

NEW AIRPORTS AND THEIR IMPACT ON MOBILITY AND AIR TRAFFIC:
AN ANALYSIS OF SABIHA GÖKÇEN INTERNATIONAL AIRPORT

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ABSTRACT

NEW AIRPORTS AND THEIR IMPACT ON MOBILITY AND AIR TRAFFIC: AN ANALYSIS OF SABİHA GÖKÇEN INTERNATIONAL AIRPORT

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In the process of globalization, air transportation plays an important role for the development of regional and national economy. There has been considerably increasing demand for air transportation and will continue in the foreseeable future. In this respect this research demonstrates a case study of Sabiha Gökçen International Airport, the second and recently built airport of İstanbul, and its relation with the region.

The main aim of this study is to understand the initial transportation benefits of the Sabiha Gökçen International Airport investment. The objectives of the research are to understand the contribution of Sabiha Gökçen International Airport to İstanbul and particularly the Anatolian side, in terms of air travel mobility as well as savings in cost and time, to identify the current and potential role of Sabiha Gökçen International Airport in the multi-airport system of İstanbul and to assess the usage of the airport by analyzing the current customer profile in order to understand the spatial aspects of the current demand.

Keywords: Airport Investment, Transportation Benefits/Impacts of Airport
Investment, Sabiha Gökçen International Airport

ÖZ

YENİ HAVAALANLARININ HAVA TRAFİĞİ VE HAREKETLİLİK ÜZERİNE ETKİLERİ: SABIHA GÖKÇEN ULUSLAR ARASI HAVAALANI ANALİZİ

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Küreselleşme sürecinde, hava ulaşımı bölgesel gelişim ve ulusal ekonomide önemli bir rol oynamaktadır. Hava ulaşımında önemli bir talep artışı görülmektedir; ve bu artışın yakın gelecekte de süreceği tahmin edilmektedir. Bu araştırma İstanbul'da 2001 yılında hizmete açılan ve kentin ikinci havaalanı olan Sabiha Gökçen Uluslararası Havaalanı, bu havaalanının kentin hava ulaşımına etkileri, ve yakın çevresi ile ilişkisine odaklanmaktadır.

Çalışmanın temel amacı, Sabiha Gökçen Uluslararası Havaalanı yatırımının ulaşım alanındaki faydalarının anlaşılmasıdır. Araştırmanın hedefi; Sabiha Gökçen Havaalanı'nın İstanbul'a, özellikle Anadolu yakasına olan katkısını yolcu hareketleri, zamandan ve maliyetten tasarruf etme bağlamında anlamak, İstanbul'un çoklu havaalanı sistemi içerisinde Sabiha Gökçen Uluslararası Havaalanı'nın mevcut ve potansiyel rolünü belirlemek ve mevcut talebi mekansal açıdan anlamak üzere kullanıcı profili analizinin yapılarak havaalanının kullanımını değerlendirmektir.

Anahtar Kelimeler: Havaalanı Yatırımı, Havaalanı Yatırımlarının Ulaşım Etkileri/Faydaları, Sabiha Gökçen Uluslararası Havaalanı

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LIST OF ABBREVIATIONS AND GLOSSARY

ACI	Airports Council International
Aerodrome	A defined area on land or water (including any buildings, installation and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.
Aircraft	Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.
Air traffic	All aircraft in flight or operating on the manoeuvring area of an aerodrome.
Air transport industry	Aviation and civil aerospace sectors
Apron	A defined area, on a land aerodrome, intended to accommodate aircraft for purposes of loading or unloading passengers, mail or cargo, fuelling, parking or maintenance .
Aviation sector	Airports, airlines, commercial aviation, activities directly serving passengers or providing airfreight services, air navigation service providers
Civil aerospace sector	Manufacture and maintenance of aircraft systems, frames and engines
Direct impact of air transport	Employment and activity within the air transport industry
DHMI	State Airports Authority
FAA	Federal Aviation Administration
GDP	Gross Domestic Product. The 'total market' value of all final goods and services produced in a country.

HAVAŞ	Ground Handling Co.
HEAS	Airport Management and Aeronautical Industries Co. Inc.
IATA	International Air Transport Association
IAURIF	Institute for Urban Planning and Development of the Paris Ile-De-France Region
ICAO	International Civil Aviation Organization
Indirect impact of air transport	Employment and activity linked to supplying the air transport industry
Induced impact of air transport	Employment and activity supported by the spending of air transport employees (e.g. suppliers of goods and services that employees purchase)
Intraregional trade	Trade (excluding domestic) within a region
Interregional trade	Trade between different regions
ITEP	Advanced Technology Industrial Park
RIMS II	Regional Input-Output Multiplier System
Runway	A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft
Spin-off effect of air transport	Impact on industries that are outside (includes tourism) of air transport
SSM	Defence Industry Undersecretariat
THK	Turkish Aeronautical Association
TSKGV	Turkish Armed Forces Foundation
TUSAŞ	Turkish Aircraft Industries Inc.

CHAPTER I

INTRODUCTION

In the process of globalization, air transportation acts as an important factor for the development of regional and national economy. There has been a considerably increasing demand for air transportation and will continue in the foreseeable future. Air transportation is dependent upon an extensive and sophisticated infrastructure. This network of hardware and software includes airports, air traffic control and navigation systems. Airports, especially international airports have turned to be in the heart of grand international exchange networks, in accordance with the role they play as gateways for the world markets, and the assets they represent to attract capitals, investments, activities and multinational headquarters. The international airports have become structuring elements of regional economies, and creators of employment and welfare.

Airports, as being the main infrastructure of air transportation stand at a crucial point to cater for the increasing demand. They are commercial organizations with a capacity to create significant income and employment. They have a dual function; they act both as transport nodes and as growth poles in the regional economy.

The first main function of an airport concerns its role as a transport node (Kramer, 1988). In this respect essentially three markets of passengers can be distinguished.

- * persons living in the region served by the airport who visit other regions by plane
- * passengers living elsewhere who travel to the region by plane
- * transfer passengers whose origin and destination do not coincide with the region where the airport is located.

The demand for the airport in the first two markets depends on factors such as: the size and the features of employment and population located in the region near the

airport; the presence of special tourist attractions in the region; prices of tickets; airport taxes; frequency and destination of flights offered; and the accessibility of the airport. The third one does not so much depend on the regional features of the airport itself, as on the presence of a main carrier on the airport, the quality of connections and on the position of the airport in the broader airport system.

Of the above factors that determine demand, the accessibility of the airport both in its local urban area and in the air transport networks plays an extremely important role since cost and time savings are dependent on this factor. Because transport costs (both monetary and time costs) are major determinants of spatial interactions (Rietveld and Vickerman, 2004), a new airport investment may become a very important transport node if it can help reduce costs and duration of travel.

A new airport can result in cost and time savings for passengers both in their air travel and in their journey to and from the airport. The latter form of cost and time savings are becoming increasingly important in expanding metropolitan areas where travel distances increase especially if there is one single airport in the metropolitan area. Hence, many large metropolitan areas in the world tend to invest on second or third, fourth airports with a view to create a multi-airport system. Secondary airports can help penetrate additional areas (residents, jobs, activity centers, etc.) and attract new air passengers. Equally importantly they can direct some of the existing passengers to the new airport, hence relieving congestion in the first and primary airport as well as providing significant cost and time savings to the nearby settlements, and also to the overall economy.

In addition to such transportation benefits as cost and time savings and relief in air traffic congestion, the second function of a new airport concerns the role they play in, and the interactions with the regional economy (Kramer, 1988). The activity in the airport such as the number of flights and the number of people working in the airport area may have an important impact on the region as a whole.

Within the above framework, this study focuses on Sabiha Gökçen International Airport, the second airport of İstanbul, located between TEM and E 5 motorways at Pendik. The construction of the airport started in February 1998 and was completed in January 2001 and it has been in operation since then. Sabiha Gökçen International Airport has an initial capacity of 3.000.000 international, 500.000 domestic passengers per year and 90.000 tons of cargo capacity per year.

The main aim of the study is to understand the initial transportation benefits of the Sabiha Gökçen International Airport investment. In particular, the study focuses on three areas of transportation benefits: contribution of Sabiha Gökçen International Airport (the secondary airport) to Atatürk International Airport (the primary airport) particularly in terms of congestion relief; cost and time savings for air passengers (particularly those living nearby), and finally changes in air mobility in the city and especially in the settlements that have a closer to the proximity to the new airport (i.e. Anatolian side of İstanbul).

Following this main aim, the objectives of the research are;

- To assess and understand the current and potential role of Sabiha Gökçen International Airport in the multi-airport system of İstanbul
- To understand the contribution and significance of Sabiha Gökçen Airport to İstanbul and particularly the Anatolian side, in terms of air travel mobility as well as savings in cost and time
- To assess the usage of the airport by analyzing the current customer profile, which is expected to help understand the spatial aspects of the current demand (i.e. residence and workplaces of the users, an other spatial or non-spatial reasons for their airport choice)

In order to attain these objectives, the main research of this thesis is designed to include a thorough analysis of the air traffic data in İstanbul, measurement of the

transportation benefits of the Sabiha Gökçen International Airport in terms of cost and time savings, a passenger questionnaire conducted at the Sabiha Gökçen International Airport, and an interview with the operator of the airport.

In the following chapter, Chapter 2, which provides an overview of airports and air transportation, the theoretical framework of this study is presented. Firstly, it provides information on the historical background of airports starting from the first generation of airports, traditionally situated in isolated locations within suburban areas, to the contemporary airports, which acquired huge capabilities not only in terms of foreseen air traffic but also of accommodating non-aviation activities. The chapter shows the transportation benefits which are the services that a community hopes to obtain by developing and maintaining an airport and the economic impacts that measure the importance of airports in the aviation industry in terms of the employment they provide and the goods and services they utilize. The interaction between the airport and urban environment is pointed out in terms of the spatial dimensions as the airport itself, the sector of the airport and the airport's region. The chapter also provides an overview of previous studies on impacts of airport investments.

Chapter 3 focuses on the concept and systems of multi-airport operation, and discusses expectations from a successful multi-airport system and justifications for investing in a second airport to create multi-airport systems. The discussion reveals that a major factor for the success of multi-airport systems is that they must exist in metropolitan areas with a high level of airline and passenger traffic. The experiences of the multi-airport system in London and in Washington are presented in this chapter.

The Fourth Chapter presents the research methodology. Framework of research, research questions and methods are presented in this chapter. Information about the the case study analysis is provided and explained. The research questions focus on the case study in order to assess the contribution of Sabiha Gökçen International Airport in terms of accessibility and mobility in the region it serves and in the multi-

airport system of İstanbul. Analysis of air traffic data, passenger survey, methods of measuring savings in time and cost and the interview with the operator of Sabiha Gökçen International Airport are presented as the main methods of the research.

General information about the case study, Sabiha Gökçen International Airport, is presented in the Fifth Chapter. The background for the development of the airport and the Advanced Technology Industrial Park is described. It is shown that the airport is one of the components of a larger development project that includes an industrial park, social and commercial zone, technology institute as well as the airport covering 1300 hectares of land that has been expropriated by SSM for the needs of this project.

In the Sixth Chapter, an analysis of air traffic in Turkey is carried out with a special focus on İstanbul. First of all, the rank of the world airports is compared to Turkish airports through the basic indicators which are the movement of aircraft, passengers and cargo. The trends of air traffic volume are discussed in the well-known Turkish airports and in İstanbul. The total number of passengers, aircraft and total cargo and the changes in these indicators in the last two years period are shown in this part of the study. The key findings are revealed through the special focus on the data which are in monthly. Assessing the rate of change and the mobility of passengers by month provide an insight into the development of air transport demand in both Atatürk International Airport and Sabiha Gökçen International Airport. The analysis also helps assess whether the latter airport have been significant in air transportation in İstanbul and have helped relieve air traffic congestion in the former one.

The Seventh Chapter presents the results of the questionnaire, which has been applied to the domestic passengers at Sabiha Gökçen International Airport. The main findings of this questionnaire have made essential contribution to this research. The chapter also includes the evaluation of the interview with the operator of the airport, HEAS, which is responsible for ground services, cargo, parking, fire service, air traffic control and all the other essential airport services.

In the final chapter of the thesis, the summary of the thesis is provided together with the methodology and findings of the research. Main conclusions are presented and thoughts are offered for future research.

CHAPTER II

AIR TRANSPORTATION: OVERVIEW OF AIRPORTS

II. 1. The Historical Background of Airports

At the beginning of the 20th century, the first generation of airports, generally called aerodromes, served as transport facilities strictly devoted to insure the maneuvering operations for airplanes (take-off, landing, parking, etc.) through runways and annex installations.

Aerodromes were traditionally situated in isolated locations within suburban areas, and the only aspect linking an airport to its city was a rapid road which lead directly to the urban center where major functions were concentrated. On the other hand, the management of airports was undertaken directly by the central governments, while the access to air traffic was restrained to limited and distinctive categories of the society (officials, businessmen, professionals, etc.) (ADEF, 1999).

After the World War II, new airports were constructed and many of existing military aerodromes around the world were converted to civil airports creating the second generation of airports. This shift coincided with two other major trends: 1) the beginning of metropolitanization of cities where suburban areas, including airports' sites, joined the urban agglomerations; consequently, major activities dispersed throughout the metropolitan territories. 2) the democratization of air traffic for ordinary citizens, which followed a formidable revolution of air transportation industry through the introduction of jet airplanes with much higher capacities and requirements.

The first generation of airports (Croydon in London , Le Bourget in Paris, etc.) has given rise to great spatial difficulties as a result of progressive air traffic

requirements, thus, platforms of this generation were, generally, converted to other exploitations. At the same time, many of airports of the second generation knew how to adapt successfully their sites and continued to develop their activities (Frankfurt, Amsterdam and Zurich, etc.), while other airports have reached their limits of saturation after several years (Gatwick in London, Orly in Paris, etc.).

Mirabel in Montreal, Dallas Fort-Worth in Texas, Roissy Charles de Gaulle in Paris, Narita in Tokyo can be given as examples of the third generation airports. They have been constructed in the 1970s. Experts call airports belonging to this third generation as gigantic airports. Common characteristics explain the main features of these gigantic airports: (ADEF, 1999)

- 1) sites are extremely vast (7200 ha at Mirabel-Montreal, 6500 ha at Dallas Fort-Worth),
- 2) locations are significantly far from urban centers (66 Km at Narita-Tokyo, 50 Km at Mirabel- Montreal),
- 3) platforms acquire huge capabilities not only in term of foreseen air traffic but also of accommodating non-aviation activities,
- 4) planning of airports are well linked –from the beginning- to the planning of their regions.

II. 2. Airport Investments: Impacts and Benefits

Policy makers and transportation analysts often emphasize investments in transportation infrastructure as a highly effective means to promote economic development. Investments in transportation services and infrastructure may contribute to the economic activity of a region by reducing business operating costs and increasing business productivity, expanding the size of labour markets and increasing business access to needed supplies, services and materials. All businesses require some level of transportation access to labour, materials and customers in order to operate and survive.

Construction of an airport is a large scale investment which brings high economic profit to the region and enables people to overcome the distance between places.

Airports are important because they provide significant transportation benefits and give rise to economic impacts. Transportation benefits are savings in travel cost and travel time as well as the services that a community hopes to obtain by developing and maintaining an airport. Economic impacts measure the importance of airports in the aviation industry in terms of the employment they provide and the goods and services they utilize. Airports are the necessary means of connecting communities to world markets. Below, we elaborate further on transportation and economic impacts.

II. 2. 1. Transportation Benefits

Investments in transportation infrastructure and services increase mobility and access. A well-designed multimodal transport network helps overcome distances. This is called greater mobility. Reaching desired social and economic activities by the help of the transport network is called better access.

Better access results in higher spatial interaction. One of the major factors leading to higher spatial interaction as a result of a transport investment is the savings in travel time and travel cost, which together make up “generalised cost” of travel. It is known that “transport costs are a major determinant of spatial interactions, such as trade, tourism, commuting, and possibly migrating” (Rietveld and Vickerman, 2004:7). Transport costs have decreased significantly over the years with continuous improvement and innovation in transport technology. Perhaps one of the most significant reduction in generalised transport costs took place in time-cost of travelling with the introduction of, and improvements in, air travel.

Value of time increases with income, hence the weight of the travel time component in generalised transport cost increases too (Rietveld and Vickerman, 2004) resulting in more significance attached to savings in travel time. This makes investments in high-speed transportation, such as motorways, expressways, high-speed railroad and

airports, particularly important for mobility. Such high-speed transport investments have increasingly higher effects on mobility levels due to the time savings they offer. That is why a major transportation benefit of a new airport is likely to be the time saving it can provide in relatively longer-distance travel.

While time-saving aspect of air travel is generally considered as one of the main transportation benefits of air transport investments, monetary cost of travelling by air has also become an increasingly important aspect, with recent developments in air industry. Air travel is becoming increasingly affordable to larger numbers of people. Plane fares have decreased significantly throughout the world, and especially in Europe, resulting in fares comparable to land transportation. Hence, an investment in air transportation, such as a new airport, may help reduce even the monetary cost of travel, particularly long-distance travel.

In addition to the time and cost savings offered by air travel as a result of a new airport, the introduction of a new airport also provides savings in the travel to and from the airports. This is one the reasons why policies to increase regional airports are supported in many countries (see DFT, 2003) and multi-airport systems are being introduced in many large metropolitan cities. Secondary or tertiary airports in metropolitan areas or regional airports as alternatives to main hub airports are being developed with the expectation that they will have transportation benefits, such as the reduction of the need for long-distance travel to and from airports (DFT, 2003). Hence a new airport has also transportation benefits regarding the time saved and cost avoided for the journey to and from the airport, which is likely to exist as a result of using the new airport as opposed to a more distant one (within the city or the wider region).

In addition to their time and cost saving benefits, new airports, particularly regional airports or secondary/tertiary airports in multi-airport cities, can help relieve congestion at central, primary and more-overcrowded airports. Relief of congestion would be a benefit not only for the airport operator by helping to run a more effective service but also for the passengers by eliminating delays resulting from over-

crowding. This form of transportation benefit will be discussed again in the next chapter that focuses on multi-airport systems.

Other transportation benefits of air travel are those related with the characteristics of air transport relative to other transport modes. In addition to the speed resulting in significant time savings, comfort and convenience can be important benefits especially if a new airport helps relieve congestion in air travel and creates a improvement in the access to and from the airport. Another important category of benefits derived from investment in airports is the improvement in service reliability and predictability (Jorge and Rus, 2003). It is also known that aviation provides higher travel safety as opposed to road transportation.

To summarise, airports, as being the infrastructure of air transportation, provide a variety of public benefits to the surrounding service areas. The most substantial of these are the time saved and the time cost avoided by using air transportation (FAA, 2000). Savings in time and cost of transportation, in return, bring other benefits in terms of both passenger transportation and cargo movement. These are elaborated below.

From the perspective of passengers:

Air transportation allows an average citizen to reside anywhere around the world and still reach their destination faster than any other mode. People travel for various reasons including business, tourism, family vacations, weddings, other celebrations and events, work, convention or just to keep in touch. All this can be accomplished with aviation that offers significant savings in travel time, and in many cases in monetary cost of travel, particularly long-distance travel.

Air transport also contributes to enhancement of community well being by improving living standards through widening choice: Cheaper and more frequent access to air travel has increased the range of potential holiday destinations. It also increases understanding of different cultures and nationalities which facilitates closer

international integration. The large number of overseas visitors has also helped widen the range of leisure and cultural activities available in many countries.

Regional airports and other airports of multi-airport systems also help widen the choice for passengers. Such regional alternative airports provide passengers greater choice (Darling, 2003), that is choice of different airports that present different levels of convenience for passengers with different needs.

Finally, airports can be convenient venues for business activities. Airports that offer convenient schedules to and from multiple destinations are efficient meeting venues for government officials, executives, managers and decision-makers to whom time is of great value.

From the perspective of air cargo:

Cargo transported by air tends to be high in value and a time sensitive operation. Some of air cargo's key commodities are electronic equipment, machinery and parts, scientific instruments, live animals, pharmaceuticals, perishable products, textiles and overnight packages (O'Connor, 1995).

Investments that improve the speed and the reliability of transport networks create the scope for maintaining prompt delivery to customers without the need to stockpile. Thus, producers value transport network improvements for their potential to reduce not only transport costs but also logistics costs generally. The producer requires transport networks that are sufficiently reliable to ensure just-in-time delivery (Byelyayev, 2002).

As the global trend towards electronic commerce continues, air cargo plays an increasingly important role in airport development and consequently an important role in regional economic development.

Measuring Transportation Benefits: Savings in Time and Cost of Travel

Airports provide a variety of public benefits to the surrounding service areas and the most substantial of these are the time saved and cost avoided by using air transportation. These transportation benefits can be expressed in a monetary unit whereas, other benefits which include the high levels of safety, comfort and convenience of aviation, access to the national and international airport system, inbound tourists and enhancements to community well-being, can not be expressed in a monetary unit but they can be demonstrated by examples.

The time saved and cost avoided by travelers are the primary benefits of the reliever airports in metropolitan areas. The following procedure, which is adopted from FAA, measures the value of time saved and cost avoided by travelers as a result of a new airport located at point A (see, Figure II.1). The alternative airport which is the primary airport, is located at B, a farther distance from the point O where the trip originates, and the destination point is D. Passengers want to travel from O to D. There is a significant difference between the time saved for O-B-D trip and the time saved for the more direct O-A-D trip by using airport A. The benefit is the time saved per trip times the number of passenger trips, all multiplied by the value of the passenger's time. There is also a benefit as a result of reduced ground travel costs, since airport A is closer to the origin of trips than airport B. The flight distances (x, y) are the other factors that affect the benefits of the alternative airport.

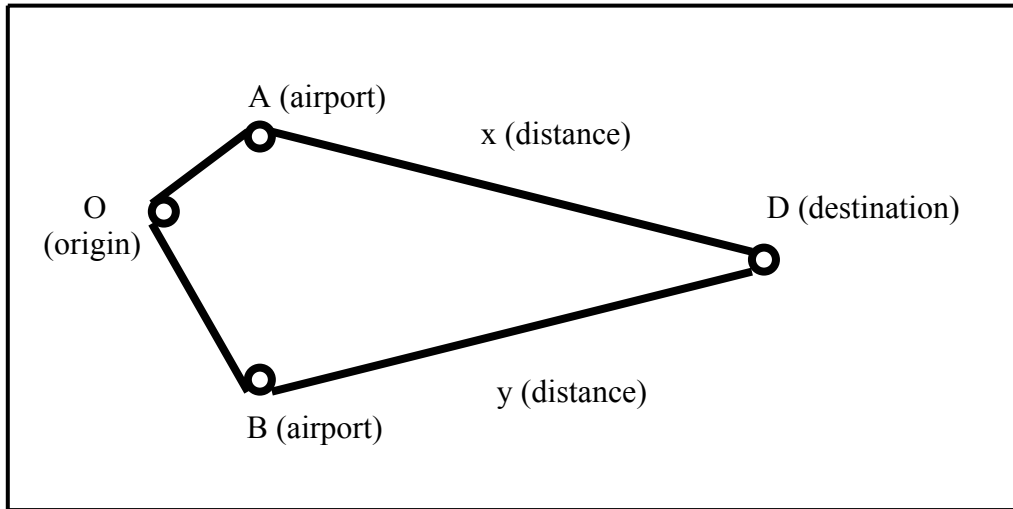


Figure II.1. Transportation Benefit of an Airport

Total Benefit = Time Saving + Travel Cost Reduction

Time Saved

O – B – D time : $b/s + y/S$

O – A – D time : $a/s + x/S$

Annual Benefit :

$v \cdot (\text{annual passengers}) \cdot (OBD - OAD)$

Reduced Travel Cost

O – B – D time costs : cb

O – A – D time costs : ca

Annual Benefit :

$(\text{annual ground trips}) \cdot (OBD - OAD)$

$\underbrace{\hspace{15em}}$
 TOTAL ANNUAL BENEFIT

Table II.1 Transportation Benefit Variables

Variables	Symbols
Ground access distance to airport A (km)	a
Ground access distance to airport B (km)	b
Car speed (km)	s
Car costs, including amortization (YTL / km)	c
Passenger time value (YTL / hour)	v
Three additional variables (If $x \neq y$)	
Direct flight distance from origin airport A to destination airport D	x
Alternative airport B to destination airport D flight distance	y
Aircraft speed (mph)	S

Source: FAA, 1992

II.2. 2. Economic Impacts

The term "economic impact" is commonly used to describe what is more accurately the "economic contribution" of an industry or activity to regional and national economies. The economic impacts of an airport are assessed by looking at the full extent of the airport's impact on the local, regional and national economy, from the actual movement of passengers and cargo, to the stimulation of economic growth that the airport's presence can cause in a local situation. These overall economic effects are measured in total jobs, wages, economic activity, etc., which are interrelated benefits to people and economies in the regions and nations.

Types of Economic Impact:

Total economic impacts are derived from the sum of on-airport impacts, visitor spending, and spin-off impacts. In addition, airport dependent impacts are provided to show the importance of each airport to the business community. Each type of impact is defined as follows: (EDR Group, 2003)

On-Airport Impacts represent economic activities that would not occur if the airport did not exist. They include payroll and operating expenditures made by the airport, airlines, maintenance facilities, ground transportation, etc.

Visitor Spending represents financial transactions that occur primarily off-airport and are associated with visitors to the area. The principal measure of visitor spending impacts are expenditures made in the regional area by air travelers who are visiting from outside the region. These expenditures may include items such as lodging, food, entertainment, and retail purchases.

Spin-Off Impacts (Multiplier Effect) are calculated using impact multipliers, which are used to reflect the recycling of money through the economy. A dollar spent in the economy does not disappear; rather, it continues to move through the local economy in successive rounds until it is incrementally exported from the community.

Airport Dependent Impacts represent area businesses that are dependent on an airport for just-in-time shipping, a high degree of corporate travel, or specialized airport facilities and services. These businesses would relocate or suffer substantial loss if the airport were not available.

In addition, total impacts which are mentioned above, can be classified as direct, indirect and induced impacts generally. On-airport impacts and airport dependent impacts are the direct impacts carried out at the airport by airlines, airport management, fixed based operators and other tenants with a direct involvement in aviation. The distinguishing feature of a direct impact is that it is an immediate consequence of airport activity. Visitor spending is the indirect impact resulting from successive rounds of spending in the local community. Spin-off impact is the induced airport impact realized through the spending of the direct and indirect employees briefly.

Measures of Economic Impact:

Each of the four impact types is measured in three ways - jobs, wages, and economic activity.

Jobs represent the total number of individuals employed. A job may represent either a full- or part-time position.

Wages are the full payroll expended for employees, including all taxes and benefits.

Economic Activity represents business sales. For government or non-profit entities, economic activity represents their annual budget. For visitor spending, economic activity represents visitor expenditures.

