test is appropriate for the variables. Westerlund panel co-integration test was chosen because of the variables' having cross-section dependence (Westerlund, 2005). The results of the Westerlund panel co-integration test are presented in Table 5.7.

Table 5.7. The Results of Westerlund Panel Cointegration Test

Stat.	Value	Z-Value	P-Value
Gt	-3.642	-3.022	0.001
Ga	-14.622	-1.518	0.045
Pt	-6.097	-3.031	0.001
Pa	-14.800	-2.768	0.003

Interpretation of the Westerlund panel co-integration test is made in two ways: The first way is to take Pt and Pa into consideration when the slope coefficients are homogeneous; the second way is to take Gt and Ga into consideration when the slope coefficients are heterogeneous (Aytun and Akın, 2014).

Because the slope coefficients are heterogeneous in this research, Gt and Ga were taken into consideration. As can be seen in Table 5.7, the p-values of both Gt and Ga are less than 0.05 ($p < 0.05$). That means there is a co-integration, in other words, long-term relationships between the research variables.

From the point of view of economics, we can say that the ancillary revenues-net profit and cargo revenues-net profit series are cointegrated if they move together over time and the distance between them is stable. Hence, co-integration reflects the presence of a long-run equilibrium towards which the economic system converges over time. An

increase in cargo revenues and ancillary revenues will make the net profit of the airline companies increase in the long term.

5.8.3. Panel Causality Test Results

To test the short-term relationships and to see causality relationships between research variables, a panel casualty test was made. Causality analysis is used to examine whether there is a causal relationship between two variables (Engeloğlu et al., 2015).

Dumitrescu Hurlin panel casualty test was chosen because the variables have cross-section dependence, and the slope coefficients are heterogeneous (Dumitrescu and Hurlin, 2012).

The results of Dumitrescu Hurlin panel causality tests are presented in Table 5.8.

Table 5.8. The Results of Dumitrescu Hurlin Panel Causality Tests

	W-Bar	Z-Bar	Prob. (p)
$\Delta \ln_cargo_rev \rightarrow \Delta \ln_net_profit$	11.2451	12.5476	0.0000
$\Delta \ln_net_profit \rightarrow \Delta \ln_cargo_rev$	1.5592	0.6849	0.4934
$\Delta \ln_anc_rev \rightarrow \Delta \ln_net_profit$	2.7804	2.1805	0.0292
$\Delta \ln_net_profit \rightarrow \Delta \ln_anc_rev$	1.3624	0.4438	0.6572

As can be seen in Table 5.8, there are one-way causalities, in other words, short-term relationships between cargo revenues to net profit and from ancillary revenues to net profit ($p < 0.05$).

From this result, we can clearly understand that; even in a short period, the increase in cargo revenues positively affects net profitability, and an increase in ancillary revenues increase the net profit of the companies.

In other words, cargo and ancillary revenues have a positive effect on increasing net profit for full-service carrier airlines (Aksoy and Bas, 2021).

CHAPTER VI

CONCLUSION AND RECOMMENDATIONS

Air transport has become an increasingly common tool used by the majority of people today and has been a constantly growing industry. As a result of the conceptual analysis, it has been understood that there is tight competition in air transport and that, in this context, airline companies have produced new strategies to increase their revenues.

It has been concluded that the earnings provided by ancillary revenues, especially in aviation, provide an essential resource for airline companies. In the research part, the relationships between cargo revenues, ancillary revenues, and net profit of the airline companies for the period of 2014Q1-2019Q4 for three full-service carrier airline companies: Turkish Airlines, American Airlines, and Delta Air Lines, were examined.

The results of co-integration analyses reveals that there is co-integration between cargo revenues and ancillary revenues; these variables move together in the long run. An increase in the cargo revenues and ancillary revenues will make the net profit of the airline companies increase in the long term, too.

Besides, the results of causality analyses show one-way causality relationships from cargo revenues to net profit and from ancillary revenues to net profit; cargo revenues and ancillary revenues are the causes of net profit. An increase in the cargo revenues and ancillary revenues will make the net profit of the airline companies increase in the short term, too.

According to the data provided by Sorensen and Lucas (2020), American Airlines and Delta Air Lines are among the top three companies with the highest ancillary revenues. It has been observed that THY's ancillary revenues are very low compared to the two American companies. It is considered that this situation has several different reasons. First of all, these two American Airlines serve a passenger group with high per capita income as the most passenger-carrying companies in the world (IATA, 2020). Due to

the high purchasing power of people in the USA, the expenditures made on the plane are higher than the passenger profile in other countries. For this reason, it is expected that passengers will buy more services that will provide ancillary revenues.

THY, on the other hand, serves passengers with relatively low-income levels and is considered to be more disadvantaged in terms of ancillary revenues. Another reason for the differentiation of ancillary revenues may be the personnel expenses of companies because the salaries of pilots, cabin, and ground handlers in the USA are much higher than their counterparts in Turkey. For this reason, it is normal for two US companies to turn to more ancillary earnings in the tightly competitive market.

In addition, as a result of the panel causality analysis, reveals that there is a two-way causality relationship between both cargo revenues-net profit and ancillary revenues-net profit. It can be stated that with the increase in the number of passengers, ancillary income and extra baggage fees increase. This increase is directly reflected in net profits.

As a result of the analysis, it is seen that Turkish Airlines has more cargo revenue than the other two companies. It seems that this result is consistent with the data of IATA (2020). Since the USA is ahead of many countries in the world in terms of aviation history, it would be a correct assessment to talk about a sharper distinction between passenger and cargo markets due to the large number and diversity of companies in the aviation market. Therefore, due to the superiority of cargo companies such as DHL, UPS, and FedEX in the USA, the cargo market shares of other companies that are mainly based on passenger transportation remain low. According to IATA data, THY is among the top 10 carrier companies worldwide regarding cargo revenues. The other two American companies are among the top three companies carrying the most passengers, according to IATA (2020) data. Therefore, it is observed that these two American companies focus on passenger transportation rather than cargo.

As a result, it was observed that cargo revenues and other ancillary revenues directly contributed to net revenues in aviation. In this context, it is thought that airline companies should give enough importance to cargo and ancillary revenues in order to increase their profitability. For instance, showing the success of last year's cargo transportation in ancillary revenues will play an important role in increasing the net

profitability of Turkish Airlines. Similarly, showing the success of American Airlines and Delta Air Lines in terms of ancillary revenues in the cargo section will contribute positively to the high profitability of these companies.



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