In addition, airports generate wealth, employment and taxes. For instance, in the U.S. Airports are responsible for nearly \$507 billion each year in total economic activity nationwide and the total economic impact of airports on the labor market is 6.7 million jobs. This includes 1.9 million jobs directly related to airports and another 4.8 million jobs indirectly created in local communities. The total jobs translate into earnings of \$190.2 billion. Finally, they generate \$33.5 billion in local, state and federal taxes (ACI, 2002).

The types of economic impact and measures of it can be summarized at Table II.1 below.

Table II.2. Summary of the Economic Impact

Economic Impact	Types of Impact	Measures of Impact
Direct Impact	* on-airport impacts	* Jobs
	* airport dependent impacts	
Indirect Impact	* visitor spending	* Wages
Induced Impact	* spin-off impacts	* Economic activity

II. 3. Interaction between the Airport and Urban Environment

Another important areas of impact of airport investment is on the urban area. The strong link between transport and land-use is well known, and the land-use impact of transport investments is well documented particularly for investments, such as roads, motorways and rail systems. Airports can also have significant spatial impacts.

Three spatial dimensions could be determined in order to better appreciate the different levels of interactions between the airport and its urban environment:

- The airport
- The sector of the airport
- The airport's region

II. 3. 1. The Airport

Often, airports are perceived as entities with their own rules, their own dynamics, their own legitimacy, that are beyond the control of local and regional authorities. But a closer inspection reveals that the parameters have changed. Today, airports are far from being closed entities. Although the prime task remains to guarantee the efficiency of the core business of the airport (air traffic), the airport domain does not only consist of runways, aprons and terminals; but includes major real estate development and a multimodal interchange node “air, rail, road”. To balance airside and landside, airports are forced to develop an overall master plan.

At present, three categories of activities can be distinguished at airports, with more or less direct relation to air traffic:

- **core business**: activities that are part of the technical operation of the airport, directly supporting the air traffic function. They are also called aviation activities, such as: airline handling, passenger transport, freight transport, and related commercial activities.

- **airport related or ancillary activities:** activities that have a direct relation to airfreight or air passenger, such as: logistic and distributions activities or hotels.

- **airport-oriented activities:** they choose the airport (or its immediate vicinity) due to the prestigious image of the airport and its excellent landside accessibility from other regional development sites : offices, conferences, exhibitions,....

The latter two categories of activities could be subsumed under non-aviation activities. Their impact on airports as job creators is also significant.

The three categories of above-mentioned economic activities generate tens of thousands of jobs on the platform. Employment depends on the volume of aviation activity at an airport, which is determined not only by the population of the region it serves, but also by the airport's air service function. The number of commercial flights and the mix of locations served by them. The ratio of annual airport passengers to regional population (for N. America and W. Europe) ranges from as high as 11.2 for Charlotte, NC, USA (a regional hub airport) to as low as 0.3 for Cologne, Germany (a local origin/destination airport). The ratio is much lower for developing countries (Weisbrod, 1993).

At western Europe airports, it is considered that every million passenger per year generates an average of 1150 jobs on airport. For example, there are 60000 jobs on Heathrow London, 42000 on Frankfurt, 38000 on Roissy CDG-Paris. On its turn each job on the platform induce an equivalent of 1 to 2 jobs in the region (Guller, 2001).

Nevertheless, these growing activities call for more and more spatial capabilities within the airport perimeter. The size of the platform starts to be measured against the elasticity required for the operation of an airport and the increasing ambitions to accommodate extra businesses and non-aviation economic activities.

Airports apply different strategies aiming at overcoming this dilemma by acquiring more lands both to extend airport capacity and to provide operational flexibility while accommodating additional facilities:

- **expansion** of the territory of the airport, in abundant quantities not only to provide new maneuverability and extra airside capacity, but also to include new sites for non-aviation activities within the perimeter. This situation exists for example in **Barcelona**-Spain, **Arlanda** Sweden and **Helsinki**-Finland. Due to legal mechanisms, co-ordination with local authorities, in this case, is not necessary.

- **outsourcing** of some core business activities from the center of the platform to the immediate airport surroundings in order to allow further expansion of the terminals and for additional profitable business activities. The experiences of **Schiphol**-Amsterdam and **Zurich** are important at this point, where long term parking and freight handling or catering are relocated to the surroundings of the platform. This sometimes requires a major infrastructural effort as in Schiphol, where remote cargo areas are connected to the platform and to air-rail service center for freight, by an automated 5 km long underground logistic system (ULS).

- **collaboration** with local / regional authorities beyond the proper airport boundaries to guarantee space for airport-related activities in the vicinity of the airport that are crucial to the success of the freight operation. For example, in **Frankfurt**, the airport launched a joint venture with the Hoechst industrial company, to develop extra logistic activities on a former production site of the latter. Within the **Schiphol** area development company , the airport and local/regional authorities co-operate in the development of specifically airport related activities (mostly logistic activities) on different sites in the immediate vicinity of the airport, provided with direct access (ring road) to the platform (Guller, 2001).

All the land-use mechanisms on and around the platform, switching-off positions, intensification of land-use on the platform, platform expansion, outsourcing, and the collaboration on sites beyond (but directly linked to) the platform, make the

arrangement, functionality, and connection of all airport-related areas and activities increasingly difficult. Today, The International Airports reach unseen levels of spatial complexity on their entire territories due to, on the one hand, the necessity to safeguard optimal performance of their progressive core business (air traffic) and, on the other hand, the accommodation of new efficient dispositions of related-activities on and around their platforms. Airport site planning is steps away from purely “technical airport planning” towards including fundamental aspects of urban design.

II. 3. 2. The Sector of the Airport

It is difficult to define concrete spatial borders which could set the limits of the so called “sector of the airport”. In effect, these borders are changeable, and depend largely on the specificity of each airport and of its relationship with the urban context: dimension of the airport, volume and nature of air traffic, importance and richness of the region, geographic position of the airport within the regional framework, availability of lands, quality of road/railway networks, etc..... However, it could be observed that, in many airports, within a zone of 5 to 10 km distance from an airport site boundaries, the urban structure of the area is heavily influenced by the presence of the airport. The attraction of business activity and land development to the vicinity of airports may take 5 to 20 years (or more) to develop. The timing and magnitude depend not only on airport and air service attributes, but also on factors of local access, metropolitan economic characteristics and land development patterns (Weisbrod, 1993).

According to the analogy between airport sectors, especially in European and North American metropolitan areas, five main categories of economic activities with major impacts on land uses, could be distinguished in relation (more or less) to the air traffic generated by the airport:

- **outsourced airport activities** that are forced to leave the platform, as we mentioned before, when the perimeter of the airport gets tight and proves incapable to accommodate further required expansions of its core activities or profitable

businesses. This action concerns, normally, freight zones and catering centers as well as long term parking area. At Gatwick-London, for example, more than 20.000 parking places are relocated outside the airport and directly linked to the platform.

- **hotels and related services** such as restaurants and commercial/shopping centers. Part of these activities is related to the volume and the type of air traffic generated by the airport, but also to the multiplier effect due to the existence of other airport related or oriented activities. The hotel stock in the sector of Roissy-CDG airport represents 5% of the total number of rooms in the region “Ile de France” and 10% of the total number of rooms of high standard hotels (IAURIF, 2001).

- **International commercial/business activities** which find a great deal of interest to be implemented in the sector of the airport, for instance: exhibition centers, congress and conference centers, communication and training centers for multi-national corporations...these attracted business activities do not rely directly on the airport for their operation, but which value location near an airport because of its prestige, air services and accessibility of location for visiting customers and employees coming by air. There are some similarities, but also significant differences, in the overall mix of business activity attracted to the areas surrounding specific airports. In common among airports were high concentrations of air transport services, freight forwarding, warehousing and high-tech oriented businesses with products having a high value-to-weight ratio.

- **tertiary activities**, where multi-national companies are particularly responsive to localize their antennas or even headquarters in the vicinity of the airport sites. This choice offers greater flexibility and mobility for companies employees and clients, as well as, better communication with their dispersed production sites. Stockley park near Heathrow and Paris-Nord II near Roissy-CDG (315 ha) are significant examples of these office stock around the airport sites (Guller, 2001).

- **logistic & distribution centers** due to the new mechanism of international exchanges where the inter-modality of transportation networks is crucial for the

performance of the production system in metropolitan areas. As mentioned before, the transportation node (air, rail, road) which many of international airport sites offer, represents a governing factor regarding the progress of these activities inside the sector of the airport.

Today, the sector of any international airport represents major economic pole for its region. For instance, the sector of Roissy-CDG accommodates 2000 ha of activities belonging to the five above mentioned categories. This area corresponds to 16% of the regional market and is assumed to be the most dynamic among the equivalent areas in the region “Ile de France” (it expands at a rate of 80 to 90 ha per year) (IAURIF, 2001).

However, the sector of the airport (as any other sector in the metropolitan area) contains also urban/residential zones with all traditional related services and facilities. The question of how to manage the sector of the airport remains a complicated issue. There are different actors: Airport authority, municipalities around the airport, regional authorities, and investors (public and/or private). Each actor has its own interest and strategy as well as its spatial/temporal level of involvement. The establishment of a coordinating framework, which elaborates development schemes based on an equilibrium of interests is, therefore, a must for the sustainability of the vital role of airport’s sector within its region.

II. 3. 3. The Airport’s Region

Subsequent to the above-mentioned analysis at platform and local levels, one should underline the wider context of impacts which is the whole metropolitan area. The question is whether the planning of the airport becomes effectively a matter tightly linked to the regional/urban planning?

Airports have become major assets for their regions, and their related activities are important motors in the respective metropolitan economies. At the same time, the market for airport-related activities is a global market where the choice is not made

between one or another pole in a certain region , but between different regions as such. This reality explains the distinctiveness of development forms related to airport's business from that of Central Business Districts (C.B.D.) or of other existing poles in the metropolitan areas.

As mentioned above, the airport-related economic effects and benefits are not limited to the airport territory, but are spread out over larger territory. Many regions have shown a successful insertion of concentrated airport-related activities on and around the platforms where the so called "sector of the airport" takes shape. This is not contradictory with possible remote forms of airport-related developments in other sectors of the metropolitan area due to contextual historic, real estate, or economic factors.

Yet, In some regions, there is an apparent disparity between strongly airport-related economic activities and the existing local economic structure around airport's site. In this case, the bulk of airport's spin-off is not necessarily located within its sector, but can also be accommodated in disperse sites throughout the region with good and fast access to the platform, contributing to a more even development balance.

A study concerning the regional localization of airport related economic activities in nine European metropolis, has shown the inclination from one region to another towards, more or less, one of the two following trends:

- **Nearby:** where strategic land reservations are available around airport's sites, sustained by cooperation with local communities and/or

- **Further away:** where regeneration throughout the metropolitan area takes place, with good and fast access to the platform

Experiences in Amsterdam, Helsinki, Zurich (relatively, nearby option) or those in Gatwick, Malpensa (relatively, further away option); show that there is a need to find a good balance between concentrating a certain kind of program close to the airport

(selective programming) and distributing other airport-related program in the wider surroundings throughout the region with good and fast access to the platform. In order to avoid spontaneous forms of development (due to autonomous initiatives of developers), this matter has to be, with no doubt, the responsibility of local/regional planning authorities, with the consultation of Airport's authority.

The metropolitan transport system: Airports, once erected at the fringe of urban areas, today lie in heavily urbanized areas along some of the most intensively used thoroughfares of the metropolitan regions. The capacity of the same roads that provide access to the airport is often exhausted by everyday commuter traffic. Given the importance of the situation, initiatives have been implemented in many regions to improve the attractiveness of public transportation for various users of the airport (passengers, employees, and visitors).

At the contemporary airport, a multimodal interchange node evolves, offering connections between different modes of landside transport on nearly every scale. Consequently, the airport site does not only provide transit from landside traffic to air traffic. Transfer between the different landside networks for non air traffic purposes becomes ever more attractive, as the networks of high speed trains, national railways or coaches, and of local and regional public transportation converge at the airport.

These opportunities have made the airport the second main railway stations of the regions. To achieve integration of all means of landside transport, major efforts have been made on these airports not only to connect each mode well to the air terminals but also to establish direct convenient interconnections between landside modes. The interchange function on airports, and its beneficial effects on transport networks in the region (an improved public transport offer and additional connections) necessitates the co-operation between transport providers, the airport operators and even airlines. This co-operation will guarantee the optimal transfer of passengers from one mode to another on the huge airport site with its multiple spots of traffic generators.

In comparison with other poles in the metropolitan areas, the international airport sites could be considered as one of the best accessible public transport nodes and will improve further in the future. Now it is crucial to anticipate the potential added value such an interchange node can have not only for its local urban benefits but also for the further development of the metropolitan area and the airport's role as a regional development pole.

II. 4. Previous Studies on the Effects of Airport Investments

While estimating the regional economic significance of airports, its transportation benefits and its economic impact are the two primary measures of an airport's importance. Transportation benefits, such as time saved, cost avoided, and congestion relief are generally covered in studies of Cost-Benefit Analysis (CBA) of airport investments (see Jorge and Rus, 2003). It is a universally common approach to measure such transportation benefits in CBA or other feasibility studies during the planning of new airports.

As for the assessment of impacts after an airport is built and started to be operated, studies generally focus on economic impact. Such economic impact studies are generally used for evaluating the direct, indirect and induced effects of airports. Some selected case studies are presented below to provide an understanding of how economic impact analysis are handled and what their requirements are.

II. 4. 1. Amsterdam Schiphol Airport

Amsterdam Schiphol Airport in Netherlands was studied by Hakfoort J. , Poot T. , and Rietveld P. They investigated the impact of Amsterdam Schiphol Airport on the Greater Amsterdam Region through means of an extended input-output model. This model makes it possible to investigate possible forward and backward linkages on the regional economy, the rest of the Netherlands and imports/exports. Backward linkages indicate how many suppliers to the airport benefit when the activity on the

airport grows. Forward linkages indicate how much the region benefits from the proximity of the airport in terms of location.

An extended input-output model is used to calculate how many jobs are created in a region when a sector such as airport activity grows and how this affects production, income and employment in the three areas.

The result of the study indicate that the total multiplier of direct employment on Amsterdam Schiphol Airport is approximately 2: one job on the airport leads to approximately one job in both indirect and induced employment (Hakfoort, 2001).

II. 4. 2. DeKalb Peachtree Airport

Another airport economic impact study was carried out for the Chief Executive Officer and Board of Commissioners of DeKalb County, Georgia by RKG Associates Inc. in 1997. DeKalb Peachtree Airport is the second busiest airport in the State of Georgia, being in its number of operations only behind Hartsfield Atlanta International Airport. Its location which is only 8 miles (12,8 km) from the heart of downtown Atlanta makes it the airport of choice for those operators of corporate, business, and general aviation aircraft visiting the Atlanta area.

The purpose of the study was to provide the results of a Cost Benefit analysis of the DeKalb Peachtree Airport, which is located in the northern portion of DeKalb County, Georgia. The objectives of the study were:

- 1) analyzing the contribution of the Airport to County residents and businesses;
 - 2) quantifying the fiscal benefit to the City of Chamblee and DeKalb County,
 - 3) evaluating the real estate and related fiscal impacts as a result of Airport noise;
- and
- 4) assessing the likely costs and benefits of alternate development scenarios for the Airport.

These alternate scenarios included:

- continuation of the present Airport operations;
- expansion of the Airport;
- reduction in the scope of Airport operations; and
- closure of the Airport and redevelopment of the property.

The methodology used in this study consisted of a review and evaluation of the Airport operating and capital budgets; interviews with Airport tenants, aircraft owners, and Airport visitors; conducting a real estate market analysis for the northern portion of the County; reviewing the results of prior Airport impact studies both in the County and elsewhere around the U.S.; surveying County businesses, real estate brokers and real estate appraisers; conducting an analysis of real estate and building permit trends in neighborhoods within close proximity to the Airport; and estimating both the direct, indirect and induced economic impacts of the Airport through the usage of an input / output model.

The cost benefit analysis of four alternatives evaluated as part of this project included: (1) continuation of the present Airport operations; (2) expansion of the Airport; (3) reduction in the scope of the Airport and (4) closure of the Airport and redevelopment of the property.

Both Alternative 1 and 2 remained very viable from both a fiscal and economic cost benefit perspective. Expansion of the Airport to accommodate additional based general aviation aircraft would add to general tax revenues at little cost to the County. On the other hand, analysis indicated that introduction of scheduled air passenger or cargo service at the Airport is economically and financially infeasible for the foreseeable future.

Alternative 3 was difficult to evaluate because it violated a contractual relationship between the County and the federal government. Assuming permission could be granted to downsize the Airport (which would probably take years and could cost millions in legal fees and lost revenues) the end result was likely to have an adverse

impact on the Airport operating budget. It was highly likely that reductions either in Airport capacity or service would result in lost business, which would cause the Airport to lose money on an operating basis and require subsidization from the County. In turn, these operating losses would make it increasingly difficult to fund the planned land acquisition or the sound insulation programs, both of which required a 10% local match which had historically been funded out of the Airport operating budget.

The final alternative evaluated, closure and redevelopment of the Airport, could cost the county an estimated \$20 to \$25 million in redevelopment expenses, even before financing costs were calculated. In addition, although the fully redeveloped property would create a new tax base to replace the current one being lost, the process was likely to take 15 or more years. During this time, substantial losses in tax revenue would be incurred. While industrial redevelopment could create employment levels comparable to those currently being generated as a result of the Airport, the County was likely to experience some turmoil in the economic base as the project matures over a 15-year or longer time frame. Also, the transitional period was likely to be painful, as an estimated 7,300 existing jobs would either relocate or disappear as firms go out of business.

In summary, the DeKalb Peachtree Airport is an important component of the economic base in both DeKalb County and the region, and it makes a strong contribution both fiscally and economically to residents of the County (RKG, 1997).

II. 4. 3. Athens-Ben Epps Airport

In addition to the study of DeKalb Peachtree Airport, there is another impact study in the State of Georgia, the Athens-Ben Epps Airport. Athens-Ben Epps Airport is named for Georgia's first aviator, Ben T. Epps Sr. , who began building and flying airplanes in Athens in 1907 and opened Ben Epps Airport in 1917.

As part of efforts to examine the economic role of the Athens-Ben Epps Airport, the administration of the Athens-Ben Epps Airport commissioned an economic impact assessment through the Applied Research Division of The University of Georgia Business Outreach Services, Small Business Development Center. The objective of the study was to quantify the employment, income and economic activity contributions of aviation by evaluating the Airport, related businesses, and the visitors that came to the area through the Airport.

Examining the role of the Athens-Ben Epps Airport on the Georgia economy involved answering the following questions: How do the Airport and affiliated businesses impact the community? How many jobs result from the Airport and affiliated businesses? How does this impact translate to activity in the local economy? Answering these questions can help to address how the Airport contributes to the local and state economies.

This analysis served to quantify the direct and “multiplier” effects of Athens-Ben Epps Airport, the economic activity encompassing Airport operations, aviation-related businesses, air travel visitor spending, and the resulting effects from these activities. The study analysed the jobs, income and economic activity resulting directly and indirectly from Athens-Ben Epps Airport (Kane, 2003).

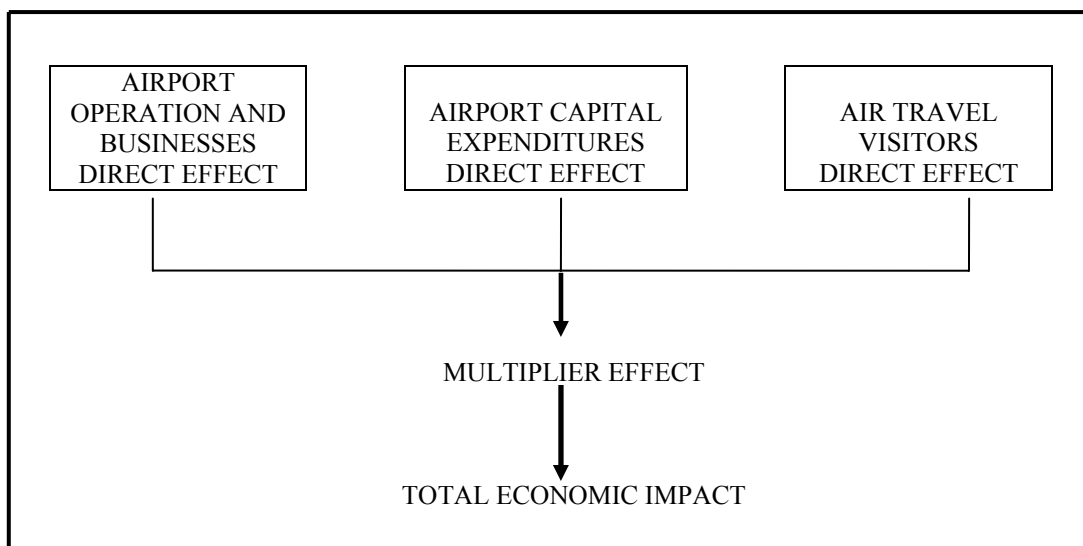


Figure II.2. Impact Category of the Athens-Ben Epps Airport

II. 4. 4. Long Beach Airport

An economic impact study was prepared by the Office of Economic Research, California State University, Long Beach at 2003 on The Long Beach Airport Area Complex. This study measured the economic impact, based on 2003 data, of three study areas. The most inclusive was the Long Beach Airport Area Complex, which is defined relative to geographical boundaries. Within the Complex, they also analyzed two subsets of data, referring to Long Beach Airport Dependent Activities and Long Beach Air Transportation and Related Activities.

Economic impact reports provided a profile of an enterprise or activity in terms of the number of jobs, earnings, and the value of output captured by the regional or national economy. The focus of this study was to estimate the economic activity generated by the Long Beach Airport, including not only activities related directly to air transportation, but also including other activities that take place on the properties adjacent to and surrounding the Long Beach Airport.

There were three main study areas analyzed in this report as mentioned above. The relationship between the three study areas is outlined in the organizational chart below.

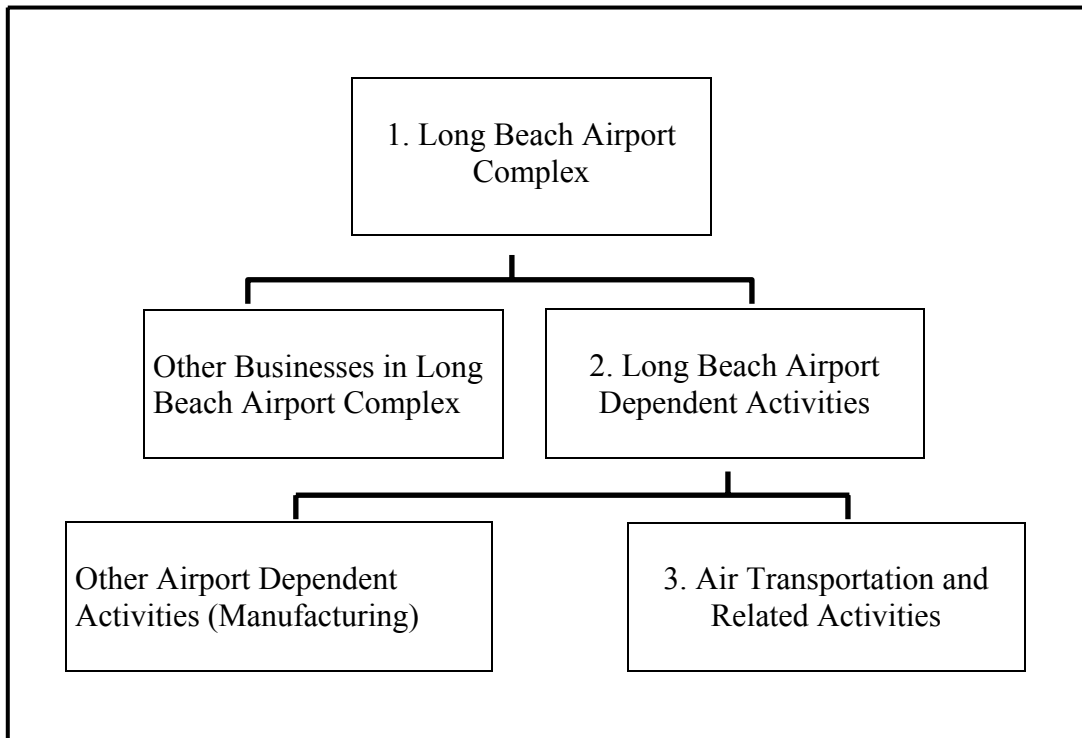


Figure II.3. The Main Study Areas of the Long Beach Airport

The methodology of the study was follows; first of all they collected a detailed database of the firms and enterprises located on the Long Beach Area Airport Complex. In order to generate this database, they relied on a number of different sources including an airport area tenant list provided by the City of Long Beach, data purchased through Info USA, the Long Beach dataset maintained by the Office of Economic Research at California State University, Long Beach; and telephone surveys. Using these sources, they were able to calculate the number of employees, earnings, and the value of output of establishments in the Long Beach Airport Complex.

To study the Long Beach Airport Dependent Activities, they reduced the set of 148 establishments by focusing on the standard industrial classification codes related to aviation and aviation-related activities. There were 84 establishments that satisfied this condition.

To identify the set of firms involved in Long Beach Air Transportation and Related Activities, they again sorted the set of establishments by the standard industrial classification codes related to air transport, airport terminal operations, and ground

transportation operations linked directly to the airport (such as rental car establishments). This sort reduced the number of establishments from 84 to 47.

The calculation of an economic impact involved the specification of direct and indirect consequences associated with the three study areas. The direct impacts are the number of jobs, the earnings, and the value of output generated by these establishments. This direct economic activity, in turn, encouraged other indirect economic activity. To calculate the indirect effects, they used the Bureau of Economic Analysis's RIMS II input-output tables for the regional economy.

As for the direct impacts of the Long Beach Airport Area Complex; there were 148 establishments which generated direct employment of almost 16,000 jobs. Direct employment in the Long Beach Airport Area Complex is highly concentrated in manufacturing (10,925 jobs) and transportation (2,065 jobs) and is associated with an annual average payroll of \$65,273, which is 60% above the average payroll for Los Angeles County. These jobs generated an estimated payroll of slightly more than \$1 billion. These businesses directly generated \$4.1 billion in sales of goods and services.

The most accurate approach to estimating the indirect regional impacts associated with an initial direct impact is with the use of a regional input-output table. An input-output table identifies all of the inter-industry flows of goods and services within a specific region and enables one to translate an initial change in final demand into total regional impacts.

Their indirect impact estimates for the Airport area were obtained by the Bureau of Economic Analysis's RIMS II input-output table for the five-county, Greater Los Angeles area (including Ventura, Los Angeles, Orange, Riverside, and San Bernardino Counties). To apply multipliers from the RIMS II model, they broke down the initial impacts (sales, employment, and earnings) into 39 detailed Standard Industrial Classification (SIC) industry categories. To the impacts in each of these

categories, they applied the corresponding regional multiplier. The impacts by industry were then summed to obtain total regional economic impacts.

It was stated that the economic activity at the airport directly supported 15,940 jobs. As area firms purchased inputs from other regional suppliers, they indirectly supported another 32,145 jobs in the Southern California region, thus directly or indirectly supporting more than 48,000 jobs in the region. Similarly, Airport area firms created economic activity in the region that generated direct earnings of over \$1 billion and total regional earnings surpassing \$2 billion. Finally, the output of Airport area firms, which totaled slightly more than \$4 billion, stimulated an additional \$5 billion of production in the region, thus leading to a total economic impact of over \$9 billion annually.

Table II.3. Long Beach Area Airport Complex

Impact	Employment		Earnings		Output	
	Direct	Total	Direct	Total	Direct	Total
Long Beach Area Airport Complex	15,940	48,085	\$1.04 bn	\$2.29 bn	\$4.12 bn	\$9.22 bn

Source: Grobar, 2003

In order to determine the direct impacts of the Long Beach Airport Dependent Activities, they examined the economic impact of firms in the Complex that were dependent on the Long Beach Airport. They focused on firms that must be located in close proximity to an airport and found 84 establishments. These establishments generated direct employment of slightly more than 13,000 jobs. Thus, the establishments in Long Beach Airport Dependent Activities accounted for 57% of all establishments in the Long Beach Airport Complex and 82% of the complex's jobs. These airport dependent jobs generated an estimated payroll of \$886 million. The 13,000 jobs supported by Long Beach Airport Dependent Activities indirectly supported another 28,000 jobs in the region, leading to a total impact (direct plus indirect) of over 41,000 jobs in the region.

Similarly, as the \$886 million in earnings generated by Long Beach Airport Dependent Activities were spent in the local economy, they led to the creation of an

additional \$1.1 billion in earnings across the region. Thus, regional earnings associated with airport dependent employment totaled almost \$2 billion.

Finally, the \$3.5 billion in goods and services produced in Long Beach Airport Dependent establishments stimulated the production of an additional \$4.3 billion in goods and services in the region, leading to a total regional output impact of almost \$8 billion.

Table II.4. Airport Dependent Activities

Impact	Employment		Earnings		Output	
	Direct	Total	Direct	Total	Direct	Total
Airport Dependent Activities	13,017	41,137	\$886 mn	\$1.97 bn	\$3.5 bn	\$7.83 bn

Source: Grobar, 2003

Regarding direct Impacts of Long Beach Air Transportation and Related Activities; they found 47 establishments which involved in or directly supporting air transportation. These establishments generated direct employment of slightly less than 2,500 jobs. These airport jobs generated an estimated payroll of \$116 million.

The 2,479 jobs supported by air transportation and related activities indirectly supported another 3,900 jobs in the region, leading to a total impact (direct plus indirect) of over 6,400 jobs in the region.

Similarly, as the \$116 million in earnings generated by employment in Long Beach Air Transportation and Related Activities are spent in the local economy, they lead to the creation of an additional \$150 million in earnings across the region. Thus, regional earnings associated with employment in Long Beach Air Transportation and Related Activities totaled \$266 million.

Finally, the \$450 million in goods and services produced in these establishments stimulated the production of an additional \$530 million in goods and services in the region, leading to a total regional output impact of over \$980 million.

Table II.5. Air Transportation and Related Activities

Impact	Employment		Earnings		Output	
	Direct	Total	Direct	Total	Direct	Total
Air Transportation and related activities	2,479	6,401	\$115.8 mn	\$266.7 mn	\$449.5 mn	\$983.9 mn

Source: Grobar, 2003

In conclusion The Long Beach Area Airport Complex is dominated by the presence of the Long Beach Airport and the Boeing Company. The Airport supports commercial and general aviation as well as related activities. While aerospace aviation employment is dominated by the Boeing Company, many other aircraft and related manufacturers operate their businesses within this footprint. In 2003, approximately 16,000 jobs or 8% of the City's employment base came from this area. These 16,000 jobs, in turn, created an additional 32,000 jobs raising the total employment impact within the region to 48,000 jobs. The direct jobs in Long Beach have an annual payroll of \$1.04 billion and an average annual payroll of \$65,000. The Long Beach Airport is a small hub airport serving approximately 3 million passengers annually. Long Beach Air Transportation and Related Activities account for almost 2,500 jobs and generated a payroll of \$116 million in 2003. These jobs, in turn, generated a total economic impact of 6,400 jobs and an annual payroll of \$267 million in the region. The Airport is clearly an important component of the overall vitality of the City's economy.

Inferences from Previous Studies:

There are a variety of literatures that focus on the importance of air transport infrastructure in general, and airports in particular, to economic development, and also on the financing of such infrastructure.

Previous work and case studies show that it is common to categorise impacts of investment in air transport, and particularly airports under three areas, namely transportation benefits, economic impact, and land-use impact. Transportation benefits, with their focus on time savings, cost savings, congestion relief, increased

mobility that helps economic feasibility of the new airport as well as enhancing the community, are extremely important in justifying investment in airports. Such transportation benefits are also the starting point of benefits in regional economy and change in land-use, since both areas are affected by savings in transport cost.

A review of previous studies on existing airports show that such studies focus on economic benefits, varying from jobs created to contributions to export and import and local industries. It is seen that in most cases, an economic input-output analysis was carried out making use of extremely comprehensively databases. In addition, effects on land-use and especially real estate values are also considered in some studies.

Discussions regarding the transportation benefits of airports included the benefits of regional airports that are developed as alternatives to central more over-crowded ones, as well as secondary or tertiary airports in cities developed to support a primary over-crowded airport. These discussions, leading to the multi-airport system concept, is of particular importance to the purpose of this thesis, which studies the Sabiha Gökçen International Airport, the second airport of İstanbul. Considering that the Sabiha Gökçen International Airport together with the Atatürk International Airport operates in multi-airport system in İstanbul, it is important to provide a further understanding of multi-airport systems. The next chapter deals with this concept.

CHAPTER III

MULTI - AIRPORT SYSTEMS

III. 1. What is a Multi-Airport System ?

A multi-airport system is the set of airports that serve the airline traffic of a metropolitan area. For example, the multi-airport system for London includes major airports as Heathrow , Gatwick and Stansted. These airports are operated by a single organization, the BAA (British Airports Authority). In addition the independently owned Luton Airport and privately owned London Airport is a part of the London multi-airport system. The detailed information about London multi-airport system will be given in the below.

From the perspective of the users, a multi-airport system includes all the airports that effectively serve the region. Today airports which are associated with different cities and jurisdictions can now be part of the same multi-airport system .

Airports are considered to be part of a multi-airport system for a metropolitan region if they meet either of two criteria.

1. They are as close as one of the existing major airports, for a significant fraction of the traffic in the metropolitan region.
2. They are officially designated and operated as part of the multi-airport system by local authorities (De Neufville, 2000).

There might be various reasons for investing in a secondary airport in a region. Although there are technical reasons, such as technical constraints regarding the runway, that may justify a secondary airport, it appears that the major reason is to

help relieve air traffic congestion in the primary airport that works close to its capacity with very frequent services. In the recent UK White Paper document on aviation, the reasons given to support investment in new regional airports to act as secondary or tertiary airports in a region help understand the main justifications for developing alternative airports. The White Paper discusses that encouraging the growth of such alternative airports would have benefits, such as supporting the growth of regional economies, relieving congestion at more over-crowded airports, reducing the need for long-distance travel to and from airports, and giving passengers greater choice (DFT, 2003).

III. 2. How does a Multi-Airport System Work ?

For a multi-airport system to operate successfully, it must exist in metropolitan areas with a high level of airline and passenger traffic. The greater the traffic, the more likely that there will be enough custom to justify a second airport and a multi-airport system.

A second airport will be a transport success if it is sufficiently attractive in comparison with the alternative primary airport. To develop a successful second airport, it is necessary to understand the factors that make them attractive.

The attractiveness of an airport is always defined in comparison to its competition. Passengers and airlines will not use an airport when they can get better service elsewhere. The attractiveness of the airport is differentiated from the perspective of the passengers and the perspective of the airlines. These are discussed below separately for primary airports and secondary airports.

III. 2. 1. Primary Airports

From the perspective of the long-distance passengers and shippers, a primary airport in a metropolitan region is attractive when it provides convenient access to desired flights and destinations to other primary airports in other metropolitan regions. The

choice of airport generally implies a choice of airline, for instance KLM through Amsterdam, British Airways through London.

Long-distance customers consider at least three factors when choosing an airport for connecting flights:

1. The range of destinations available,
2. The frequency of service, the overall level of traffic at the airport,
3. The reliability of schedules, influenced by the number of the runways.

From the perspective of the airlines in a deregulated environment, they have considerable choice about which airports they serve. For example, KLM based at Amsterdam Schiphol Airport, may easily develop major bases elsewhere. If their primary airport does not provide sufficient capabilities, at the right price, they will move major operations, to enable them to compete.

III. 2. 2. Secondary Airports

From the perspective of the passengers, a second airport is attractive when it provides convenient access to desired flights and destinations compared to the alternative primary airport. Two different types of passenger traffic can be defined: originating and transfer traffic. However, transfer traffic does not constitute a sizeable market for second airports. Transfer passengers do not want to change between airports; they prefer to connect through some other hub airports. Therefore, focus needs to be on the passengers that originate in a region.

Originating traffic consists of the persons who either live in the metropolitan region or have been staying there for a while before flying. The geographic accessibility of an airport and the frequency of departures to their destinations are the major factors that originating passengers consider. The geographic accessibility determines savings in transport costs too. Passengers would find a secondary airport if it provides significant savings in time and cost of travel to and from the airport as well as savings in time and cost of the air journey. In addition, services, such as discounted

or free parking at the airport, convenient shuttles to and from airport, and other customer services and lounges at the airport may act as factors attracting originating passengers to the secondary airport.

From the perspective of the airlines, in a multi-airport system they choose according to their commercial advantage. Sometimes they have to use a second airport for technical reasons. For example, the runways at primary airport can be too short for some type of aircraft and they have to land the second airport as well.

A second airport is commercially attractive to airlines if it provides a good market. This would be mostly related with the location of the airport and its capacity to penetrate substantial numbers of residential, commercial and office areas. In addition, savings in operations (landing fees etc.) may act as important factors in choosing a secondary airport. When airlines have the choice, they may also tend to allocate flights to secondary airports either when their primary airport is heavily congested or has very high frequency. Another important aspect from the perspective of airlines is that some secondary (or tertiary) airports in cities may be allocated to the airline for it to operate its business from the airport as its main base. Such agreements may also increase the appeal of the airport for a specific airline.

III. 2. 3. Threshold of Viability for a Second Airport

There is a threshold for the effective commercial viability of a second major airport. This depends primarily upon the number of originating passengers from the metropolitan region as a whole.

The threshold for the viability of a second commercial airport for a metropolitan region is over 10 million originating passengers or at least 25 million total passengers a year. The only exceptions to this rule occur when the primary airport is somehow constrained, for example by runways which are too short to permit international flights (De Neufville, 2000).

III. 3. Examples to Multi - Airport Systems in the World

III. 3. 1. London Metropolitan Area

The multi-airport system for London includes 5 airports. First one is Heathrow, which is about 50 million annual passengers. Next one is Gatwick, which used to be the hub of operations for British Caledonian Airlines, with about 20 million annual passengers. Third one is Stansted, which along with the previous two, is owned and operated by a private company, BAA (British Airlines Authority). The last two airports are Luton and London City. Luton, owned and operated by the local municipality, is generally used on holiday tour packages while London City is a privately owned downtown airport near the financial center.

Government played an important role in the establishment of the London multi-airport system. London / Gatwick is the second largest airport , London / Stansted is the third largest airport and developed by the British Airports Authority, the Government agency that has since been privatized and become the BAA plc.

The government spent lavishly at London / Stansted, on the construction of a modern central terminal building. It also arranged for the construction and operation of a private railroad connection from the airport to the rail network into central London. However, the current and foreseeable traffic at London / Stansted does not justify the investment on economic terms (De Neufville, 2000).

The London multi-airport system offers an excellent example of the limits on the power of government to foster traffic at second airports.

In the regulated environment, the government was able to grow traffic at London / Gatwick to a remarkable extent but it was relatively powerless in the commercial sector. Today, in the deregulated environment, the government has not been able to grow traffic at the second airports yet.

London / Gatwick grew during the 1960s and 1970s largely as a result of the government's 'two airline' policy. During this period, the government divided the important international routes between the airlines owned by the government and the privately owned British Caledonian. The growth of London / Gatwick was virtually guaranteed by the way the British Government allocated its international traffic rights.

In order to eliminate competition between the airports, The British Government insured the development of the second, otherwise much less competitive airport. In the current deregulated context, there is free competition between the second airports and the principal airport of London / Heathrow.

III. 3. 2. Washington - Baltimore City - Region

The multi-airport system actually serves two major cities which are Washington and the city of Baltimore consisting of three commercial airports. Washington / National, the downtown airport within 3 kilometers of the White House, serves medium size and smaller aircraft. Second one is Washing / Dulles, the international airport opened in the 1970's. It generally served about 3 to 4 million passengers in the first 20 years. After establishing United Airlines as a hub at the airport, the traffic has approximately doubled. The last one is Baltimore / Washington airport, between Baltimore and Washington and serving both cities although mostly Baltimore.

The action of government was decisive for the development of the major second airport of Washington / Dulles. In this respect, the US Federal Government played an important role as both owner and provider of capital funds.

The Federal Government acquired a large area West of Washington, built some magnificent facilities including a 27 km special motorway solely for the use of the traffic from the outer peripheral motorway to Washington / Dulles airport about 30 years ago. Additionally the resources of the national government were available to construct this facility.

The plan assumed that the traffic would flow naturally to this facility and would soon surpass the crowded of Washington / National airport. However, Washington / National still has 50% more traffic than the second airport of Washington.

The US Federal Aviation Administration set up a '600 mile' (1000 km) rule in order to increase the traffic volume of Washington / Dulles. According to this rule, all flights which are going more than 600 miles from Washington would have to leave from Washington / Dulles airport (FAA, 1992). This rule made all international flights use this new airport but it did not work.

The airlines paid attention to their customers preference of Washington / National due to accessibility of the airport to the important buildings in the capital. In this respect, airlines executed intermediate stops at cities within the limits, they virtually used 'touch and go' operations, landing briefly to the purpose of meeting the letter of the regulations. Finally, within a few years the 600 mile and international rules were virtually meaningless.

The traffic at Washington / Dulles stayed at a really low level compared to its capacity and compared to the primary airport for about 20 years.

The Baltimore Washington International Airport has been the second most active airport around Washington. Its geographic accessibility to a major regional market, the city of Baltimore, which is comparable in size and population to Washington and a hub for US Air and preceding airlines, and inexpensive flights from the East of the US to Europe are the major factors of its success.

Washington / Dulles has become the East Coast hub for United Airlines and this decision by United Airlines to take advantage of the large unused capacity and excellent facilities was the factors that doubled the traffic at Washington / Dulles in last years.

III.4. Summary

To conclude the discussions about multi-airport systems, it can be said that a secondary airport can be successful in large metropolitan areas with substantially high air traffic levels, preferably above 10 million originating passengers or at least 25 million total passengers a year. It is seen that secondary airports are generally supported by the governments on the grounds that they can help relieve air traffic congestion, reduce travel distances to and from airports, as well as helping regional economies and increasing choices for people.

The London and Washington multi-airport system cases show that governments also play important roles for growing the traffic at the secondary airports, especially in regulated operating environments. However, it is also seen that in the first years of operation, traffic volumes at second airports did not reach the expected levels.

In deregulated operating environment there is free competition between the airports. It becomes extremely important to increase the attractiveness of secondary airports. Savings in travel time and cost are important factors to attract passengers, as well as savings in parking at the airports. Operating policies and policies regarding fees applied to airlines can act as factors to increase attractiveness for airlines. Allocation of such secondary airports for certain airlines can also help support the airports. In the cases analysed, it was seen that after the decision by airlines to choose these second airports as a hub airport for their operations, the traffic volume at second airports have doubled.

In this study the second airport of İstanbul, Sabiha Gökçen International Airport is studied with reference to the multi-airport system concept described above as well as the theoretical discussion made in the previous chapter regarding benefits expected from investments in airport. The methodological framework of the study, which rests on these arguments above, is presented in the next chapter.

CHAPTER IV

METHODOLOGY

IV. 1. Framework of Research

It has been shown that impacts of investment in air transport, and particularly in airports, can be categorized under three areas, namely transportation benefits, economic impact, and land-use impact.

As discussed in earlier chapters, transportation benefits include time savings, cost savings, congestion relief, and increased mobility resulting in economic feasibility of the project as well as community enhancement. These expected benefits are extremely important in justifying investment in airports and are also the basis for benefits in regional economy and change in land-use, both of which are largely induced by savings in transport cost. Benefits in regional economy has been a vast area of research with many studies focusing on economic development impacts of airports, and addressing benefits, such as jobs created, enhancement of local economy through increases in export and import activities, etc. It was also seen that, effects on land-use and especially real estate values were covered in some studies.

For the purpose of this research, which aims to study the initial impacts of the new airport of İstanbul, Sabiha Gökçen International Airport, focusing on transportation benefits of the new airport is of significant importance. The first reason for this is that, as mentioned above, transportation benefits such as time and cost savings and increase in passengers as well as cargo are fundamental to creating any economic or land-use impact. Secondly, the airport to be analysed in this study has opened recently and during the time that the research was undertaken, its employment figures, operations, and cargo movement were under constant change due to the continuous expansion of business and addition of new operators. Thirdly, it is also

important to note that data for constructing an input-output analysis is not easily available as it is in many North American cities presented in the previous chapters. It was mentioned that in most cases, a regional input-output model was used for an economic analysis making use of extremely comprehensively databases, which would require a significantly long time to gather in Turkey. In addition to the lacking of necessary data, it was considered that because of the recent opening of the airport, it would be too soon to conduct a comprehensive study of economic impact. Sabiha Gökçen International Airport has been in operation since January 2001; however, the expected increase of the air traffic volume can be seen only in the past year, 2005 (Appendix C). The requirements for applying the regional input-output model have not occurred yet. Because of the recent opening of the system, it is also not viable to conduct an analysis on land-use change. Another reason for not including a land-use study is that the airport was planned and developed as a component of a wider Advanced Technology Industrial Park, for which vast areas were expropriated. Due to this purchase of land around the airport by the Defence Industry Undersecretariat, it is not possible to carry out an analysis on land-use change since the change is directed by the project, rather than free market conditions. Moreover, the only component of the Project implemented so far is the airport. There appears to be intense development around the airport after the other projects are also implemented; however, these will be the result of the comprehensive package of projects, rather than the airport investment alone. To summarise, analysing regional economic impacts and land-use impacts of the airport investment does not yet appear to be productive research areas in the case of Sabiha Gökçen International Airport.

The appropriate analysis for the case study area, taking also into consideration the focus of the research on multi-airport systems, is the *transportation benefits* of the airport investment, including congestion relief effects on the primary airport, Atatürk International Airport, savings in travel time and travel cost, and increased mobility and accessibility in the region, the Anatolian side of İstanbul. In this respect, the research will involve the analysis of air traffic data in İstanbul to assess the contribution of this secondary airport to the primary airport; the application of a passenger survey (Appendix A) at Sabiha Gökçen International Airport in order to

identify the relationship between the region, the Anatolian side of İstanbul, and the airport; an analysis and estimation of savings in travel time and cost for the region resulting from the opening of the new airport; and an interview with HEAS organization, which is responsible for operation and management of the airport.

While the research is expected to reveal the contribution of the new airport to the accessibility of the region and possible development effects that can be expected in the foreseeable future, it will also enable an evaluation of the two airports, particularly the secondary airport, within the multi-airport system of İstanbul. The analysis will also help assess the attractiveness of Sabiha Gökçen International Airport in its region.

IV. 2. Research Questions

As discussed above, the main focus of research in this study is the transportation benefits of Sabiha Gökçen Airport. It is intended to assess how Sabiha Gökçen Airport affected accessibility and mobility in the region it serves. In addition, understanding the position of Sabiha Gökçen Airport in the multi-airport system of İstanbul is another aspect of the research.

Consequently, the research questions are as follows:

- * How does Sabiha Gökçen International Airport affect the accessibility of the region and the mobility of people living in the region?
- * Is there an increase in frequency of air travel since Sabiha Gökçen International Airport has begun operation?
- * Are there any significant savings in travel time and travel cost (particularly in trips to and from the airport) that may result in increased mobility (or explain the reasons for increased mobility if there is an increase)?

* How does Sabiha Gökçen International Airport perform in the multi-airport system of İstanbul?

* Has Sabiha Gökçen International Airport reached the expected traffic level?

* Has Sabiha Gökçen International Airport helped reduce the traffic congestion at Atatürk International Airport yet?

* Does Sabiha Gökçen International Airport have a significant contribution to air travel in İstanbul, as would be expected from a secondary airport of a multi-airport system?

In addition to the above key questions of the research, it is also intended to find answers to the following secondary questions:

* How does having different airport operators (for Atatürk International Airport and Sabiha Gökçen International Airport) affect the multi-airport system? Does this create any problems or confusions in operation?

* What is the airport operator's point of view regarding the current and future role of Sabiha Gökçen International Airport?

* Are there currently any operating policies to make Sabiha Gökçen International Airport more attractive? What are their effects?

* Are there any operating policies planned to be introduced in the near future to make Sabiha Gökçen International Airport more attractive?

IV. 3. Research Method

IV. 3. 1. Analysis of Air Traffic Data

In order to respond to multi-airport research questions, the air traffic data are examined. The number of passengers, movement of aircraft and total cargo data are collected and the recent changes are evaluated. The main purpose of the analysis is to determine the contribution of the secondary airport to air travel and air transportation. It is intended to find out how secondary airport affects the total air traffic volume, and whether secondary airport relieves the pressures that affect the primary airport.

This data collection process includes the comprehensive research of the air traffic data of all Turkish Airports that have been obtained from State Airport Authority (DHMI) (except for Sabiha Gökçen International Airport). The air traffic data of Sabiha Gökçen International Airport have been obtained from Defence Industry Undersecretariat (SSM), the owner of the airport.

In addition to Turkish Airports, the air traffic data collection process of the World Airports and the rank of the well-known airports are acquired from the international establishment, Airports Council International (ACI).

IV. 3. 2. Sabiha Gökçen International Airport Passenger Survey

A passenger survey was carried out in Sabiha Gökçen International Airport with the purpose of understanding the transportation / mobility benefits of the airport. In this survey, 73 passengers, who took a domestic flight, participated in the questionnaire. The aim of this questionnaire is to understand the profile of the passengers who use Sabiha Gökçen International Airport, the reasons why they prefer this airport and the change in the frequency of their air travel after the airport has been in operation.

This survey was executed at Sabiha Gökçen International Airport on Sunday (09.April.2006). It was assumed that both trips for business (returning) and leisure trips could be covered. Only passengers taking a domestic flight were chosen because of the focus needs to be on passengers that originate in a region to evaluate the success of the multi-airport system.

The number of passengers who participated in the questionnaire have been chosen in all domestic flights including departing and arriving aircraft during a day. Indeed 5 or 6 passengers have been chosen from an aircraft which was departing or arriving from/to Sabiha Gökçen International Airport. The questionnaire was applied to 73 passengers in total representing approximately 2 % samples of daily passengers in April 2005. This was calculated from the trends of air traffic volume at Sabiha Gökçen International Airport. The estimation of the monthly passengers at Sabiha Gökçen International Airport in April is approximately 102.000 and daily passenger number is 3.400. In this respect the chosen samples represent approximately 2 % of the daily passengers in April 2006.

IV. 3. 3. Analysis of Savings in Travel Time and Travel Cost Resulting from the Development of Sabiha Gökçen International Airport

In this research the value of time saved and reduced ground travel cost of passengers by using air transportation are calculated. The transportation benefit variables of this calculation were mentioned in Chapter 2 and here the measurement method of the variables are discussed.

The essential variable is the value of time. The calculation of the value of passenger time is derived from Gross National Product per capita (at current prices) in 2005. The value of GNP per capita is 5008 US Dollars, which equal to 6749 YTL (\$1=1,3476YTL). This value represents yearly amount and monthly amount is calculated as $6749/12 = 562,4\text{YTL}$. The working hours of a person in a day is 8 and there are 22 working days in a month. Total working duration of a person in a month

is therefore 176 hours. As a result, the value of time for a passenger can be accepted to be 3,2 YTL/hour.

It is clear that the above calculation is a simplified form of converting time savings into a monetary value. Obviously, the value of time differs for different purposes of trips: it is known, for example, that the value of time may be higher for business trips and lower for trips of touristic purposes. However, it is also known that there are benefits in adopting the most transparent and perhaps simplified methods of modeling in order to eliminate the need to make high number of assumptions, which may prove to be difficult to verify. Hence, it is accepted in this study that the above approach provides a general assessment of time savings to be evaluated together with cost savings resulting from the new airport investment.

The other variables affecting costs are the car speed and car costs. The speed of a car is accepted 60 km/hour and the cost of it 0,30 YTL/km. The value of crossing the bridge (Boğaziçi, Fatih Sultan Mehmet) for personal car is 3,00 YTL in İstanbul. These values are taken into account during the estimation of the transportation benefit of a passenger.

In this research, the flight distance from origin airport to destination airport is neglected. Only ground access distance to airport is included in investigating savings in time and cost. Similarly, the congestion of roads and the delays at airports are also neglected.

The origin points of trips will be chosen at the Anatolian side of İstanbul which are closer to Sabiha Gökçen International Airport and the overall benefit of a passenger will be estimated by means of the time saved and reduction in travel cost.

IV. 3. 4. Interview with the Operator of Sabiha Gökçen International Airport

The operator of Sabiha Gökçen International Airport is Airport Management and Aeronautical Industries Co. Inc. (HEAS). An interview was made with HEAS Media

and Public Relations manager through electronic mail and telephone. The questions that were asked to the manager of HEAS Media and Public Relations are presented in the appendix part.

The aim of this interview was;

- Determining the effects of having different operators at Sabiha Gökçen International Airport and Atatürk International Airport.
- The policy of the operator in order to increase the air traffic volume
- The expectations of the operator in the near future in terms of air traffic volume and the project of Advanced Technology Industry Park (ITEP).

CHAPTER V

CASE STUDY: SABIHA GÖKÇEN INTERNATIONAL AIRPORT

V. 1. A Brief History of Sabiha Gökçen International Airport

The idea of building a second airport to serve İstanbul, a city with a population of over 10 million located at a strategic point linking the continents of Europe and Asia was first proposed by Adnan Kahveci, the Minister of Finance in 1983, during the prime-ministry of Turgut Özal. Sabiha Gökçen Airport is part of the Advanced Technology Industrial Park (ITEP) scheme, an ambitious investment project second only in scale of investment to Turkey's South-East Anatolia Project. It was decided to begin by building the airport, so that it could provide logistic support for the next phases of the project (Çelebi, 2001).

Construction commenced in February 1998 and was completed in January 2001. The airport, which is open to international traffic, has an initial capacity of three million international and 500 000 domestic passengers. Unlike Turkey's other airports, the Sabiha Gökçen Airport is not operated by the State Airport Management Directorate of the Ministry of Transport, but by the Airport Operation and Aviation Industries Company (HEAS), which is responsible for ground services, cargo, parking, fire service, air traffic control and all the other essential airport services. The company's main shareholder is the Defence Industry Office, and its top priorities are flight and ground safety, and high service quality. As one of the foremost high-technology airports, not only in Turkey but in Europe, there is a certain expectation that air traffic volume through Sabiha Gökçen International Airport is to rise rapidly over the next years.

V.2. Advanced Technology Industrial Park (ITEP)

In accordance with the Defense Industry Executive Committee decisions, Undersecretariat for Defence Industries (SSM) has been instructed to commence and carry out the Advanced Technology Industrial Park and Airport Project in Kurtköy - Pendik, İstanbul, toward in-country establishment of an outstanding center for Innovation, Technology and High Technology-Export Oriented Production.

Advanced Technology Industrial Park and Airport Project is a development project that involves linking the commercialization of technology with effective public and private investments to create the dynamic, scientific, technological and more importantly an indigenous infrastructure for economic growth, technological development and global competitiveness.

ITEP Project was started in 1987 with the decision of Defense Industry Executive Committee and for the facilities that will be established through the objectives of the Project. An area of nearly 1301 hectares were expropriated in İstanbul Pendik with a Council of Ministers Decision.

The ITEP area is located on the axis between Europe and Asia and at the center of a dynamically expanding market. ITEP site takes place between TEM and E-5 motorways, and is very close to Pendik Harbor and railway network. It was seen as the only suitable place for such a big industrial park investment according to feasibility reports prepared by many other organizations.

To determine the extent and scope of action required to achieve the ITEP Project, a Feasibility and Master Plan Study was conducted by an international consortium in 1991-1992. The outcome of this study, i.e. the Feasibility and Master Plan Study Report, has identified the following four main elements in order to attain the said objectives, namely:

- 1) Advanced Technology Industrial Park that will operate under free-zone status,
- 2) An International Airport which become operational in January 2001 and named Sabiha Gökçen International Airport,
- 3) A Social and Commercial Zone, and
- 4) A technologically oriented, foundation based special purpose Technology Institute.

V. 2. 1. Elements of the Project

The Feasibility and Master Plan Study Report have identified the following four main elements in order to attain the project objectives. A total 1,300 hectares of land has been expropriated by SSM for the needs of mentioned main elements of the ITEP Project. Location of these elements within the boundaries of 1,300 hectares of the Project area, as envisaged by the Feasibility and Master Plan Study Report, can be seen on the map below.

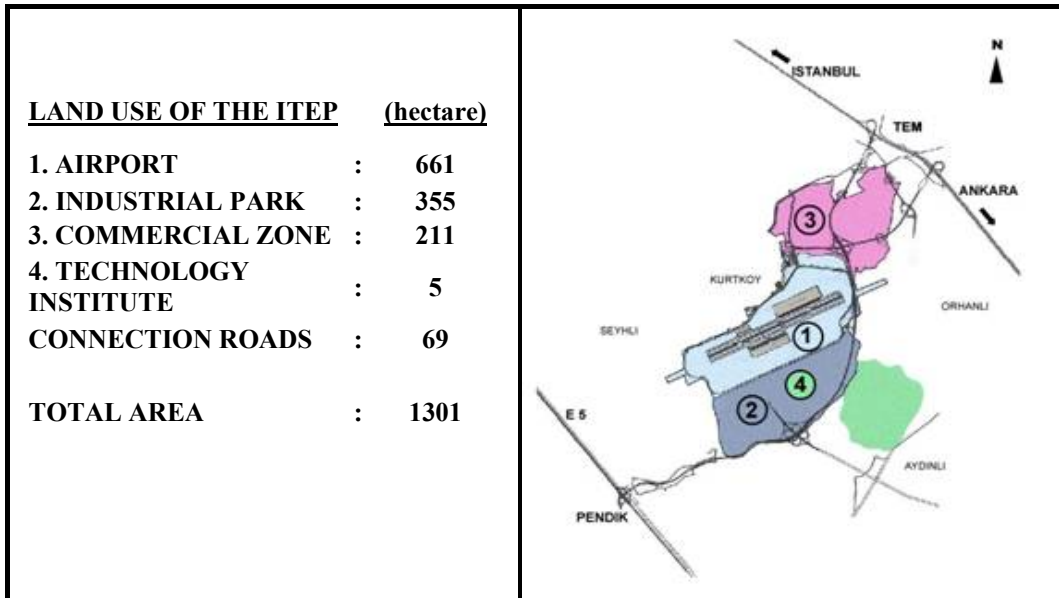


Figure V.1. Elements of the ITEP

Sabiha Gökçen International Airport

Sabiha Gökçen International Airport has been in operation since January 2001 as the most modern airport in service in Turkey. The Airport occupies an area of 661 hectares as a part of 1,300 hectares of land, expropriated by SSM for the project purposes. As an airport open to both domestic and international passenger and cargo traffic, Sabiha Gökçen International Airport Project has been planned to be put into implementation in two distinct phases. Phase I envisaged the construction and operation of an international airport with a capacity of 3,000,000 passengers per year at the International Flights Terminal, 500.000 passenger per year at the Domestic Flights Terminal and 90.000 tons per year cargo terminal.

Airport Management and Aeronautical Industries Co. Inc. (HEAS) has been founded as the organization responsible for the operation and management of the airport. The majority of shares in this company is held by SSM and other shareholders are Turkish Armed Forces Foundation (TSKGV), Turkish Aircraft Industries Inc. (TUSAŞ), Turkish Aeronautical Association (THK), HAVELSAN and ASELSAN.

Table V.1. Service of Sabiha Gökçen International Airport

INTERNATIONAL FLIGHTS TERMINAL	3.000.000 passenger/year (24.647 m ²)
DOMESTIC FLIGHTS TERMINAL	500.000 passenger/year (2700 m ²)
RUNWAY	45×3000 m
PASSENGER APRON	45 WIDE BODY AIRCRAFTS (240.000 m ²)
CARGO CAPACITY	90.000 tons/year
NAVIGATION SYSTEMS	ILS,DVOR,DME,NDB, PAR, SSR
CATEGORY	CAT II

Source: SSM

Industrial Park

Having Free-Trade Zone status, the Advance Technology Industrial Park occupies an area of 355 hectares out of 1,300 hectares expropriated for project purposes. The Industrial park will welcome technology-intensive businesses to carry out a mix of

knowledge-based innovation functions. These functions will encompass research, product and market development, engineering, pilot manufacturing, environment-friendly advance technology manufacturing, customer support and associated services.

The Technological Park model, as has been developed worldwide, is a suitable model or mechanism to achieve various objectives desired to be realized by the ITEP Project. The model has evolved in order to provide an environment, which encourages advanced technology industry by bringing education, science and industry synergistically together toward the common goal of innovation.

Globalization and consequent global competition have accelerated during the final decades of the 20th century, and therefore, value creation through innovation in products, services and processes has increasingly become an effective way in today's market economies for capturing a share and managing the risks. Accordingly, the Advance Technology Industrial Park element of the ITEP Project has been designed so as to bring the enterprises and institutions that are willing and able to collaborate synergistically in a particular business segment together and direct their efforts and capabilities toward technological innovations and the commercialization thereof. To maximize synergies, there will be a mix of companies: from upstream and downstream sectors, large, medium, small and start-up; as well as local and international.

The professional service companies that will serve the Industrial Park community shall also be located within the Social and Commercial Zone element of the ITEP Project. Such firms would include legal firms, consulting firms, venture-capital funds, lending institutions, human resource companies, training institutions, transportation and customs clearance companies, and so on.

Social and Commercial Zone

211 hectares of area at the northern extremity of the ITEP Project land has been designated as Social and Commercial Zone. This area consists of the Commercial

Area designated for retail businesses and professional service sector companies; a Housing Zone where two ranges of housing types are envisaged – from apartment housing to villa housing; a Hotel Area including visitor and conference/fair/exhibition facilities; and a Recreation and Leisure Area providing open green areas and facilities to enhance the lifestyle of the local population.

Main roles that the Social and Commercial Zone plays within the ITEP Project can be summarized as follows:

1. It provides space for the provision of social and commercial services such as retailing, housing, hotels and leisure areas which are situated in an environment of sufficient quality to be able to be associated with the image, aims and objectives of the ITEP Project.
2. It provides an area where the value added by the planning process around the ITEP Project can be realized, and the proceeds used to support the less profitable aspects of the project.
3. It provides a balancing social focus for the project.
4. It provides space for the professional service companies to set up their offices to serve the Industrial Park community.

Technology Institute

Establishment of a foundation based, special purpose University within the ITEP Project has been foreseen in the Master Plan to meet qualified and specially trained labor force demands of the high-tech companies in the Industrial Park and provide for specific R&D activities to be conducted in line with the needs of industry.

The inefficiencies observed in the Turkish University System in terms of university-industry cooperation and the low level of contribution of R&D activities conducted by the universities to the technological needs of the country, have resulted in the idea of establishment of a special University within the Project area.

The recent establishments of foundation based, flexible Universities that have the organizational, financial and human resources necessary to serve the needs the industrial establishments in the Industrial Park, in the Marmara Region and the vicinity of the Project area during the time period following date the Master Plan was prepared, have brought up the alternative of using the current university system to meet the needs of the Project rather than establishing a new university. In parallel with these developments, the establishment of an Institute of Advanced Technology which will conduct only postgraduate studies and R&D activities in line with the needs of a particular sector (or group of sectors) located within the Industrial Park, has also come to the agenda as another alternative that needs to be further explored.

In the current situation, due to the capacity of the nearby universities which satisfy the project necessities, rather than establishing a new university foundation of an Institute of Advanced Technology is being planned.

Of all the above components of the Advanced Technology Industrial Park, only the Sabiha Gökçen International Airport has been developed and opened to service so far. None of the other described developments have been realised yet.

CHAPTER VI

AIR TRAFFIC IN TURKEY WITH A SPECIAL FOCUS ON İSTANBUL

VI. 1. The Rank of World Airports and Turkish Airports

The basic indicator of an airport traffic is the movement of aircraft, passengers and cargo. The air transport statistics are generally arranged by these basic indicators in order to understand the past, to interpret today and to plan the future. The airports which have an average of 35 or more traffic per hour are categorized as the busiest airports in the world according to the International Civil Aviation Organization (ICAO).

Atatürk International Airport and Antalya International Airport are the busiest airports in Turkey, belonging also to the category of the busiest airports in the world. The strategic location of İstanbul and the tourism potential of Antalya stand as crucial factors which contribute to this traffic density.

Table VI.1 shows the ranking of world airports in terms of total passengers carried. It is seen that İstanbul Atatürk International Airport ranks 76th with about 15 million annual passengers in 2004. However, the rate of increase from 2003 and 2004 is remarkably high, indicating that the airport may have a higher rank in the near future. It is worth noting that Atatürk International Airport carried an annual total of 19.6 million passengers in 2005. Air traffic in İstanbul seems to grow significantly.

Tables from VI.1 to VI.6 show world airports and Turkish airports in passenger, aircraft and cargo movements. It is seen that Turkish airports rank rather low; however, their rate of growth is significantly high.

Table VI.1. World Airports Ranking by Total Passengers

Rank 2003	City (Airport)	Total Passengers 2003	Total Passengers 2004	% Change
1	ATLANTA (ATL)	79.086.792	83.606.583	5,41
2	CHICAGO (ORD)	69.508.672	75.533.822	7,98
3	LONDON (LHR)	63.487.136	67.344.054	5,73
4	TOKYO (HND)	62.876.269	62.291.405	-0,94
5	LOS ANGELES (LAX)	54.982.838	60.688.609	9,40
6	DALLAS/FT WORTH (DFW)	53.253.607	59.412.217	10,37
7	FRANKFURT/MAIN (FRA)	48.351.664	51.098.271	5,38
8	PARIS (CDG)	48.220.436	51.260.363	5,93
9	AMSTERDAM (AMS)	39.960.400	42.541.180	6,07
10	DENVER (DEN)	37.505.138	42.393.766	11,53
11	PHOENIX (PHX)	37.412.165	39.504.898	5,30
12	LAS VEGAS (LAS)	36.285.932	41.441.531	12,44
13	MADRID (MAD)	35.854.293	38.704.731	7,36
14	HOUSTON (IAH)	34.154.574	36.506.116	6,44
15	MINNEAPOLIS/ST PAUL (MSP)	33.201.860	36.713.173	9,56
76	ATATÜRK (İstanbul)	12.104.342	15.600.601	22,41

Airports participating in the ACI Annual Traffic Statistics Collection.

Total Passengers: total passengers enplaned and deplaned, passengers in transit counted once.

Source: ACI

Table VI.2. Turkish Airports Ranking by Total Passengers

Rank 2003	Airports	Total Passengers 2003	Total Passengers 2004	% Change
76	ATATÜRK (İstanbul)	12.104.342	15.600.601	22,41
**	S. GÖKÇEN (İstanbul)*	157.172	245.659	36,02
248	ESENBOĞA (Ankara)	2.783.927	3.275.725	15,01
273	A. MENDERES (İzmir)	2.337.749	2.942.281	20,55
98	ANTALYA	10.371.600	13.656.053	24,05
284	DALAMAN	2.255.074	2.747.454	17,92
458	ADANA	786.855	1.147.483	31,43
325	MILAS - BODRUM	1.599.568	2.036.624	21,46

Source: DHMI

* SSM

** No data available

Table VI.3. World Airports Ranking by Total Movements of Aircraft

Rank 2003	City (Airport)	Total Movements 2003	Total Movements 2004	% Change
1	CHICAGO (ORD)	928.691	992.427	6,42
2	ATLANTA (ATL)	911.723	964.858	5,51
3	DALLAS/FT WORTH AIRPORT (DFW)	765.296	804.865	4,92
4	LOS ANGELES (LAX)	622.378	655.097	4,99
5	PHOENIX (PHX)	541.771	546.763	0,91
6	PARIS (CDG)	515.025	525.660	2,02
7	MINNEAPOLIS/ST PAUL (MSP)	510.382	541.093	5,68
8	CINCINNATI (HEBRON (CVG)	505.557	517.520	2,31
9	LAS VEGAS (LAS)	501.029	544.679	8,01
10	DENVER (DEN)	499.794	560.198	10,78
11	DETROIT (DTW)	491.073	522.538	6,02
12	HOUSTON (IAH)	474.913	517.197	8,18
13	LONDON (LHR)	463.650	475.999	2,59
14	VAN NUYS (VNY)	460.734	448.681	-2,69
15	FRANKFURT/MAIN (FRA)	458.865	477.475	3,90

Airports participating in the ACI Annual Traffic Statistics Collection.

Total Movements: landing and take off of an aircraft.

Source: ACI

Table VI.4. Turkish Airports Ranking by Total Movement of Aircraft

Rank 2003	Airports	Total Movement of Aircraft 2003	Total Movement of Aircraft 2004	% Change
113	ATATÜRK (İstanbul)	161.827	187.487	13,69
**	S. GÖKÇEN (İstanbul)*	6.412	8.983	28,62
437	ESENBOĞA (Ankara)	35.961	41.898	14,17
513	A. MENDERES (İzmir)	25.592	28.735	10,94
287	ANTALYA	68.764	88.560	22,35
579	DALAMAN	18.358	21.078	12,90
696	ADANA	10.384	13.657	23,97
643	MILAS - BODRUM	13.994	16.129	13,24

Source: DHMI

*... SSM

** No Data Available

Table VI.5. World Airports Ranking by Total Cargo

Rank 2003	City (Airport)	Total Cargo 2003	Total Cargo 2004	% Change
1	MEMPHIS (MEM)	3.390.515	3.554.575	4,62
2	HONG KONG (HKG)	2.668.880	3.119.008	14,43
3	TOKYO (NRT)	2.154.691	2.373.133	9,20
4	ANCHORAGE (ANC)*	2.102.025	2.252.911	6,70
5	SEOUL (ICN)	1.843.055	2.133.444	13,61
6	LOS ANGELES (LAX)	1.833.300	1.913.676	4,20
7	PARIS (CDG)	1.723.700	1.876.900	8,16
8	FRANKFURT/MAIN (FRA)	1.650.476	1.838.894	10,25
9	MIAMI (MIA)	1.637.278	1.778.902	7,96
10	SINGAPORE (SIN)	1.632.409	1.795.646	9,09
11	NEW YORK (JFK)	1.626.722	1.706.468	4,67
12	LOUISVILLE (SDF)	1.618.336	1.739.492	6,97
13	CHICAGO (ORD)	1.510.746	1.474.652	-2,45
14	TAIPEI (TPE)	1.500.071	1.701.020	11,81
15	AMSTERDAM (AMS)	1.353.760	1.467.204	7,73

Airports participating in the ACI Annual Traffic Statistics Collection.

Total Cargo: loaded and unloaded freight and mail in metric tonnes.

*ANC data includes transit freight.

Source: ACI

Table VI.6. Turkish Airports Total Cargo

Rank 2003	Airports	Total Cargo 2003	Total Cargo 2004	% Change
**	ATATÜRK (İstanbul)	502.692	573.284	12,31
**	S. GÖKÇEN* (İstanbul)	8.618	8.994	4,18
**	ESENBOĞA (Ankara)	60.365	73.926	18,34
**	A. MENDERES (İzmir)	50.300	56.306	10,67
**	ANTALYA	206.536	278.405	25,81
**	DALAMAN	30.549	37.418	18,36
**	ADANA	20.550	24.695	16,78
**	MILAS - BODRUM	24.584	28.319	13,19

Source: DHMI

* SSM

** No Data Available

As compared to the well-known airports in the world, airports in Turkey are located at the bottom of the rank with respect to passenger numbers and movement of aircraft.

In addition to the information above, detailed statistics are presented in the appendix part . (see Appendix C)

VI. 2. Trends of Air Traffic Volume in Turkish Airports

In Turkey, some well-known airports are presented in Tables VI.7 to VI.9 below that show total number of passengers, total aircraft number, and total cargo in the last four years together with change in passenger traffic, total aircraft number and cargo in the last two years.

Table VI.7. Total Passenger Traffic

Airports	2002	2003	2004	2005	% Change (2004 - 2005)
ATATÜRK (İstanbul)	11.357.691	12.104.342	15.600.601	19.647.142	20,60
S. GÖKÇEN* (İstanbul)	130.227	157.172	245.659	996.738	75,35
ATATÜRK+S. GÖKÇEN	11.487.918	12.261.514	15.846.260	20.643.880	23,24
ESENBOĞA (Ankara)	2.836.628	2.783.927	3.275.725	3.828.873	14,45
A.MENDERES (İzmir)	2.489.392	2.337.749	2.942.281	3.660.586	19,62
ANTALYA	10.334.951	10.371.600	13.656.053	15.844.860	13,81
DALAMAN	2.374.301	2.255.074	2.747.454	3.172.578	13,40
ADANA	685.836	786.855	1.147.483	1.708.952	32,85
TRABZON	396.028	429.047	775.699	1.083.452	28,40
MİLAS-BODRUM	1.619.513	1.599.568	2.036.624	2.499.079	18,51

Source: DHMI, * SSM

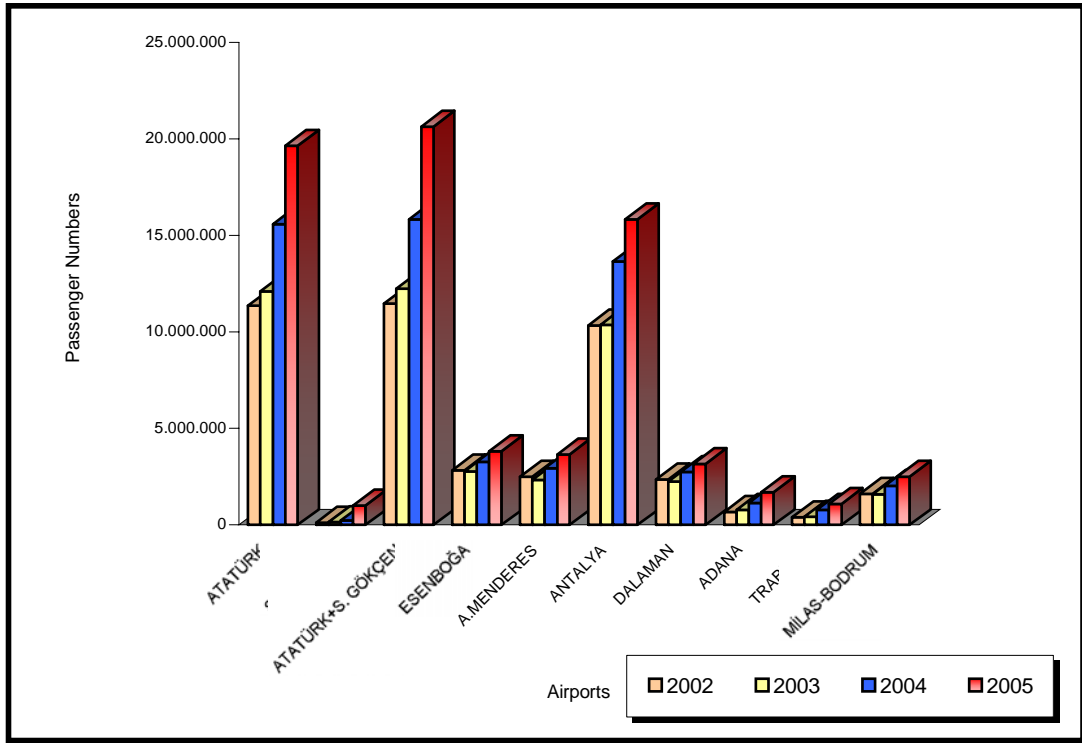


Figure VI.1. Total Passenger Traffic

When we compare the last two years of total passenger traffic, there is 20 % increase in general (on average) at the airports of Turkey and we can see the same ratio at Atatürk International Airport as well. We can see that although passenger traffic is limited and significantly low in Sabiha Gökçen Airport compared to other airports, the rate of increase is substantial. We can conclude that Sabiha Gökçen Airport has limited passenger traffic currently, but that these levels are increasing significantly.

Table VI.8. Total Aircraft

Airports	2002	2003	2004	2005	% Change (2004 - 2005)
ATATÜRK (İstanbul)	160.364	161.827	187.487	219.118	14,44
S. GÖKÇEN* (İstanbul)	5.299	6.412	8.983	17.585	48,92
ATATÜRK+S. GÖKÇEN	165.663	168.239	196.470	236.703	17,00
ESENBOĞA (Ankara)	37.421	35.961	41.898	53.628	21,87
A.MENDERES (İzmir)	25.902	25.592	28.735	36.282	20,80
ANTALYA	69.225	68.764	88.560	104.577	15,32
DALAMAN	20.835	18.358	21.078	24.722	14,74
ADANA	9.457	10.384	13.657	21.567	36,68
TRABZON	5.124	5.391	7.846	11.565	32,16
MİLAS-BODRUM	13.525	13.994	16.129	19.538	17,45

Source: DHMI, * SSM

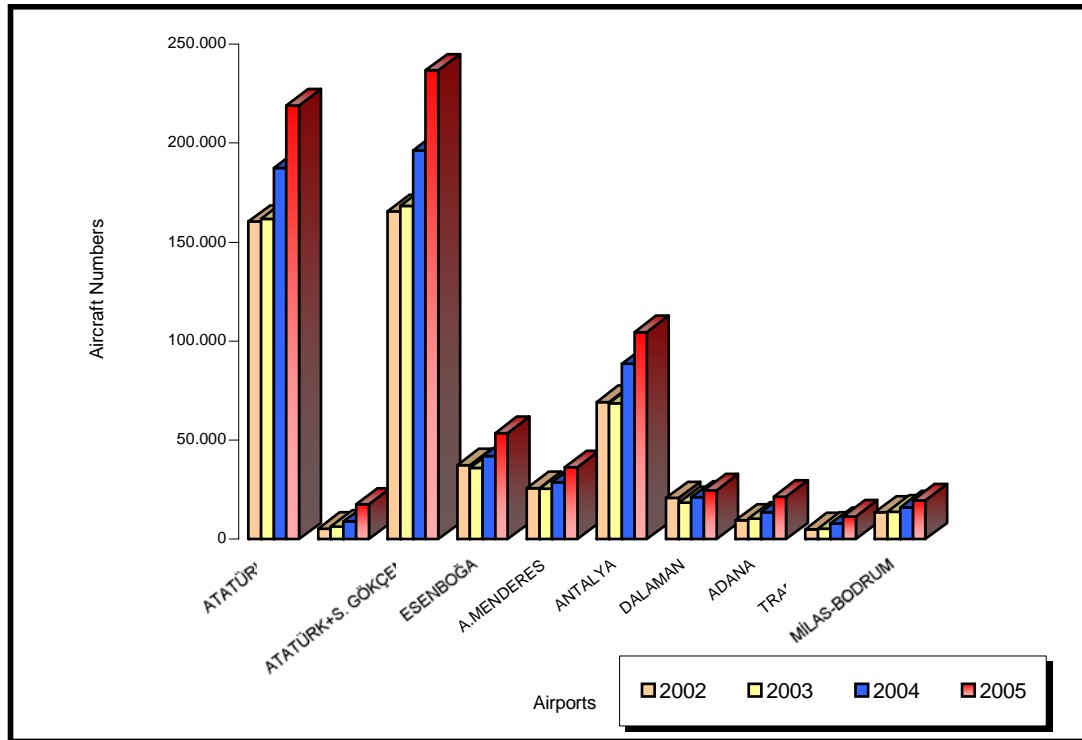


Figure VI.2. Total Aircraft

Table VI.9. Total Cargo

Airports	2002	2003	2004	2005	% Change (2004 - 2005)
ATATÜRK (İstanbul)	480.022	502.692	573.284	611.743	6,29
S. GÖKÇEN* (İstanbul)	957	8.618	8.994	13.599	33,86
ATATÜRK+S. GÖKÇEN	480.979	511.310	582.278	625.342	6,89
ESENBOĞA (Ankara)	55.858	60.365	73.926	75.073	1,53
A.MENDERES (İzmir)	51.982	50.300	56.306	62.190	9,46
ANTALYA	183.369	206.536	278.405	320.062	13,02
DALAMAN	32.673	30.549	37.418	43.178	13,34
ADANA	17.439	20.550	24.695	28.478	13,28
TRABZON	8.052	8.156	11.929	15.440	22,74
MİLAS-BODRUM	24.814	24.584	28.319	31.150	9,09

Source: DHMI, * SSM

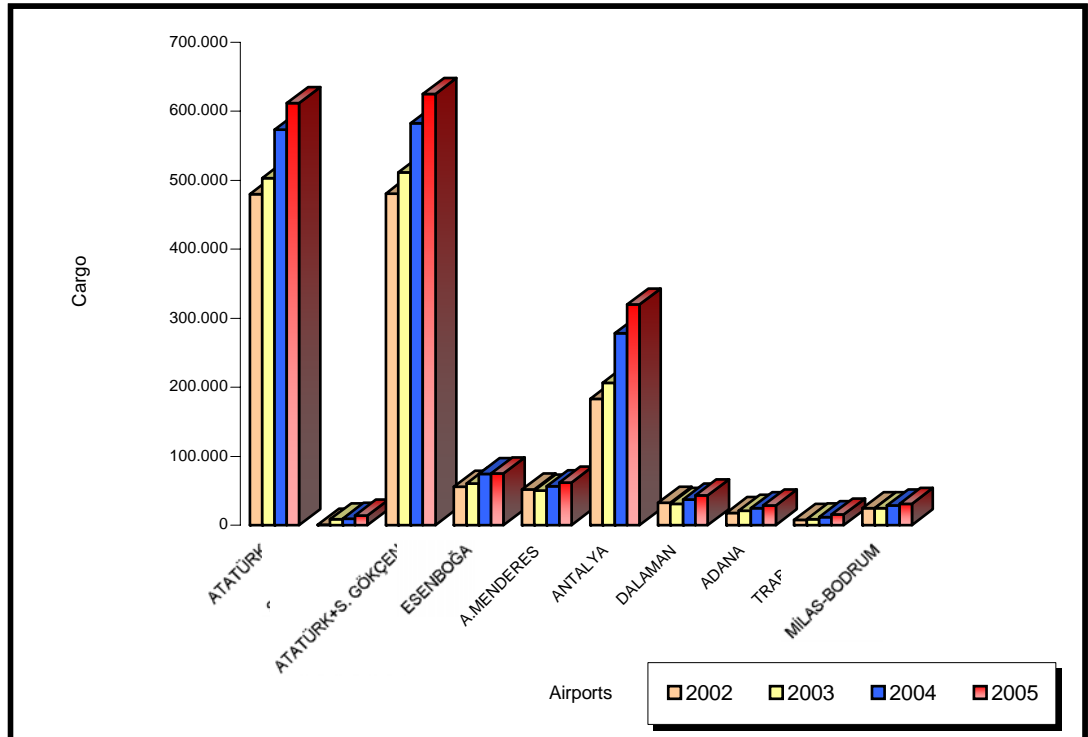


Figure VI.3. Total Cargo

Total aircraft movement is also high for İstanbul Atatürk International Airport in comparison to other airports in Turkey. In cargo movements too, Atatürk International Airport has high traffic, although airports in other cities are experiencing considerable increase. While some airports witnessed high rates of growth in cargo, on average the rate of growth is still limited, being around 9 %. The total cargo growth ratio is lower than the total passenger traffic growth. The reason for this is probably the preference of roads and highways for cargo traffic in Turkey, due to lower transport costs.

Further information on these airports with domestic and international traffic data are given in the appendix.

VI.2.1. Air Traffic Volume in İstanbul

Atatürk International Airport and Sabiha Gökçen International Airport are the two airports of İstanbul. Atatürk Airport, the busiest airport in Turkey, reached almost 20 million passengers in 2005. On the other hand Sabiha Gökçen Airport, which has been in operation since January 2001, reached only 1 million passengers in 2005.

Looking at the current annual passenger traffic levels in Atatürk International Airport, it is possible to suggest that the traffic level can to a certain extent justify the development of a secondary airport. It may be remembered from Chapter 3 that the threshold for a secondary airport is accepted to be 25 million annual air passengers. Although, the annual air passenger traffic was only about 10 million in the early 2000s, when Sabiha Gökçen International Airport was being built, the rapid increase in air traffic can be considered a sound indicator that the city will reach the above threshold in near future. Hence, although the current air passenger traffic levels are somewhat lower than the accepted threshold for developing a second airport, the significantly high rates of growth in air passenger traffic in İstanbul shows that building the second airport and creating a multi-airport system was probably a sound strategy for the near future efficiency of the aviation in the city. Whether the second

airport has important contributions to the aviation in the city and particularly to the primary airport in terms of congestion relief, is discussed below.

Analysis of the 2005 annual passenger numbers show that passenger traffic volume of Sabiha Gökçen International Airport is 5 % of traffic volume of Atatürk International Airport. This shows that Sabiha Gökçen International Airport is not significant yet for İstanbul air travel. Accounting for only about 4.8 % of total air passengers in İstanbul, there is no indication of Sabiha Gökçen International Airport as a significant secondary airport of a multi-airport system. Consequently, it also difficult to suggest that Sabiha Gökçen International Airport has any congestion relief effects on Atatürk International Airport yet.

While annual average passenger figures do not reveal Sabiha Gökçen International Airport as significant for İstanbul yet, the analysis of monthly air traffic in 2005 reveals a notable growth in the usage of this airport. As shown in Table VI.10 and Figures VI.1 and VI. 2, passenger traffic in Sabiha Gökçen International Airport increased from below 20 thousand in January to above 150 thousand in December.

Table VI.10. Passenger Traffic at Sabiha Gökçen and Atatürk Airports, 2005

Airport Month	ATATÜRK AIRPORT 2005 Passenger Numbers			S. GÖKÇEN AIRPORT 2005 Passenger Numbers		
	Domestic	International	Total	Domestic	International	Total
January	529909	834209	1364118	891	18834	19725
February	453542	682134	1135676	880	18444	19324
March	504612	946528	1451140	801	14861	15662
April	551013	929164	1480177	956	23623	24579
May	621402	1165610	1787012	28169	68337	96506
June	691485	1184817	1876302	33851	34699	68550
July	699773	1107188	1806961	52793	43370	96163
August	902244	1181376	2083620	77815	55933	133748
September	871869	1171277	2043146	71622	44260	115882
October	557514	1049484	1606998	57556	39565	97121
November	617592	941864	1559456	113774	39154	152928
December	593360	859176	1452536	109883	46667	156550
TOTAL	7594315	12052827	19647142	548991	447747	996738

Source: DHMI, SSM

On comparing the number of passengers by month, we can see the fluctuations and breaking points at the figures. Generally, the mobility of the people increase in the summer time and this affects the air traffic volume.

When we look at the passenger numbers of international flights, the most crowded month is May in 2005. The Champions League final football match between Milan and Liverpool was arranged by UEFA at Olympiad Stadium in İstanbul. In this organization, the supporters of the teams were orientated to different airports. This is the reason of the high level international passenger numbers in May at Sabiha Gökçen Airport.

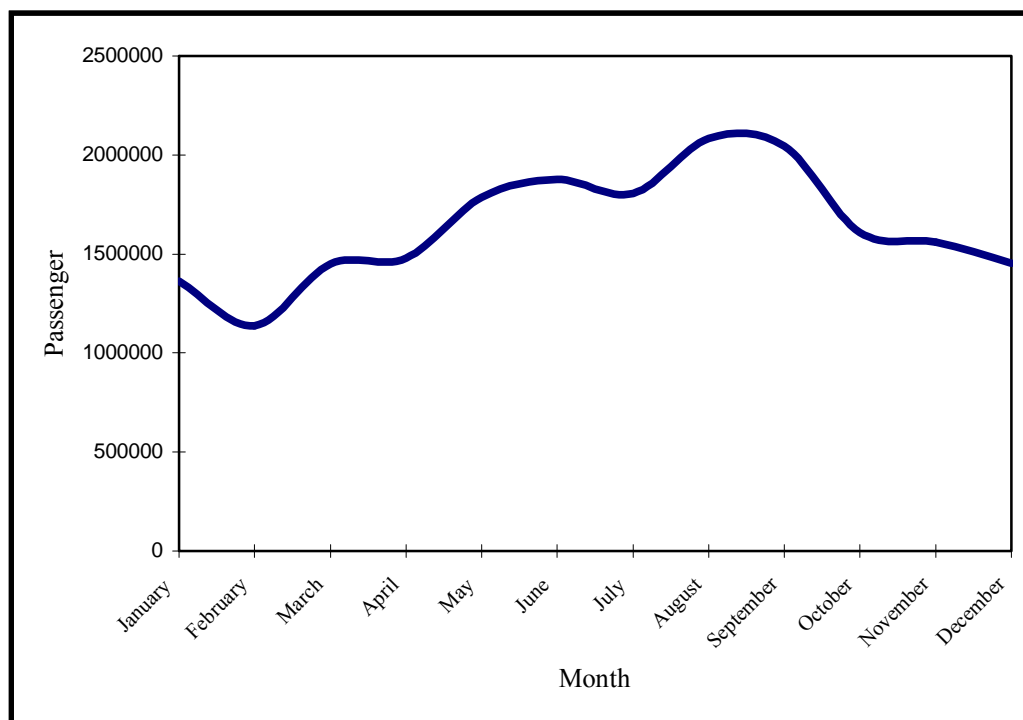


Figure VI.4. Atatürk International Airport Monthly Passenger Numbers, 2005

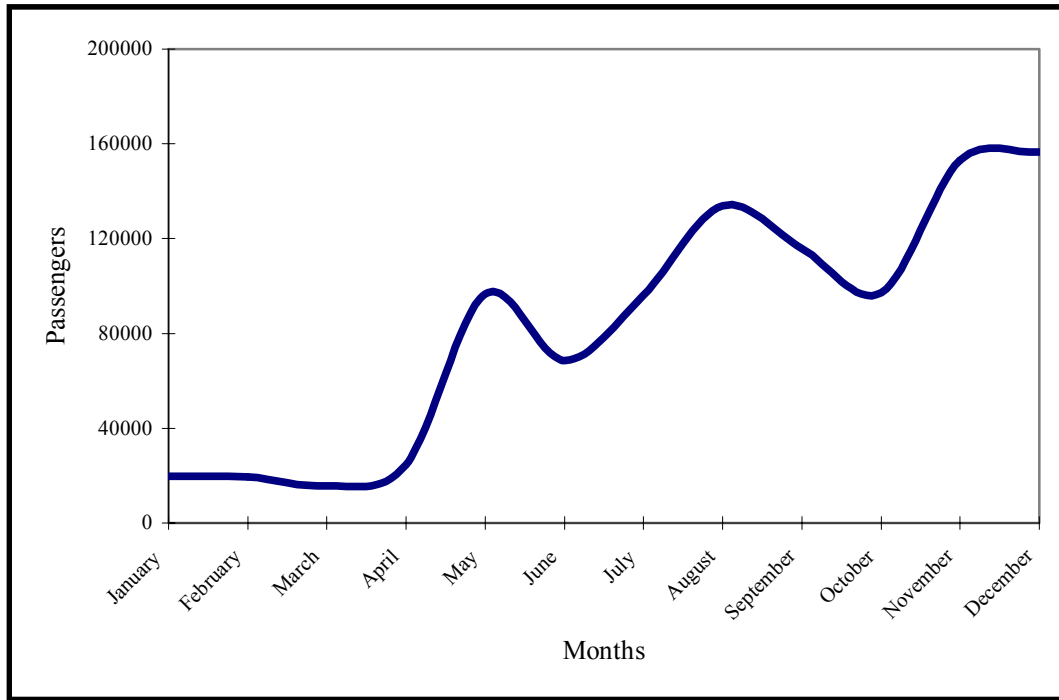


Figure VI.5. Sabiha Gökçen Airport Monthly Passenger Numbers, 2005

Turkish Airlines started to arrange domestic flights from Sabiha Gökçen Airport from the 30th of April 2005. The rise of the domestic passenger number can be seen from this time onwards. Generally, the air traffic volume decreases in winter. However, the number of domestic passengers doubled in November in Sabiha Gökçen Airport. The reason for this is that Pegasus Airlines chose Sabiha Gökçen Airport as a hub for their domestic flights at the beginning of November 2005.

When we look at Tables VI.11 , VI.12 and VI.13 below, we see that domestic passenger numbers have increased at a higher rate than international passenger numbers. The low fare policy of the airlines and increased services by both Turkish Airlines and Pegasus Airlines affected the process and the passenger demand. Increase in domestic air travel is important for the research focus of this study. As described in the methodology chapter, effects of the Sabiha Gökçen International Airport on the mobility of people living / working in that region are of particular importance for the study. It is possible to argue that the increase in domestic flights

(due to increased services, cheap fare policies, etc.) may be interpreted as an indication of increase in mobility in the area.

The tables also show that in the months when Sabiha Gökçen International Airport experienced a significant increase in growth rates of passenger traffic, there was a corresponding fall in growth rates in passenger traffic of Atatürk International Airport. This is particularly significant for domestic flights in July and in December. It is possible to interpret this reverse relation as the potential role of Sabiha Gökçen International Airport in helping relieve air traffic congestion in Atatürk International Airport.

Table VI.11. Sabiha Gökçen and Atatürk Airports in terms of Domestic Passenger Numbers

Airport Month	ATATÜRK AIRPORT Domestic Passenger Numbers			S. GÖKÇEN AIRPORT Domestic Passenger Numbers		
	2004	2005	%	2004	2005	%
January	311700	529909	70,01	327	891	172,48
February	300312	453542	51,02	409	880	115,16
March	360918	504612	39,81	94	801	752,13
April	425289	551013	29,56	146	956	554,79
May	463820	621402	33,97	1974	28169	1327,00
June	496627	691485	39,24	4002	33851	745,85
July	589301	699773	18,75	414	52793	12651,93
August	611649	902244	47,51	1011	77815	7596,83
September	542298	871869	60,77	341	71622	20903,52
October	415960	557514	34,03	406	57556	14076,35
November	437686	617592	41,10	744	113774	15192,20
December	475365	593360	24,82	455	109883	24050,11
TOTAL	5430925	7594315	39,83	10323	548991	5218,13

Source: DHMI, SSM

Table VI.12. Sabiha Gökçen and Atatürk Airports in terms of International Passenger Numbers

Airport Month	ATATÜRK AIRPORT International Passenger Numbers			S. GÖKÇEN AIRPORT International Passenger Numbers		
	2004	2005	%	2004	2005	%
January	668117	834209	24,86	15031	18834	25,30
February	642673	682134	6,14	16709	18444	10,38
March	699621	946528	35,29	13795	14861	7,73
April	812907	929164	14,30	11758	23623	100,91
May	842238	1165610	38,39	12567	68337	443,78
June	843083	1184817	40,53	14192	34699	144,50
July	1025290	1107188	7,99	20282	43370	113,83
August	1111869	1181376	6,25	32099	55933	74,25
September	1007185	1171277	16,29	24910	44260	77,68
October	916583	1049484	14,50	22945	39565	72,43
November	812295	941864	15,95	26999	39154	45,02
December	787815	859176	9,06	24049	46667	94,05
TOTAL	10169676	12052827	18,52	235336	447747	90,26

Source: DHMI, SSM

Table VI.13. Sabiha Gökçen and Atatürk Airports in terms of Total Passenger Numbers

Airport Month	ATATÜRK AIRPORT Total Passenger Numbers			S. GÖKÇEN AIRPORT Total Passenger Numbers		
	2004	2005	%	2004	2005	%
January	979817	1364118	39,22	15358	19725	28,43
February	942985	1135676	20,43	17118	19324	12,89
March	1060539	1451140	36,83	13889	15662	12,77
April	1238196	1480177	19,54	11904	24579	106,48
May	1306058	1787012	36,82	14541	96506	563,68
June	1339710	1876302	40,05	18194	68550	276,77
July	1614591	1806961	11,91	20696	96163	364,65
August	1723518	2083620	20,89	33110	133748	303,95
September	1549483	2043146	31,86	25251	115882	358,92
October	1332543	1606998	20,60	23351	97121	315,92
November	1249981	1559456	24,76	27743	152928	451,23
December	1263180	1452536	14,99	24504	156550	538,88
TOTAL	15600601	19647142	25,94	245659	996738	305,74

Source: DHMI, SSM

To further investigate the possible role of Sabiha Gökçen in helping relieve traffic congestion in the primary airport Atatürk International Airport, Table VI.14 and Figure VI.3 compares the percentage shares of each airport in the total air passenger

traffic in İstanbul throughout 2005. The table shows that on average 95 % of total passengers flew from Atatürk Airport and the remaining 5 % flew from Sabiha Gökçen Airport for the whole duration of 2005. However, the ratio of Sabiha Gökçen Airport increased significantly in the last months of the year. In January, Sabiha Gökçen International Airport carried only 1 % of total air passengers in İstanbul. By the end of the year almost 10 % of air passengers in İstanbul were using Sabiha Gökçen International Airport. The increase from 1 % in the beginning of the year to 10 % by the end of the year is an extremely significant increase. It is also expected that the increase will continue, further enhancing the relative position of Sabiha Gökçen International Airport

Table VI.14. The Dispersion of Total Passengers in İstanbul, 2005

Airport Month	S. GÖKÇEN AIRPORT		ATATÜRK AIRPORT		İSTANBUL
	Total Passenger	Ratio (%)	Total Passenger	Ratio (%)	Total Passenger
January	19725	1,43	1364118	98,57	1383843
February	19324	1,67	1135676	98,33	1155000
March	15662	1,07	1451140	98,93	1466802
April	24579	1,63	1480177	98,37	1504756
May	96506	5,12	1787012	94,88	1883518
June	68550	3,52	1876302	96,48	1944852
July	96163	5,05	1806961	94,95	1903124
August	133748	6,03	2083620	93,97	2217368
September	115882	5,37	2043146	94,63	2159028
October	97121	5,70	1606998	94,30	1704119
November	152928	8,93	1559456	91,07	1712384
December	156550	9,73	1452536	90,27	1609086
TOTAL	996738	4,83	19647142	95,17	20643880

Source: DHMI, SSM

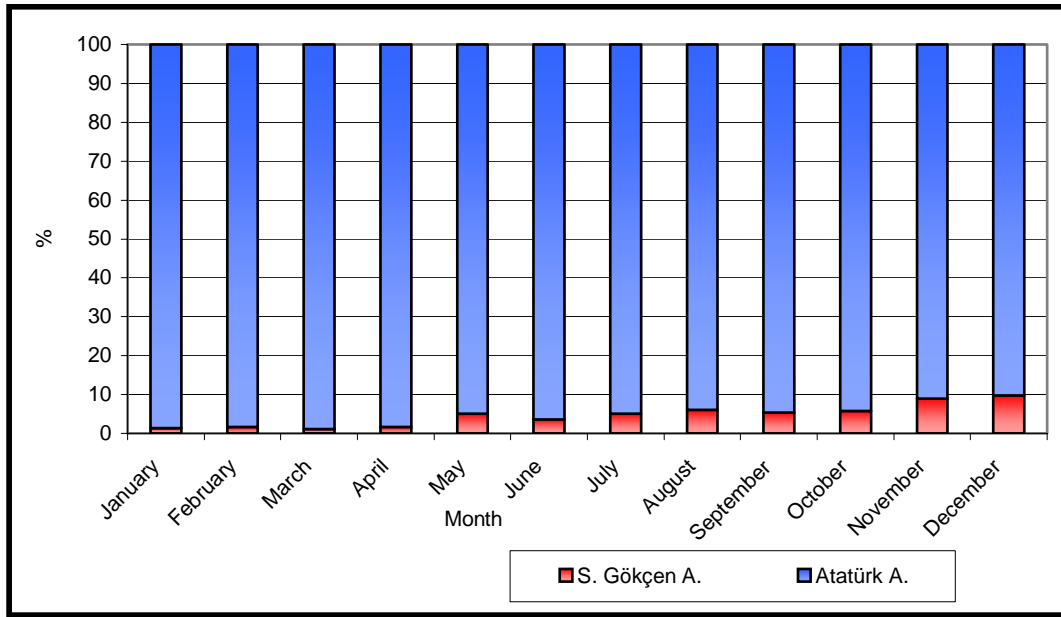


Figure VI.6. The Proportion of Total Passenger in İstanbul, 2005

To summarize, overall and average passenger travel figures reveal that Sabiha Gökçen International Airport is not very significant yet in the air travel of İstanbul. However, when the analysis is carried out on a monthly basis, assessing the rate of change, it is seen clearly that the importance of Sabiha Gökçen International Airport in air transportation is increasing. In particular, the analysis of the last months of 2005, revealing that 10% of İstanbul air passenger traffic took place in Sabiha Gökçen International Airport, shows that the airport is becoming increasingly important as the secondary airport of the İstanbul Multi-Airport System. The decrease in the rate of traffic growth in Atatürk International Airport in December 2005, may also indicate that in the near future Sabiha Gökçen International Airport can help relieve air traffic congestion in Atatürk International Airport.

CHAPTER VII

AN ANALYSIS OF SABİHA GÖKÇEN INTERNATIONAL AIRPORT WITH A FOCUS ON ITS SECONDARY AIRPORT FUNCTIONS

VII. 1. Sabiha Gökçen International Airport Passenger Survey

In this research, the questionnaire has been applied to the passengers who took a domestic trip at Sabiha Gökçen International Airport. The number of the participants to the questionnaire was 73.

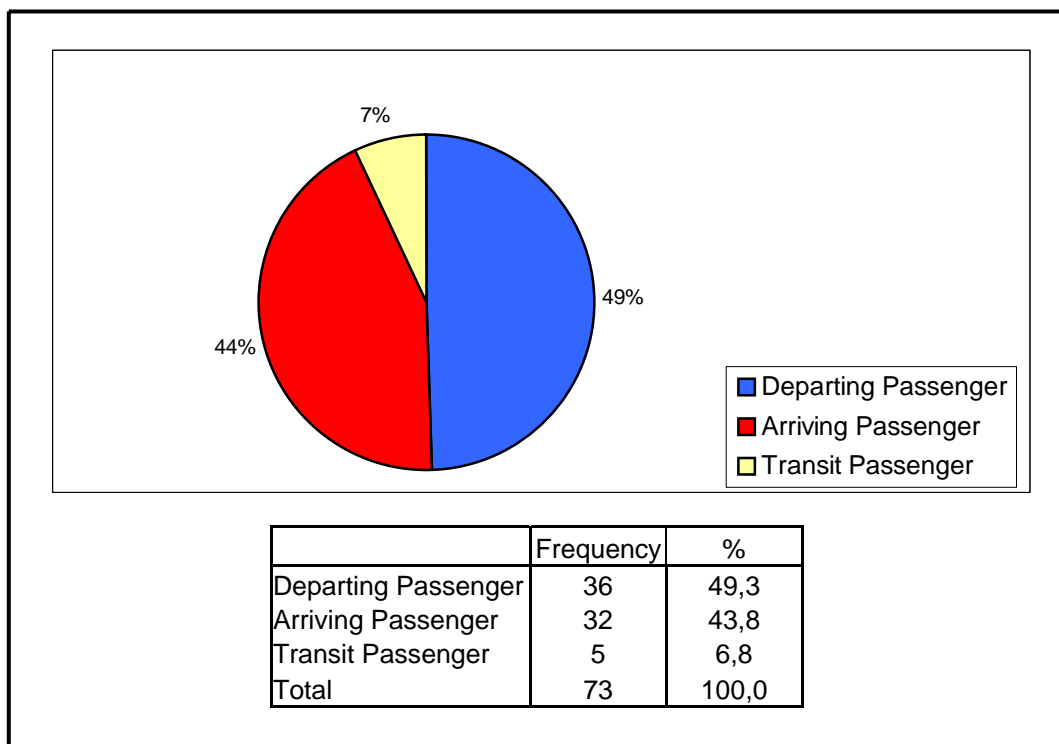


Figure VII.1. The Participants to the Questionnaire

The participants to the questionnaire can be classified in three groups such as departing, arriving and transit passengers. In this survey, the distribution of the participants to the questionnaire can be seen in the pie graph as; 49 % of the

passengers are departing, 44 % of the passengers are arriving and 7 % of the passengers are transit (Figure VII.1).

63 % of the passengers who participated to the questionnaire have been living in İstanbul (Figure VII.2). Furthermore, 91 % of them have been living at the Anatolian side of İstanbul and 73 % of them have been working at the Anatolian side of İstanbul (Figures VII.3 and VII.4). This shows that Sabiha Gökçen International Airport is generally used by the passengers living or working at the Anatolian side of İstanbul. In other words, it is mostly used by originating passengers.

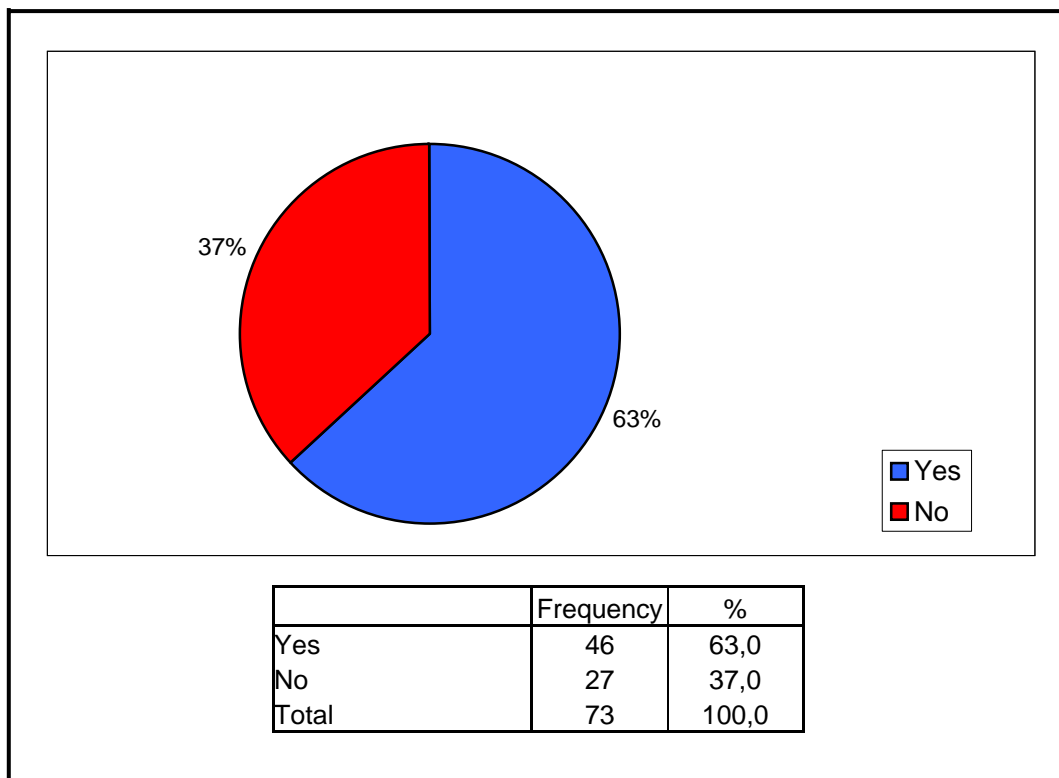


Figure VII.2. The Passengers who live in İstanbul

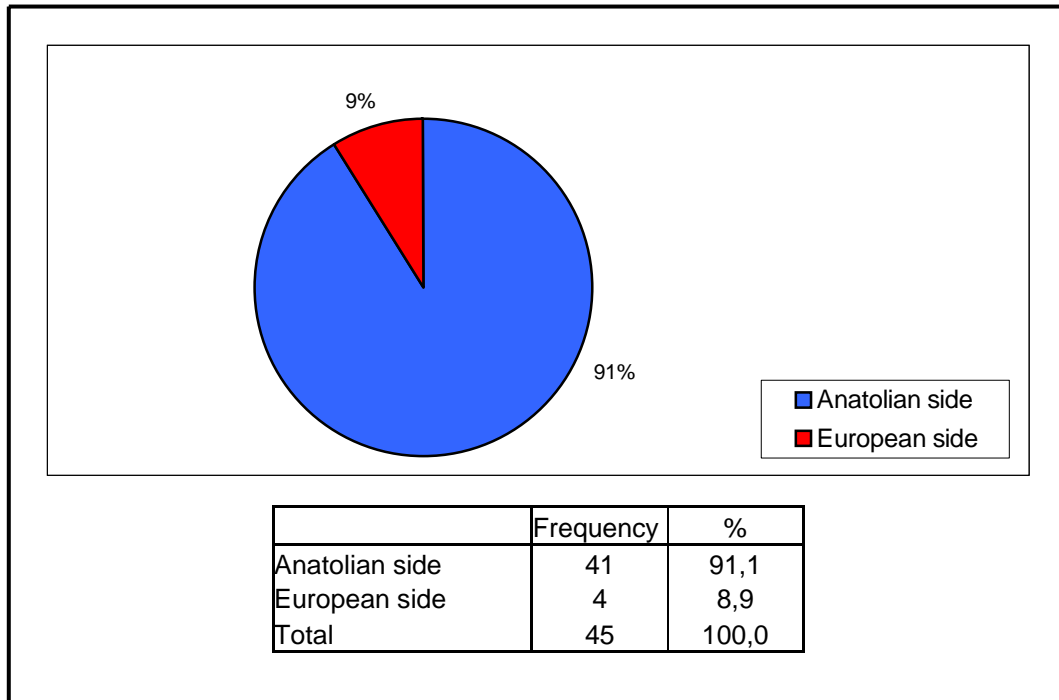


Figure VII.3. The Residence of the Passengers in İstanbul

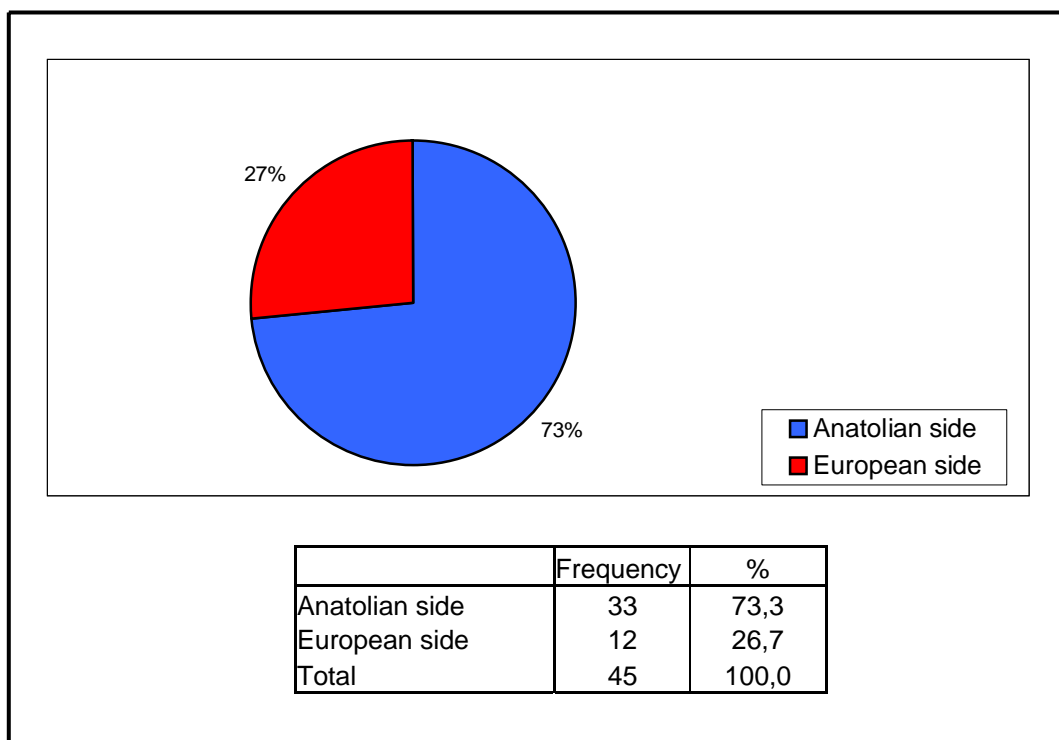


Figure VII.4. The Working Place of the Passengers in İstanbul

94 % of departing the passengers that did not live in İstanbul, stayed at the Anatolian side of İstanbul (Figure VII.5). 81 % of the passengers that did not live in İstanbul visited the Anatolian side of the city in this trip (Figure VII.6).

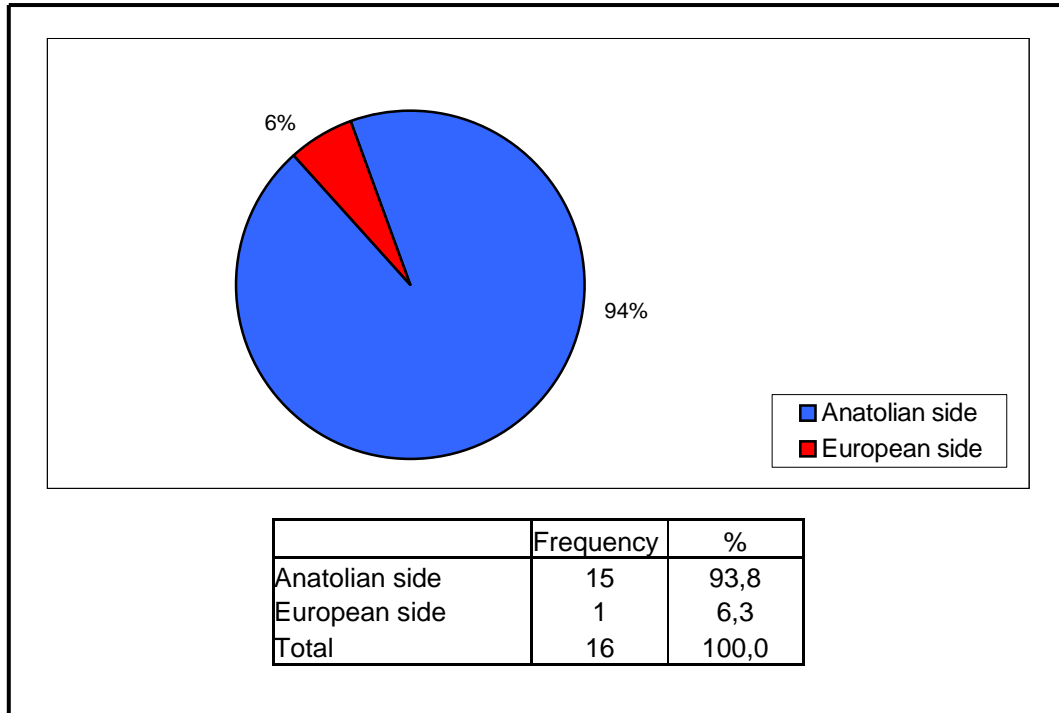


Figure VII.5. The Staying Site of the Departing Passengers

The analysis of trip purposes show that 33 % of the passengers were taking a leisure purpose (vacation) trip; and 29 % were on a business trip. 32 % were travelling for personal reasons (Figure VII.7).

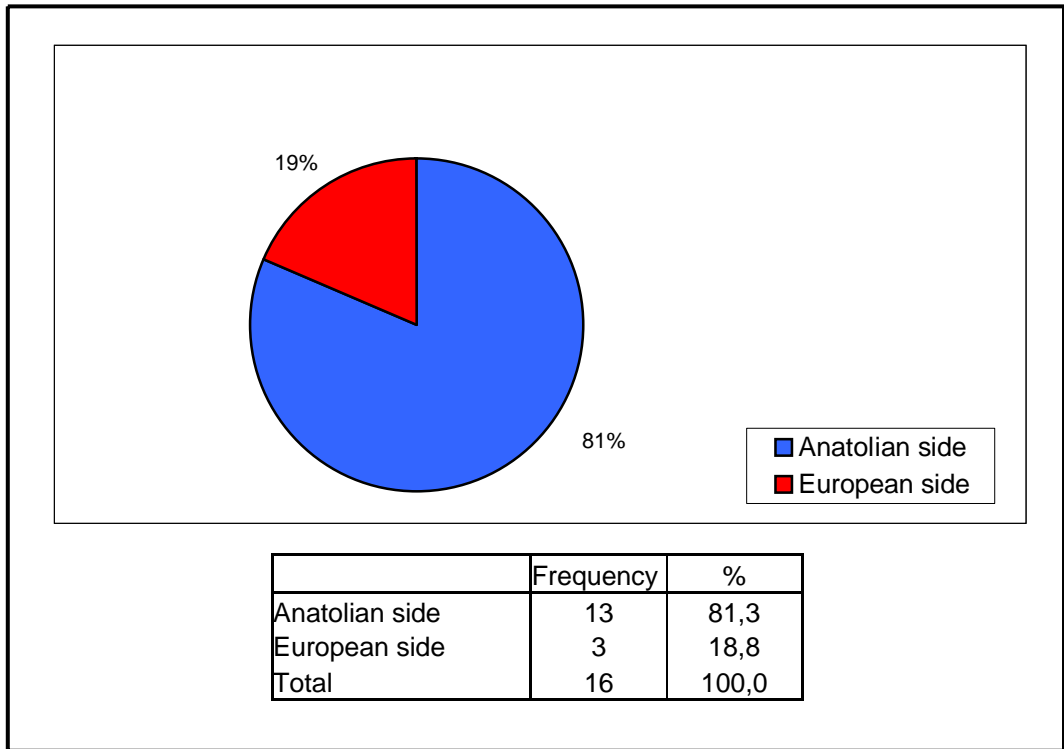


Figure VII.6. The Visiting Site of the Departing Passengers

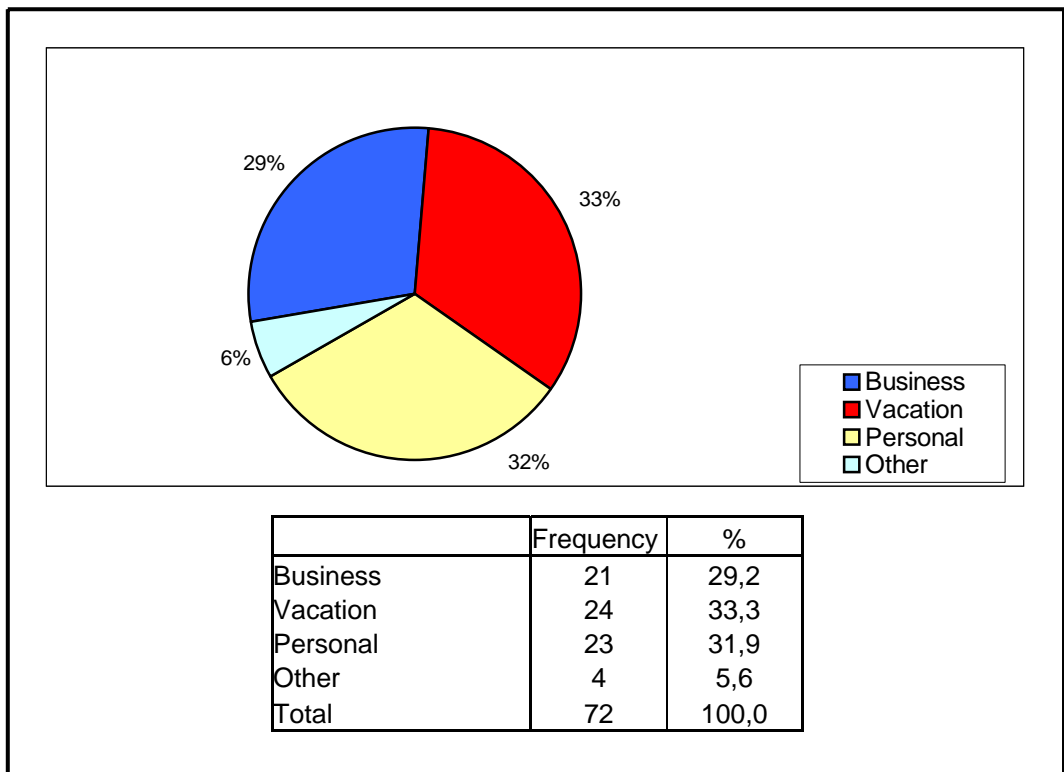


Figure VII.7. The Purpose of the Trip

The analysis of the relationship between the business trip and the location of the business activities show that the majority (60 %) of the passengers who took a business trip at Sabiha Gökçen International Airport, participated in a business activity (convention, meeting, congress, etc.) in the Anatolian side of İstanbul. 35 % of them were the departing passengers who participated in a business organisation in other cities (Figure VII.8).

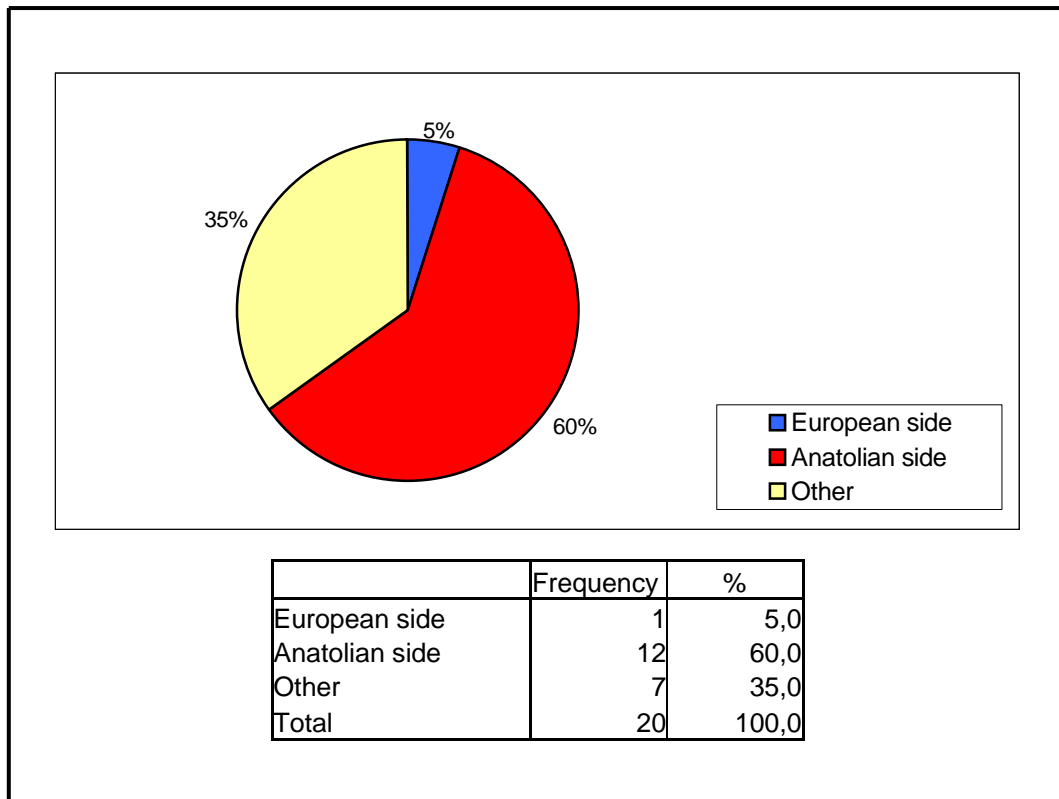


Figure VII.8. The Relationship between the Business Trip and the Location

When the passengers were asked which airport they generally prefer using, it was seen that 66 % prefer Sabiha Gökçen International Airport and the remaining 34 % prefer Atatürk International Airport (Figure VII.9). In later figures given further below, the answers to this question are cross-tabulated with the information regarding the residence and work places of the respondents. These are to be discussed below.

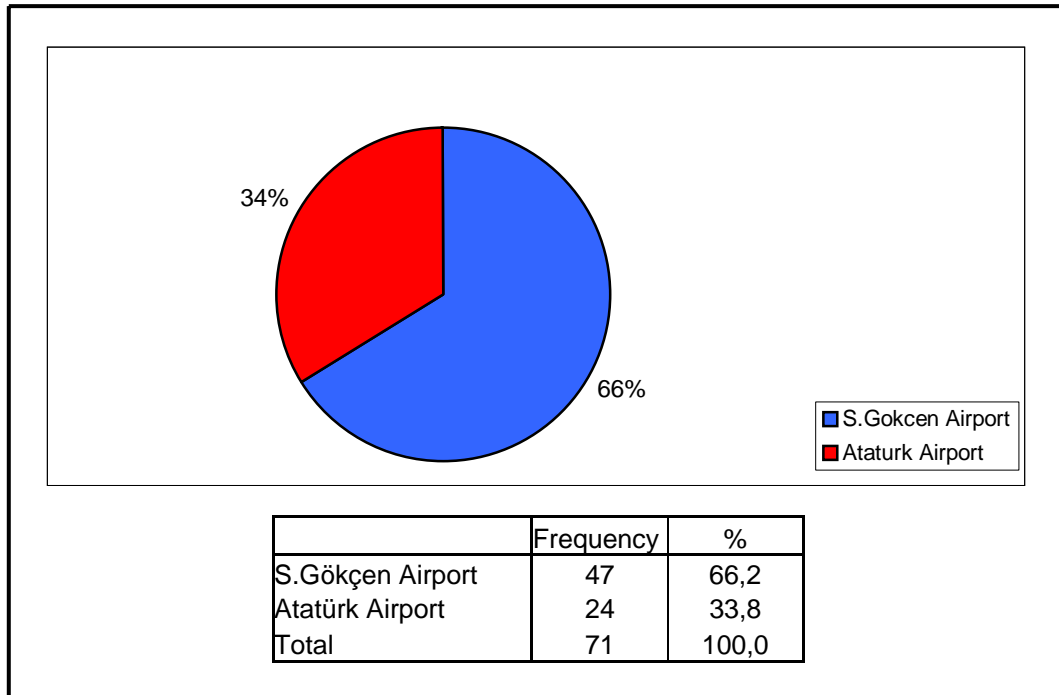


Figure VII.9. The Preference of Airports in General

Regarding the same question that aims to understand which airport the respondents generally prefer using in İstanbul, the main reasons for their preference were also asked. It was seen that those who prefer Atatürk International Airport do so because of the location of the airport at the European side of the city (Figure VII.10). Although not significantly high, a number of passengers stated that planes' schedule time was another reason for their preferring Atatürk International Airport.

Of the passengers who prefer Sabiha Gökçen International Airport, 31 % of them do so generally because this airport is closer to their homes (in other words, these are the passengers who reside at the Anatolian side) (Figure VII.11). In addition, 22 % stated that the reason was the airport's location at the Anatolian side. This probably means that these passengers are those who have business or meetings at the Anatolian side, and therefore prefer using this Airport. Of the other reasons asked, advantageous flight fares were mentioned only by a small proportion of passengers. A number of passengers mentioned other reasons for choosing Sabiha Gökçen International Airport: among them, low price parking areas is worth noting.

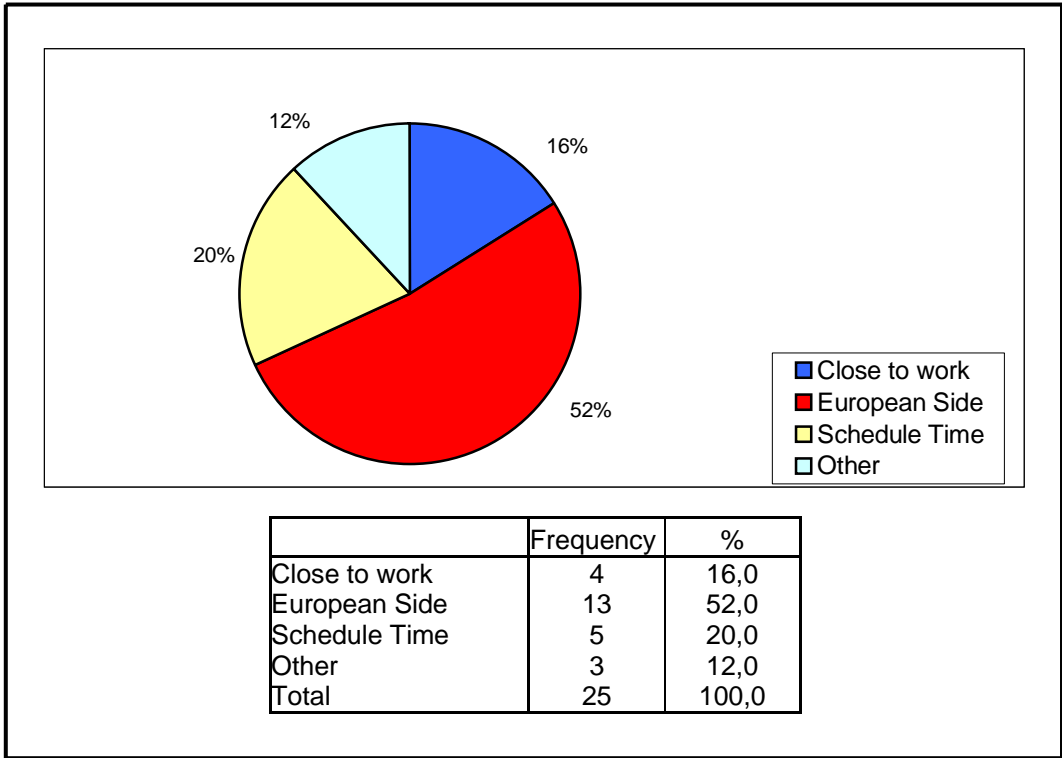


Figure VII.10. The Reason why Passengers Prefer Ataturk Airport

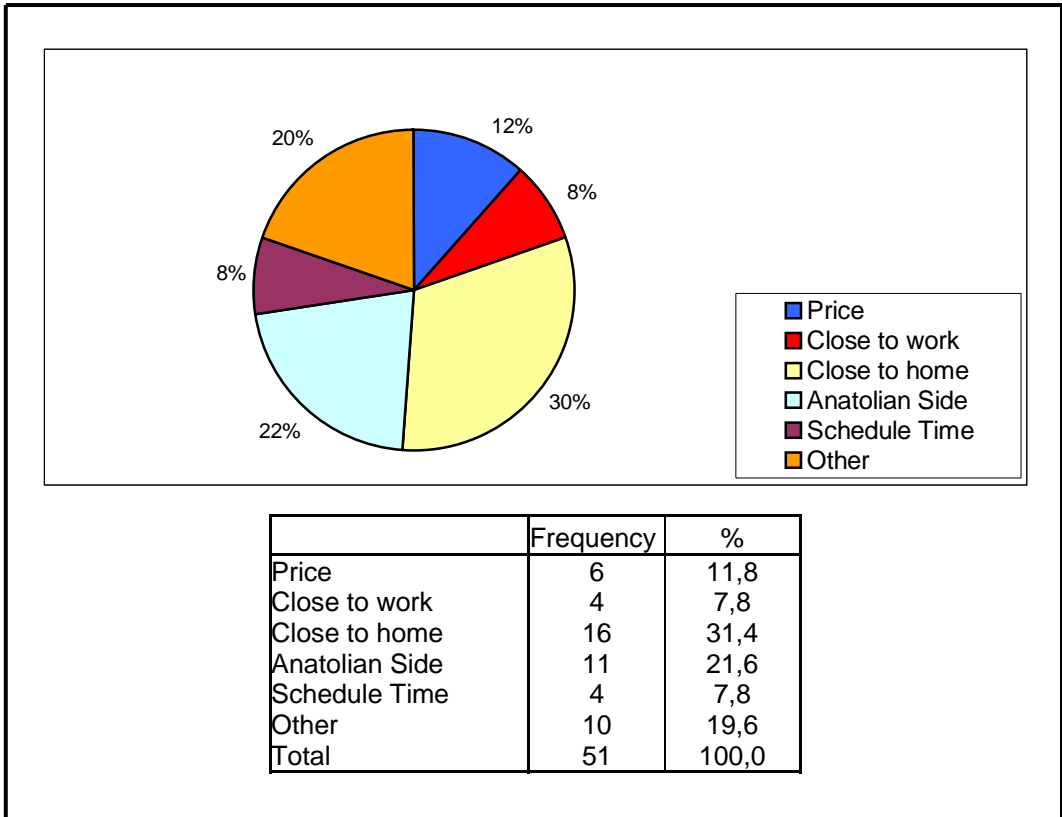


Figure VII.11. The Reason why Passengers Prefer Sabiha Gökçen Airport

When passengers were asked whether they would use Sabiha Gökçen International Airport for the next trip, 67 % of them stated that they would (Figure VII.12). When we analyze by cross-tabulation of the remaining 33 % who stated they would prefer Atatürk Airport instead we see that the passengers who did not live in İstanbul and some others who have been working at the European side of İstanbul constitute the majority.

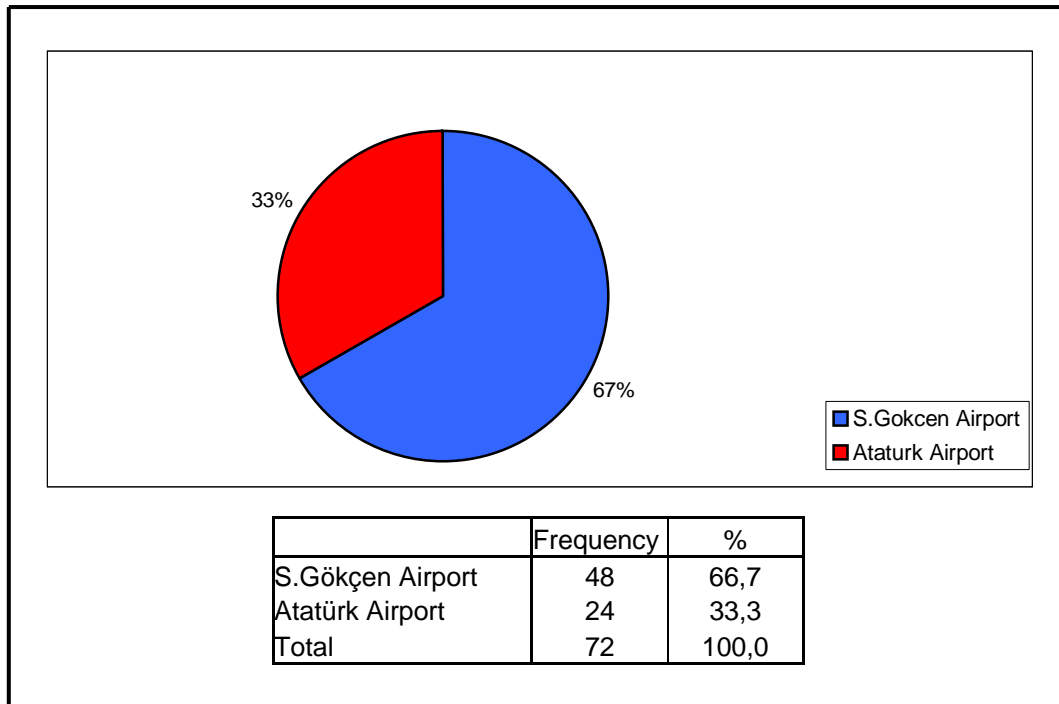


Figure VII.12. The Preference of the Airports for the Next Trip

The questionnaire also required the respondents to comment on whether there has been any change in their frequency of using the air transport mode after the opening of Sabiha Gökçen International Airport. According to the answers given to the questionnaire (Figure VII.13), after the opening of the second airport in İstanbul, approximately half of the passengers' flying frequency was increased. The cross-tabulation of this question with the residence and work-places of the respondents showed that it was particularly 76 % of the passengers who have been living and 70 % of the passengers who have been both living and working at the Anatolian side of İstanbul that stated an increase in their frequency of air travel.

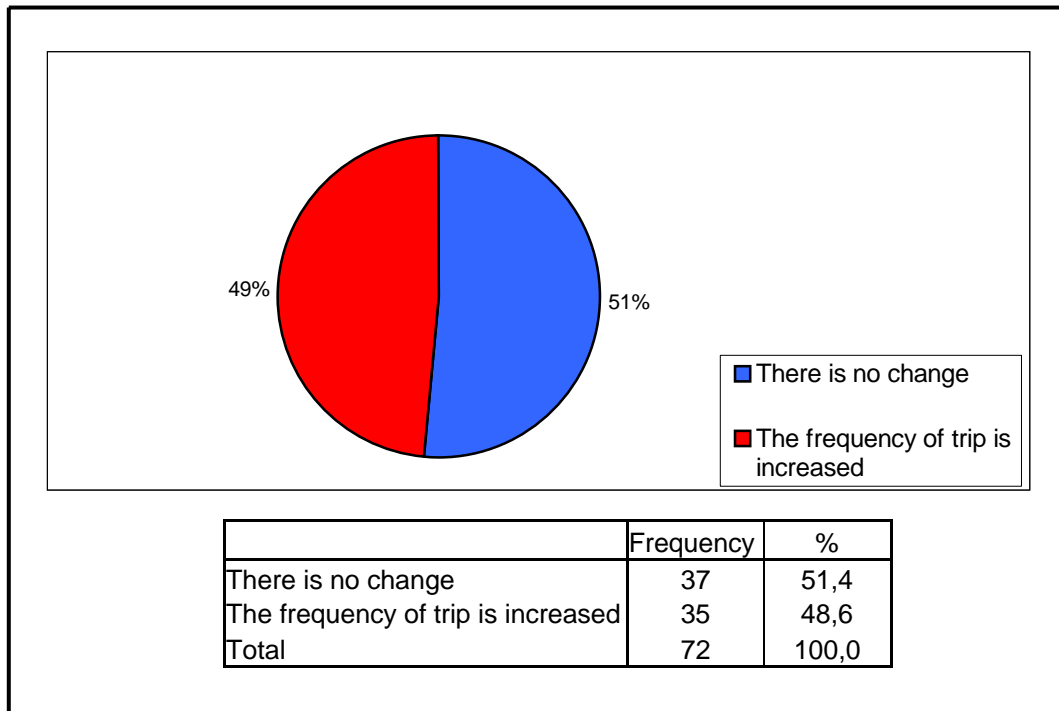


Figure VII.13. The Frequency Change of the Trip After Operating Sabiha Gökçen International Airport

As mentioned above, the question regarding the general preference regarding İstanbul airports by the respondents (given earlier in Figure VII.9) was cross-examined with the location of residences and workplaces of the respondents. Figure VII.14 which shows the cross-examination of airport preference answers according to residence locations reveals that 94 % of the passengers, who prefer Sabiha Gökçen International Airport in general, reside in the Anatolian side of İstanbul. Looking at the cross-examination from the other way, it can also be seen that 80 % of the passengers, who reside in the Anatolian side of İstanbul, stated that they generally prefer flying from Sabiha Gökçen International Airport. These results strongly indicate the regional/local significance of Sabiha Gökçen Airport: majority of passengers who reside in the Anatolian side of the city, the region that this airport serves, state they prefer using this airport.

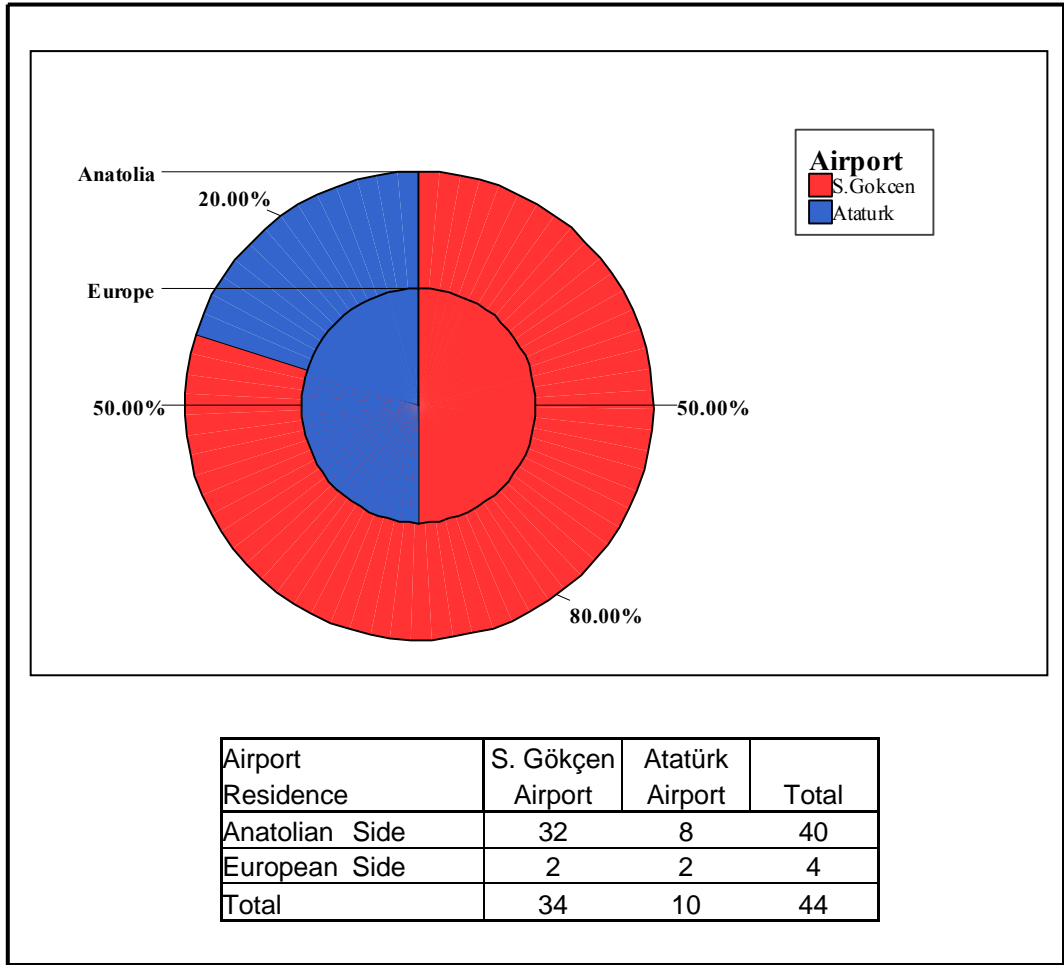


Figure VII.14. Residence and the Preference of Airports in General

Cross-examination of the airport preference of respondents with their workplace also indicates a similar correlation as seen in the residence locations (Figure VII.15). 88 % of the passengers, who prefer Sabiha Gökçen International Airport in general, work at the Anatolian side of İstanbul. 94 % of the passengers, who work at the Anatolian side of İstanbul, fly from Sabiha Gökçen International Airport.

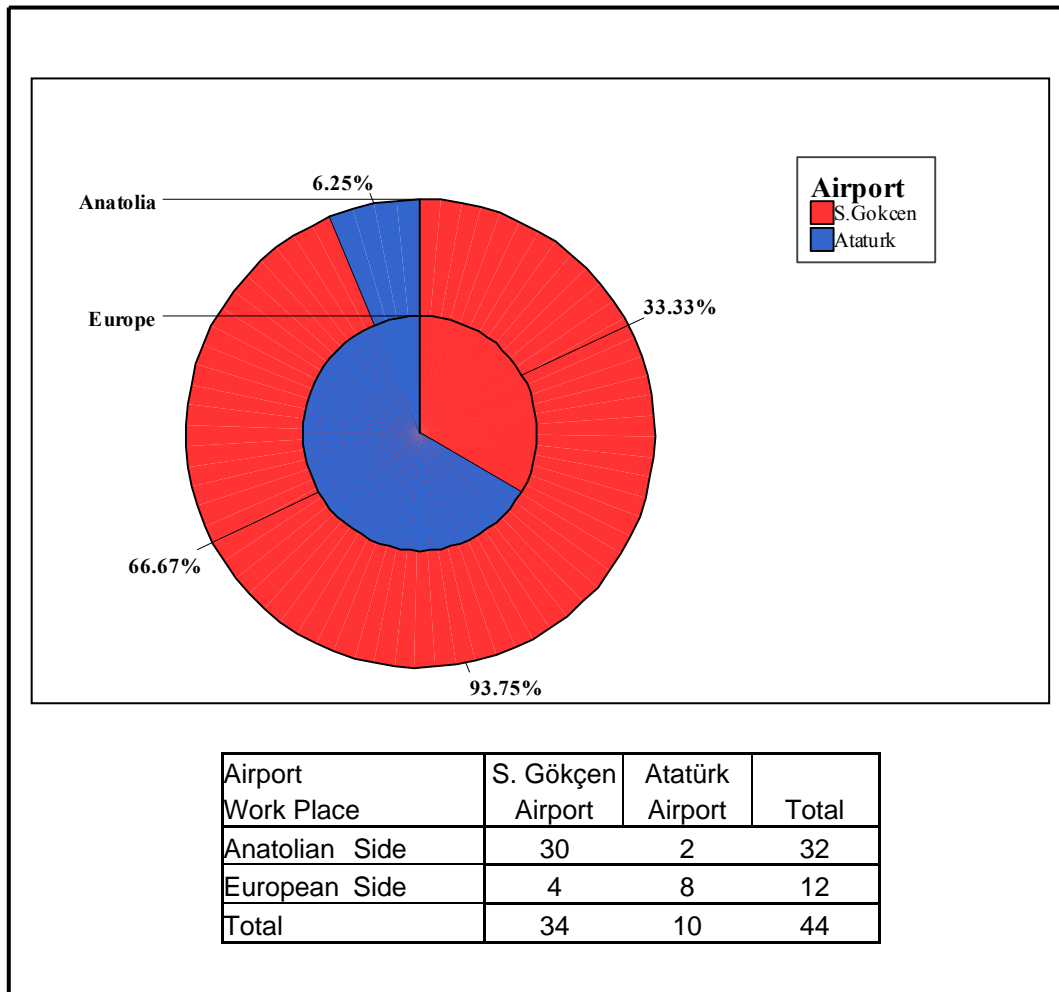


Figure VII.15. Work Place and the Preference of Airports in General

To summarise, the evaluation of the questionnaire and the results of the interview with the passengers especially indicate that Sabiha Gökçen International Airport is being used by people living and working in the Anatolian side of İstanbul, and that the main reason for their choice is the location of this airport at the Anatolian side. Hence the results indicate a strong regional/local significance for the airport. All other reasons for choosing this airport did not reveal a statistical significance. Relatively low percentages of passengers mentioned discount flight fares and low price (and in some cases free) parking facility as other factors that make them prefer using Sabiha Gökçen International Airport.

Similarly, factors regarding the convenience of flight schedule times were not quoted much by the respondents. Although the passengers did not refer to these service

quality factors, such as cost, frequency, and convenience, it is believed that these factors still have a certain level of importance since it was seen in the previous chapter that passenger numbers increased significantly following the Pegasus Airlines' choosing Sabiha Gökçen International Airport as a hub for their domestic flights and offering higher frequency services and lower price alternatives. In addition, it was seen in the previous chapter that Turkish Airlines' increasing the number of destination in domestic flights from Sabiha Gökçen International Airport and the application of the low price policy on various routes were among the reasons of increasing passenger traffic volume. Therefore, such improved service qualities inevitably attract passengers to the airport; however, it is extremely important to stress again that, when asked, passengers appear to value these changes in flights less than the fact that these flights are based on the Anatolian side of the city, close to their homes or workplaces. This aspect emphasises the current and potential future role of the airport for its region.

The questionnaire also showed that there was a tendency for passengers who take a trip to the other cities around İstanbul to prefer Sabiha Gökçen International Airport. For instance, there were passengers whose destination was Kocaeli or Sakarya, located at the east side of Marmara Region, and who chose Sabiha Gökçen International Airport to travel to these cities. Perhaps this data needs to be verified by a more comprehensive research on mobility in this wider region; nevertheless, these examples indicate the possible role that Sabiha Gökçen International Airport can play for the city-region of İstanbul and particularly the east side of Marmara Region.

The questionnaire results also indicate that Sabiha Gökçen International Airport can in time become an important part of the multi-airport system in İstanbul. It was shown in the previous chapter that passenger numbers at this airport is still low compared to the Atatürk International Airport, but that the most recent figures indicate increasing significance of this airport in air travel in İstanbul. The questionnaire shows that people who use Sabiha Gökçen are predominantly those who live and work at the Anatolian side of the city. This shows the importance of the regional character of the airport, and its articulation to the multi-airport system of the

city by penetrating a certain region that, in the absence of this secondary airport, has longer distances to travel to the primary airport. This convenience in travel is also probably the reason behind the questionnaire finding that more than half of the passengers increased their frequency of their air travel after the opening of Sabiha Gökçen Airport. This is an important finding regarding the increased accessibility of the area brought about with this secondary airport. The concept of increased accessibility is further elaborated in the section below that aims to measure benefits such as time saved and cost avoided with the addition of the secondary airport to İstanbul.

VII.2. Transportation Benefits of Sabiha Gökçen International Airport: Savings in Travel Time and Cost

Time saved and cost avoided by using air transportation are the benefits that can be expressed in a monetary unit. The method was described in the methodology chapter. The application of this method will be demonstrated in order to choose a point which is closer to the second airport, Sabiha Gökçen International Airport in İstanbul.

The following procedure measures the value of time saved and reduction in travel cost by travelers as a result of the location of the secondary airport. Because the secondary airport is located in the Anatolian side of İstanbul, as opposed to the primary airport located in the European side, the focus of the approach is on the Anatolian side of the city because this is where savings can be expected in travel time and travel cost. Hence, in calculating the changes in trips to the airport, the origin points of trips chosen to analyse are located in the Anatolian side of İstanbul where Sabiha Gökçen International Airport is located.

Before certain origin points are chosen, four different locations for origin points were analysed, as shown in Table VII.1.

Table VII.1. Some Origin Points of Trips in the Anatolian Side of İstanbul

Origin Point	Modes of Trip	ATATÜRK AIRPORT			S. GÖKÇEN AIRPORT		
		distance	price	trip duration	distance	price	trip duration
KOZYATAĞI	Taxi	35 km	36,50 YTL	35 min.	24 km	25,50 YTL	24 min.
	Passenger Car		13,50 YTL ¹	35 min.		7,20 YTL	24 min.
	* Havaş		14,00 YTL	90 min.		6,50 YTL	50 min.
PENDİK	Taxi	55 km	56,50 YTL	55 min.	12 km	13,50 YTL	12 min.
	Passenger Car		19,50 YTL ¹	55 min.		3,6 YTL	12 min.
KADIKÖY	Taxi	38 km	39,50 YTL	38 min.	35 km	36,50 YTL	35 min.
	Passenger Car		14,40 YTL ¹	38 min.		10,50 YTL	35 min.
ÜMRANIYE	Taxi	33 km	34,50 YTL	33 min.	31 km	32,50 YTL	31 min.
	Passenger Car		12,90 YTL ¹	33 min.		9,30 YTL	31 min.

(1) Including bridge (Boğaziçi, Fatih Sultan Mehmet Bridge) crossing fee (3,00YTL)

* Information is obtained from Havaş (Ground Handling Co.)

The acceptance of speed for taxi and passenger car is 60 km/hour.

For passenger car, the average cost of car is accepted 0,30 YTL/hour.

Congestion and stopping time in traffic due to signalization are neglected.

The calculation price of taxi depends on the price list of taximeter.

After considering the four different origin points above, all of which are located in the Anatolian side of İstanbul, it was decided to conduct the detailed study to two points, Kozyatağı and Pendik, which are closer to Sabiha Gökçen International Airport, and hence making a significant difference in time and cost of travel. Moreover, as described in detail below, it is possible to accept Kozyatağı as a gravity centre for the whole of Anatolian side.

The first selected origin point is Kozyatağı, which can be considered a central point for the Anatolian side of settlements: residential density around this area is rather high, making Kozyatağı a gravity centre for these settlements at this side. In addition, shuttles to the airport, operated by Havaş (Ground Handling Co.), also uses this area as its central station for airport services. Tables VII.2 to VII.4 show different distances, prices, and trip durations from Kozyatağı to the two alternative airports for different transport modes.

Table VII.2. Time and Cost Savings for Passengers Travelling by Havaş (Ground Handling Co.) from Kozyatağı

Origin	Airport	Distance	Price	Trip Duration
Kozyatağı	Atatürk International Airport	35 km	14.00 YTL	90 minute
	S. Gökçen International Airport	24 km	6.50 YTL	50 minute

All information above were provided by Havaş and verified through controlling distances on the map (Figure VII.16). Trip duration, which is also provided by Havaş, include the shuttles' various stopping places along the route.

Following results can be achieved using the data in the above table (*for calculation of value of time figures, please refer to Chapter 4: Methodology*):

Reduction in Travel Cost : $14.00 - 6.50 = 7.50$ YTL

Time Saved : $90 - 50 = 40$ minute

Value of time (vot) : 3.2 YTL / hour

$$\begin{aligned}
 \text{Passenger Benefit} &= (\text{vot}) \times 40\text{min.} + 7.5 \\
 &= 3.2 \times 40/60 + 7.5 \\
 &= 2.13 + 7.5 \\
 &= \mathbf{9.63 \text{ YTL}}
 \end{aligned}$$

The calculations above show that for a passenger travelling from Kozyatağı using Havaş shuttle services, the introduction of Sabiha Gökçen International Airport, results in a total saving of 9.63 YTL for each trip to (or from) the airport.

A similar approach is used below for the taxi trips.

Table VII.3. Time and Cost Savings for Passengers Travelling by Taxi from Kozyatağı

Origin	Airport	Distance	Price	Trip Duration
Kozyatağı	Atatürk International Airport	35 km	36.50 YTL	35 minute
	S. Gökçen International Airport	24 km	25.50 YTL	24 minute

In order to calculate taxi trip costs, calculations were made considering the flat opening fare of taximeters in İstanbul and then increases in price per km. In addition, these findings were also verified by contacting taxi stops in Kozyatağı.

In order to calculate trip durations, the assumption was that average car journey speeds along these routes would be 60 km/hour. It was assumed that the journeys included certain urban sections that restrict speeds as well as traffic signals that reduce average journey speeds. On the other hand, the journeys also included substantial sections along expressways, where traffic speeds can be much higher. It was decided that 60 km/hour would be a sound average reflecting both low-speed segments of the journey in urban traffic and high-speed segments in expressways. Traffic congestion effects are not included.

Following results can be achieved using the data in the above table:

Reduction in Travel Cost : $14.00 - 6.50 = 11.50$ YTL

Time Saved : $35 - 24 = 11$ minute

Value of time (vot) : 3.2 YTL / hour

$$\begin{aligned}
 \text{Passenger Benefit} &= (\text{vot}) \times 11 \text{ min.} + 11.5 \\
 &= 3.2 \times 11 / 60 + 11.5 \\
 &= 0.59 + 11.5 \\
 &= \mathbf{12.09 \text{ YTL}}
 \end{aligned}$$

It can be seen that for a passenger travelling from Kozyatağı by taxi, the introduction of Sabiha Gökçen International Airport, results in a total saving of 12.09 YTL for each trip to (or from) the airport.

Calculations are also made for car journeys in the table below.

Table VII.4. Time and Cost Savings for Passengers Travelling by Car from Kozyatağı

Origin	Airport	Distance	Price	Trip Duration
Kozyatağı	Atatürk International Airport	35 km	13.50 YTL	35 minute
	S. Gökçen International Airport	24 km	7.20 YTL	24 minute

Trip duration for the car journey was calculated based on the same assumption described above for the taxi journeys that average journey speed is 60 km/hour.

Following results can be achieved using the data in the above table:

Reduction in Travel Cost : $13.50 - 7.20 = 6.30$ YTL

Time Saved : $35 - 24 = 11$ minute

Value of time (vot) : 3.2 YTL / hour

$$\begin{aligned}
 \text{Passenger Benefit} &= (\text{vot}) \times 11 \text{ min.} + 6.3 \\
 &= 3.2 \times 11/60 + 6.3 \\
 &= 0.59 + 6.3 \\
 &= \mathbf{6.89 \text{ YTL}}
 \end{aligned}$$

Calculations above show that for a passenger travelling from Kozyatağı by car, the introduction of Sabiha Gökçen International Airport results in a total saving of 6.89 YTL for each trip to (or from) the airport.

The above analysis shows that for passengers travelling from Kozyatağı, the existence of Sabiha Gökçen International Airport as an alternative results in a total saving of 9.63 YTL by HAVAŞ; 12.09 YTL by taxi; and 6.89 YTL by private car.

The second selected origin point is Pendik which is 12 km far away from Sabiha Gökçen International Airport. This area together with settlements in Kartal represent an important magnitude of population. Considering the proximity of the area to the secondary airport in comparison to the primary airport, analysis of savings in time and cost of journeys to the airport also becomes important for this region. Tables VII.5 and VII.6 shows this analysis.

Table VII.5. Time and Cost Savings for Passengers Travelling by Taxi from Pendik

Origin	Airport	Distance	Price	Trip Duration
Pendik	Atatürk International Airport	55 km	59.50 YTL	55 minute
	S. Gökçen International Airport	12 km	13.50 YTL	12 minute

Once again, the prices are calculated by using taximeter information and verified by contacting taxi stations in the area. The trip duration is again calculated by assuming that speed of journeys is 60 km/hour on average. Following calculations can be made using the information in the above table:

$$\text{Reduction in Travel Cost} : 59.50 - 13.50 = 46.00 \text{ YTL}$$

$$\text{Time Saved} : 55 - 12 = 43 \text{ minute}$$

$$\text{Value of time (vot)} : 3.2 \text{ YTL / hour}$$

$$\text{Passenger Benefit} = (\text{vot}) \times 43 \text{ min.} + 46.00$$

$$= 3.2 \times 43/60 + 46.00$$

$$= 2.29 + 46.00$$

$$= \mathbf{48.29 \text{ YTL}}$$

Table VII.6. Time and Cost Savings for Passengers Travelling by Car from Pendik

Origin	Airport	Distance	Price	Trip Duration
Pendik	Atatürk International Airport	55 km	19.50 YTL	55 minute
	S. Gökçen International Airport	12 km	3.60 YTL	12 minute

Reduction in Travel Cost : $19.50 - 3.60 = 15.90$ YTL

Time Saved : $55 - 12 = 43$ minute

Value of time (vot) : 3.2 YTL / hour

$$\begin{aligned}
 \text{Passenger Benefit} &= (\text{vot}) \times 11 \text{ min.} + 15.9 \\
 &= 3.2 \times 43/60 + 15.9 \\
 &= 2.29 + 15.9 \\
 &= \mathbf{18.19 \text{ YTL}}
 \end{aligned}$$

Due to its relative proximity to Sabiha Gökçen International Airport, Pendik area has significantly higher benefits in terms of savings in airport journeys as a result of this new airport. The analysis shows that for passengers travelling from Pendik, the existence of Sabiha Gökçen International Airport as an alternative results in a total saving of 48.29 YTL by taxi; and 18.19 YTL by private car. People living or working in this region have considerably increased accessibility to air transport, resulting in large savings in travel time and travel cost.

So far, the calculated benefits were based on the cost and time savings for an individual passenger. There is also the question of calculating annual passenger savings, i.e. representing these individual savings in total annual figures. This means calculating annual passenger benefits for those of passengers who benefit from this investment, i.e. passengers originating from the Anatolian side. It was assumed that passengers originating from the Anatolian side are those who live or work at this side. This requires an assumption for the percent of Sabiha Gökçen Airport users that live or work in the Anatolian side, the area that benefits most in accessibility (savings) terms. Such an assumption was made using the passenger survey results. A

cross-tabulation was made with passengers living in the Anatolian side and passengers working in the Anatolian side. It was found that 45% of the respondents *both* lived and worked in the Anatolian side of the city. It was considered to use this percentage, because this percentage shows passengers with the highest probability of using Sabiha Gökçen International Airport originating from the Anatolian side. It is possible that the real percentage is higher: people who live but not work in the Anatolian side may also prefer Sabiha Gökçen International Airport and originate from the Anatolian side; as well as people who do not live but work in the Anatolian side. Nevertheless, as mentioned above focusing on people who both live and work in the Anatolian side provides us with a group who are most likely to prefer Sabiha Gökçen International Airport and originate from the Anatolian side, hence who are most likely to enjoy the transportation benefits, i.e. time and cost savings.

Total domestic passenger number of Sabiha Gökçen International Airport was 548.991 in 2005. 45 % of this number (based on the questionnaire results) is 247.045 passengers. The individual benefits are to be calculated as annual using this figure.

It was considered that using the Kozyatağı figures for individual benefits was more realistic in calculating annual benefits (as opposed to Pendik figures which are very high due to the proximity of the site to the secondary airport). Kozyatağı can be considered as a gravity centre for the Anatolian side; the fact that HAVAŞ operates its shuttles from this centre also supports this argument.

When we multiply the individual benefits from Kozyatağı as the average individual benefits for Anatolian side with the annual Sabiha Gökçen passenger number originating from the Anatolian side, we can find out the total annual benefit of passengers as shown in Table VII.7.

Table VII.7. Total Annual Passenger Benefit from Kozyatağı (YTL)

By HAVAŞ	By Taxi	By Car
$247.045 \times 9,63 = \mathbf{2.379.043}$	$247.045 \times 12,09 = \mathbf{2.986.774}$	$247.045 \times 6,89 = \mathbf{1.702.140}$

To summarise, Sabiha Gökçen International Airport has significant transportation benefits for the Anatolian side of the city when the passengers' savings in travel time and cost are taken into consideration.

VII. 3. Interview with the Operator of Sabiha Gökçen International Airport

Sabiha Gökçen International Airport is operated by the Airport Operation and Aviation Industries Company (HEAS), which is responsible for ground services, cargo, parking, fire service, air traffic control and all the other essential airport services.

HEAS was founded in January 2000 and has been operating Sabiha Gökçen International Airport since January 2001, the opening date of the airport. Today, the number of people who work at the airport is 683. Some of them work in relays because the airport is in operation every time.

In the interview, the operator emphasized that there is no restriction for the use of the airport in terms of the services and transportation facilities. The operator did not give any information about the exact service fee (landing fee, fuel flowage fee, aircraft parking fee, hangar rentals etc.) differences between Atatürk and Sabiha Gökçen Airports but they have variable agreements according to the usage frequency of the airport by the airlines.

It was stated by the operator that the important feature of the airport is that all of the services are provided by the same company, HEAS at Sabiha Gökçen International Airport. The management of all services from the same company facilitates the coordination between interunits which provide ground, cargo, parking and other services. When there is a problem with these services, to solve this problem is easy because the responsible unit is clear. This also helps to plan and introduce different services to complement the air travel service. For example, parking facility at the airport for domestic flights terminal is free of charge and Pegasus Airlines has rented parking area from the operator and they have been serving this free of charge. In

addition, only international flights terminal parking area has not been serving free of charge but it is cheaper than Atatürk International Airport's parking facility. This is an important service to attract more passengers. The operator emphasised that they do not need any policies to attract more passengers in the near future. They stated that they were pleased with the increasing air traffic volume and their principal aim is the provision of efficient services to the airlines and passengers without any delays.

Moreover, Sabiha Gökçen International Airport takes a part in the airline company's guides, instruction sheets so that Sabiha Gökçen International Airport like other international airports is open to all airline companies without additional negotiations. Sabiha Gökçen International Airport is the 19th airport which is open to international flights in Turkey.

Turkish Airlines and Pegasus Airlines have scheduled domestic flights from Sabiha Gökçen Airport. Turkish Airlines have been arranging domestic flights since the 30th of April 2005 and Pegasus Airlines have been arranging since the 1st of November 2005. International flights are arranged to The Netherlands, Germany, Belgium, England (London / Luton), Switzerland, United Arab Emirates and charter flights to The Central Asian Republics.

Besides the commercial flights, the multi-purpose flights are arranged. For example; training flights, recreational flights, baloon, advertisement flights and emergency medical flights are the other facilities of the airport. All types of aircraft can easily land and take off regarding the physical and technological features of runway.

Today, Sabiha Gökçen International Airport has an initial capacity of three million international and 500 000 domestic passengers. As a result it has 3,5 million annual passenger capacity. After finishing the project, the airport capacity will be three million domestic and seven million international passengers thus a total of 10 million passengers. According to the operator, the air traffic volume is expected to rise rapidly over the next few years at Sabiha Gökçen Airport.

CHAPTER VIII

CONCLUSION

VIII. 1. Summary

The principal aim of this research has been to assess and understand the current and potential role of Sabiha Gökçen International Airport in the multi-airport system of İstanbul, to understand the contribution of the airport to İstanbul and particularly the Anatolian side, in terms of benefits in accessibility and mobility and to identify the importance of İstanbul's second airport for the Anatolian side of the city through an in-depth analysis of the customers and of the main factors underlying the existing passenger travel demand in the concept of multi-airport system.

The process of this research began with the overview of airports. The transportation benefits and economic impacts of an airport investment were emphasized in terms of the contribution to the community well being and economy of the region. The detailed interaction between the airport and its urban environment was explained. The effects of the airport investments were identified by the examples which were applied in different countries. In addition, the research gave information about the concept of the multi-airport system with the experiences of London metropolitan area and Washington-Baltimore. All of these constitute the theoretical framework of this research.

The main focus of this study is the transportation benefits of Sabiha Gökçen International Airport. It was aimed to understand the position of the airport and to assess how the airport affected accessibility and mobility in the region it serves. In particular the aim was to understand whether this secondary airport in İstanbul resulted in air traffic congestion relief in the primary airport and whether there were significant savings in travel cost and travel time for journeys to the airport. The research questions and methodology were designed accordingly.

In order to respond to the research questions, the recent developments of the air transportation data were examined; a passenger survey was implemented to the passengers who took a domestic flight; and transportation benefits to originating passengers were calculated by analysing savings in travel time and cost. Finally an interview was also applied to the operator of Sabiha Gökçen International Airport.

VIII. 2. Findings

The main findings of this research are derived from Chapter 6 that has a special focus on the traffic data of the airports and Chapter 7 that presents the questionnaire that has been implemented to the domestic passengers as well as the calculation of transportation benefits and the interview with the operator of Sabiha Gökçen International Airport. The key findings of this study can be explained as;

- Sabiha Gökçen International Airport has been in operation since January 2001 but the expected rise has not been seen yet. Consequently, Sabiha Gökçen International Airport has not relieved the congestion of Atatürk International Airport in terms of air traffic passenger yet.
- However, when the monthly air traffic data is analysed, the increase in air traffic in Sabiha Gökçen International Airport is significant. In particular, the analysis of the last months of 2005, revealing that 10% of İstanbul air passenger traffic took place in Sabiha Gökçen International Airport, shows that the airport is becoming increasingly important as the secondary airport of the İstanbul Multi-Airport System. The decrease in the rate of traffic growth in Atatürk International Airport in December 2005, may also indicate that in the near future Sabiha Gökçen International Airport can help relieve air traffic congestion in Atatürk International Airport
- Domestic passenger numbers have increased at a higher rate than international passenger numbers. This may indicate the increasing mobility of the people living and working in the Anatolian side of İstanbul.

- Choosing Sabiha Gökçen International Airport as a hub for domestic flights by Pegasus Airlines and offering low price alternatives to the passengers, additionally the increasing number of destinations in terms of domestic flights by Turkish Airlines appear to be the essential factors of the rise of domestic passenger traffic volume.
- Passenger survey revealed that Sabiha Gökçen International Airport, the second airport of İstanbul, is mostly used by originating passengers as the characteristic part of the multi-airport system. This also shows that the airport is becoming increasingly important as the secondary airport of the İstanbul Multi-Airport System. In addition, this finding also indicates a strong regional/local significance for the airport.
- According to the passenger survey after the opening of the second airport in İstanbul, approximately half of the passenger's flying frequency was increased. This is an important impact on mobility, indicating the transportation benefits of the investment.
- Sabiha Gökçen International Airport has significant transportation benefits particularly for the originating passengers in the Anatolian side. Savings in travel time and travel cost are significant when journeys originating from Anatolian side to the Atatürk International Airport are compared with those to the Sabiha Gökçen International Airport.
- Interview with the airport operator showed that free or discount parking facilities at the airport as well as discount tickets helped attract passengers to the airport. Regarding the future, the operator stated that they believed the steady increase in passenger numbers would continue without the operator's having to implement additional policies to attract passengers.

It can be concluded that although passenger air traffic levels in Sabiha Gökçen International Airport are still limited, the rate of growth is significant and that the past months witnessed a considerable share of traffic for this airport in total air traffic in İstanbul. Moreover, due to the fact that the airport is preferred mainly by people living and working in the Anatolian side and that the airport provides significant savings in travel time and travel cost for those living and working in the Anatolian side, passenger traffic levels in the airport are expected to increase. For the same reasons, the regional and local significance of the airport is increasing. It can be seen that the Sabiha Gökçen International Airport is becoming an important part of the İstanbul Multi-Airport System and is holding the potential to relieve the pressures on Atatürk International Airport in the near future.

VIII. 3. Concluding Remarks

Airports, as being the infrastructure of air transportation provide significant transportation benefits and economic impacts, and have become an integral part of the local, regional and national economies. They are a key catalyst for economic growth through employment and the utilization of goods and services, and have a profound influence on the quality of life of populations around the world. They integrate world markets and promote the international exchange of people, products, investment and ideas.

While estimating the regional economic significance of airports, its economic impact and its transportation benefits are the two primary measures of an airport's importance. In this study transportation benefits are tried to be evaluated in terms of the mobility and the accesibility of Sabiha Gökçen International Airport in the Anatolian side of İstanbul with respect to mentioned methodology in the previous chapters.

This study can be a database for future research of air transportation in İstanbul. For a further study on the subject, after finishing the project of Advanced Technology Industrial Park considering all elements, the total contribution to the

economy of the region, the Anatolian side of İstanbul and also the east side of Marmara Region, 'the total economic impact' may be studied.

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APPENDIX A

PASSENGER QUESTIONNAIRE

1.Nereden geliyorsunuz? / Nereye gidiyorsunuz?			

2.İstanbul'da mı yaşıyorsunuz?			
Evet		Hayır	
Nerede ikamet ediyorsunuz? _____ Nerede çalışıyorsunuz? _____	<i>Gelen yolcu için</i>		<i>Giden yolcu için</i>
	İstanbul'da kalacak mısınız?		Nerede kaldınız?
	Evet	Hayır	
	Nerede kalacaksınız?		Nereyi ziyaret ettiniz?
	Kaç gün?		Kaç gün?

3.Yolculuk amacı nedir?

.....iş amaçlı gezi amaçlı kişisel diğer

* İş amaçlı ise katılacağınız etkinlik veya toplantı nerede yapılacak?

.....Avrupa yakasında

.....Anadolu yakasında

.....Havaalanı yakınında

.....

4.İstanbul'da genelde tercih ettiğiniz havaalanı hangisidir?

.....Sabiha Gökçen Havalimanı

.....Atatürk Havalimanı

* Eğer Atatürk Havalimanı tercih ediliyorsa sebebi nedir?

-Fiyat
-İşe yakın oluşu
-Eve yakın oluşu
-Avrupa yakasında oluşu
-Sefer saatinin uygun oluşu
-

* Eğer Sabiha Gökçen Havalimanı tercih ediliyorsa sebebi nedir?

-Fiyat
-İşe yakın oluşu
-Eve yakın oluşu
-Anadolu yakasında oluşu
-Sefer saatinin uygun oluşu
-Atatürk Havalimanı seferlerinde yer olmayışı
-

5.Bundan sonraki seyahatler için hangi havaalanını kullanacaksınız?

.....Sabiha Gökçen Havalimanı Atatürk Havalimanı

6.Sabiha Gökçen Havalimanının açılması uçak ile seyahat sıklığınızı ne oranda değiştirdi?

-Değişmedi
-Seyahat sıklığım arttı
-

APPENDIX B

INTERVIEW WITH OPERATOR

1. Hangi tarihten itibaren havaalanı işletimi tarafınızca yapılmaktadır?
Kaç yıllık süre ile?

Başka bir havaalanı işletiyor musunuz?
2. Çalışan sayısı
Part time....
Full time....
3. Sizce Sabiha Gökçen Havaalanı'nın kullanımını kısıtlayan bir etken var mı?

Varsa...
.....Yetersiz havaalanı hizmetleri
.....Yetersiz ulaşım bağlantıları
.....
4. Sabiha Gökçen ile Atatürk Havaalanı karşılaştırıldığında sunulan hizmetlerdeki ücret farklılıkları nelerdir?

Landing fee
Fuel flowage fee
Aircraft parking fee
Hangar rentals
5. Sabiha Gökçen Havaalanını kullanan uçak firmaları hangileri?

İç hat.....
Dış hat.....
Charter.....
6. Havaalanının sunduğu diğer hizmetler nelerdir?

.....Rekreasyon amaçlı uçuşlar, paraşüt
.....Balon
.....Eğitim
.....Acil medikal uçuşlar
.....Model uçak
.....Reklam amaçlı uçuşlar
.....

C.1. STATISTICS OF WELL-KNOWN AIRPORTS IN TURKEY

2003 PASSENGER TRAFFIC			2004 PASSENGER TRAFFIC			2005 PASSENGER TRAFFIC			
	Domestic	International	Total	Domestic	International	Total	Domestic	International	Total
ATATÜRK (İstanbul)	3.126.074	8.978.268	12.104.342	5.430.925	10.169.676	15.600.601	7.594.315	12.052.827	19.647.142
S. GÖKÇEN* (İstanbul)	2.826	154.346	157.172	10.323	235.336	245.659	548.991	447.747	996.738
ESENBOĞA (Ankara)	1.773.531	1.010.396	2.783.927	2.141.047	1.134.678	3.275.725	2.640.555	1.188.318	3.828.873
A.MENDERES (İzmir)	985.052	1.352.697	2.337.749	1.403.321	1.538.960	2.942.281	1.983.422	1.677.164	3.660.586
ANTALYA	615.420	9.756.180	10.371.600	1.092.858	12.563.195	13.656.053	1.588.749	14.256.111	15.844.860
DALAMAN	166.072	2.089.002	2.255.074	189.877	2.557.577	2.747.454	291.757	2.880.821	3.172.578
ADANA	498.996	287.859	786.855	805.105	342.378	1.147.483	1.276.694	432.258	1.708.952
TRABZON	374.439	54.608	429.047	718.735	56.964	775.699	1.022.146	61.306	1.083.452
MİLAS-BODRUM	277.819	1.321.749	1.599.568	395.365	1.641.259	2.036.624	573.552	1.925.527	2.499.079
2003 TOTAL AIRCRAFT			2004 TOTAL AIRCRAFT			2005 TOTAL AIRCRAFT			
	Domestic	International	Total	Domestic	International	Total	Domestic	International	Total
ATATÜRK (İstanbul)	56.372	105.455	161.827	72.479	115.008	187.487	92.974	126.144	219.118
S. GÖKÇEN* (İstanbul)	2.100	4.312	6.412	3.237	5.746	8.983	8.003	9.582	17.585
ESENBOĞA (Ankara)	25.447	10.514	35.961	29.359	12.539	41.898	40.954	12.674	53.628
A.MENDERES (İzmir)	14.308	11.284	25.592	16.991	11.744	28.735	23.171	13.111	36.282
ANTALYA	11.083	57.681	68.764	14.455	74.105	88.560	19.971	84.606	104.577
DALAMAN	5.059	13.299	18.358	5.215	15.863	21.078	6.672	18.050	24.722
ADANA	7.768	2.616	10.384	10.767	2.890	13.657	17.355	4.212	21.567
TRABZON	3.830	1.561	5.391	6.332	1.514	7.846	9.179	2.386	11.565
MİLAS-BODRUM	5.096	8.898	13.994	5.613	10.516	16.129	7.291	12.247	19.538

STATISTICS

APPENDIX C

	2003 TOTAL AIRCRAFT (commercial)			2004 TOTAL AIRCRAFT (commercial)			2005 TOTAL AIRCRAFT (commercial)		
	Domestic	International	Total	Domestic	International	Total	Domestic	International	Total
ATATÜRK (İstanbul)	42.910	104.048	146.958	59.183	112.279	171.462	80.962	124.057	205.019
S. GÖKÇEN* (İstanbul)	279	4.008	4.287	920	5.273	6.193	5.843	8.789	14.632
ESENBOĞA (Ankara)	20.606	8.841	29.447	23.321	10.598	33.919	29.133	10.698	39.831
A.MENDERES (İzmir)	10.039	10.564	20.603	13.254	11.110	24.364	19.290	12.380	31.670
ANTALYA	8.904	56.812	65.716	12.134	72.897	85.031	17.578	82.839	100.417
DALAMAN	2.568	12.702	15.270	3.026	15.419	18.445	3.683	17.052	20.735
ADANA	4.654	2.503	7.157	6.971	2.756	9.727	11.042	3.863	14.905
TRABZON	3.491	845	4.336	6.019	674	6.693	8.702	745	9.447
MİLAS-BODRUM	3.538	8.507	12.045	4.194	10.065	14.259	5.941	11.616	17.557
	2003 TOTAL CARGO			2004 TOTAL CARGO			2005 TOTAL CARGO		
	Domestic	International	Total	Domestic	International	Total	Domestic	International	Total
ATATÜRK (İstanbul)	82.983	419.709	502.692	111.593	461.691	573.284	129.779	481.964	611.743
S. GÖKÇEN* (İstanbul)	0	8.618	8.618	0	8.994	8.994	3,58	13.595	13.599
ESENBOĞA (Ankara)	27.492	32.873	60.365	36.096	37.830	73.926	39.326	35.747	75.073
A.MENDERES (İzmir)	21.221	29.079	50.300	25.442	30.864	56.306	29.682	32.508	62.190
ANTALYA	14.622	191.914	206.536	24.793	253.612	278.405	34.967	285.095	320.062
DALAMAN	2.223	28.326	30.549	2.630	34.788	37.418	3.675	39.503	43.178
ADANA	10.864	9.686	20.550	14.536	10.159	24.695	17.382	11.096	28.478
TRABZON	6.469	1.687	8.156	10.323	1.606	11.929	13.619	1.821	15.440
MİLAS-BODRUM	3.507	21.077	24.584	4.796	23.523	28.319	6.449	24.701	31.150

Source : DHMI
* SSM

C.2. MONTHLY STATISTICS OF WELL-KNOWN AIRPORTS IN TURKEY

2005 DOMESTIC PASSENGER TRAFFIC													
	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
ATATÜRK (İstanbul)	529.909	453.542	504.612	551.013	621.402	691.485	699.773	902.244	871.869	557.514	617.592	593.360	7.594.315
S. GÖKÇEN (İstanbul)	891	880	801	956	28.169	33.851	52.793	77.815	71.622	57.556	113.774	109.883	548.991
ESENBOĞA (Ankara)	197.261	186.766	196.685	210.913	233.816	237.258	236.615	227.597	238.763	208.495	231.360	235.026	2.640.555
A.MENDERES (İzmir)	138.696	126.691	152.526	157.039	175.136	175.370	183.030	189.626	177.909	158.189	170.035	179.175	1.983.422
ANTALYA	98.834	80.333	94.378	95.354	150.952	162.786	170.458	181.382	188.318	118.200	128.444	119.310	1.588.749
DALAMAN	7.955	7.171	11.429	14.101	22.514	36.870	50.332	57.863	41.371	22.993	10.549	8.609	291.757
ADANA	85.535	73.557	99.686	107.581	121.058	116.841	113.211	115.131	113.859	100.593	116.209	113.433	1.276.694
TRABZON	71.501	57.566	61.959	66.624	78.318	87.973	111.231	123.046	101.329	75.133	98.001	89.465	1.022.146
MİLAS-BODRUM	10.858	9.506	13.189	22.580	39.440	70.825	129.231	135.969	71.075	28.123	22.742	20.014	573.552
2005 INTERNATIONAL PASSENGER TRAFFIC													
	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
ATATÜRK (İstanbul)	834.209	682.134	946.528	929.164	1.165.610	1.184.817	1.107.188	1.181.376	1.171.277	1.049.484	941.864	859.176	12.052.827
S. GÖKÇEN (İstanbul)	18.834	18.444	14.861	23.623	68.337	34.699	43.370	55.933	44.260	39.565	39.154	46.667	447.747
ESENBOĞA (Ankara)	81.085	65.526	56.212	68.771	79.989	103.367	182.729	185.791	130.566	82.445	73.788	78.049	1.188.318
A.MENDERES (İzmir)	58.765	45.424	56.938	97.422	170.009	178.895	293.762	295.921	207.587	152.201	63.392	56.848	1.677.164
ANTALYA	324.368	344.978	576.598	806.257	1.592.104	1.717.978	2.240.757	2.242.431	1.798.828	1.787.342	582.142	242.328	14.256.111
DALAMAN	722	714	3.281	49.498	348.877	435.381	562.370	583.017	479.580	399.630	14.583	3.168	2.880.821
ADANA	35.531	33.872	19.534	22.819	27.699	38.828	52.273	65.550	45.961	30.696	26.201	33.294	432.258
TRABZON	3.946	4.108	1.241	1.391	1.106	5.539	12.259	16.674	7.839	2.299	1.208	3.696	61.306
MİLAS-BODRUM	0	345	2.743	41.002	239.411	282.671	385.050	404.122	316.658	247.642	4.749	1.134	1.925.527
2005 TOTAL PASSENGER TRAFFIC													
	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
ATATÜRK (İstanbul)	1.364.118	1.135.676	1.451.140	1.480.177	1.787.012	1.876.302	1.806.961	2.083.620	2.043.146	1.606.998	1.559.456	1.452.536	19.647.142
S. GÖKÇEN (İstanbul)	19.725	19.324	15.662	24.579	96.506	68.550	96.163	133.748	115.882	97.121	152.928	156.550	996.738
ESENBOĞA (Ankara)	278.346	252.292	252.897	279.684	313.805	340.625	419.344	413.388	369.329	290.940	305.148	313.075	3.828.873
A.MENDERES (İzmir)	197.461	172.115	209.464	254.461	345.145	354.265	476.792	485.547	385.496	310.390	233.427	236.023	3.660.586
ANTALYA	423.202	425.311	670.976	901.611	1.743.056	1.880.764	2.411.215	2.423.813	1.987.146	1.905.542	710.586	361.638	15.844.860
DALAMAN	8.677	7.885	14.710	63.599	371.391	472.251	612.702	640.880	520.951	422.623	25.132	11.777	3.172.578
ADANA	121.066	107.429	119.220	130.400	148.757	155.669	165.484	180.681	159.820	131.289	142.410	146.727	1.708.952
TRABZON	75.447	61.674	63.200	68.015	79.424	93.512	123.490	139.720	109.168	77.432	99.209	93.161	1.083.452
MİLAS-BODRUM	10.858	9.851	15.932	63.582	278.851	353.496	514.281	540.091	387.733	275.765	27.491	21.148	2.499.079

2005 NUMBER OF DOMESTIC AIRCRAFT TRAFFIC													
	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
ATATÜRK (İstanbul)	6.214	5.653	6.652	7.211	8.317	8.794	9.395	9.424	8.555	7.572	7.541	7.646	92.974
S. GÖKÇEN (İstanbul)	128	156	263	209	579	599	778	1.027	901	746	1.213	1.404	8.003
ESENBÖĞA (Ankara)	2.909	2.900	3.370	3.460	3.373	3.715	3.800	3.659	3.665	3.383	3.446	3.274	40.954
A.MENDERES (İzmir)	1.665	1.496	1.865	1.901	2.052	2.149	2.253	2.196	2.014	1.875	1.808	1.897	23.171
ANTALYA	1.288	1.174	1.295	1.341	1.799	1.924	2.283	2.340	2.063	1.693	1.507	1.264	19.971
DALAMAN	166	290	385	517	703	784	958	928	821	616	251	253	6.672
ADANA	1.107	1.374	2.032	1.571	1.529	1.434	1.294	1.307	1.372	1.433	1.381	1.521	17.355
TRABZON	634	562	646	668	721	784	831	893	807	848	890	895	9.179
MİLAS-BODRUM	118	93	202	354	586	900	1.356	1.459	1.072	554	302	295	7.291
2005 NUMBER OF INTERNATIONAL AIRCRAFT TRAFFIC													
	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
ATATÜRK (İstanbul)	9.684	8.413	9.813	10.152	11.095	10.733	11.674	12.154	11.132	10.987	10.192	10.115	126.144
S. GÖKÇEN (İstanbul)	502	528	460	548	866	716	830	1.208	964	1.045	989	926	9.582
ESENBÖĞA (Ankara)	967	843	745	831	942	1.086	1.587	1.550	1.309	982	942	890	12.674
A.MENDERES (İzmir)	540	431	494	829	1.257	1.378	2.216	2.227	1.506	1.173	544	516	13.111
ANTALYA	2.192	2.346	3.594	5.074	9.604	10.109	12.758	12.643	10.230	10.639	3.721	1.696	84.606
DALAMAN	12	5	47	433	2.218	2.609	3.421	3.519	2.928	2.668	156	34	18.050
ADANA	285	290	254	249	303	374	540	558	401	332	282	344	4.212
TRABZON	158	122	153	132	88	134	335	399	290	127	236	212	2.386
MİLAS-BODRUM	6	9	30	319	1.509	1.832	2.470	2.545	1.910	1.540	61	16	12.247
2005 TOTAL NUMBER OF AIRCRAFT TRAFFIC													
	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
ATATÜRK (İstanbul)	15.898	14.066	16.465	17.363	19.412	19.527	21.069	21.578	19.687	18.559	17.733	17.761	219.118
S. GÖKÇEN (İstanbul)	630	684	723	757	1.445	1.315	1.608	2.235	1.865	1.791	2.202	2.330	17.585
ESENBÖĞA (Ankara)	3.876	3.743	4.115	4.291	4.315	4.801	5.387	5.209	4.974	4.365	4.388	4.164	53.628
A.MENDERES (İzmir)	2.205	1.927	2.359	2.730	3.309	3.527	4.469	4.423	3.520	3.048	2.352	2.413	36.282
ANTALYA	3.480	3.520	4.889	6.415	11.403	12.033	15.041	14.983	12.293	12.332	5.228	2.960	104.577
DALAMAN	178	295	432	950	2.921	3.393	4.379	4.447	3.749	3.284	407	287	24.722
ADANA	1.392	1.664	2.286	1.820	1.832	1.808	1.834	1.865	1.773	1.765	1.663	1.865	21.567
TRABZON	792	684	799	800	809	918	1.166	1.292	1.097	975	1.126	1.107	11.565
MİLAS-BODRUM	124	102	232	673	2.095	2.732	3.826	4.004	2.982	2.094	363	311	19.538

2005 NUMBER OF DOMESTIC AIRCRAFT TRAFFIC (commercial)													
	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
ATATÜRK (İstanbul)	5.687	5.009	6.088	6.079	6.724	7.128	8.136	8.527	7.569	6.647	6.713	6.655	80.962
S. GÖKÇEN (İstanbul)	69	61	73	51	316	348	527	719	710	639	1.064	1.266	5.843
ESENBÖĞA (Ankara)	2.264	2.092	2.316	2.384	2.464	2.559	2.604	2.568	2.499	2.367	2.481	2.535	29.133
A.MENDERES (İzmir)	1.387	1.261	1.490	1.585	1.748	1.735	1.796	1.789	1.691	1.616	1.562	1.630	19.290
ANTALYA	1.014	828	988	1.203	1.648	1.757	2.047	2.055	1.837	1.553	1.436	1.212	17.578
DALAMAN	92	79	103	181	359	486	675	665	519	321	108	95	3.683
ADANA	691	618	905	893	1.019	1.001	951	958	940	912	1.054	1.100	11.042
TRABZON	613	538	621	651	690	723	793	851	782	719	850	871	8.702
MİLAS-BODRUM	102	81	99	232	482	798	1.173	1.229	813	470	245	217	5.941
2005 NUMBER OF INTERNATIONAL AIRCRAFT TRAFFIC (commercial)													
	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
ATATÜRK (İstanbul)	9.490	8.225	9.247	9.883	10.784	11.544	11.401	11.844	10.987	10.749	9.968	9.935	124.057
S. GÖKÇEN (İstanbul)	467	500	428	506	808	632	730	1.080	901	976	906	855	8.789
ESENBÖĞA (Ankara)	803	673	611	704	748	933	1.427	1.402	1.086	832	726	753	10.698
A.MENDERES (İzmir)	514	384	452	775	1.166	1.282	2.114	2.133	1.454	1.119	507	480	12.380
ANTALYA	2.122	2.299	3.515	5.019	9.441	9.709	12.518	12.437	10.034	10.466	3.632	1.647	82.839
DALAMAN	12	5	37	414	2.161	2.495	3.179	3.305	2.831	2.455	129	29	17.052
ADANA	275	282	213	218	267	351	467	516	385	302	263	324	3.863
TRABZON	46	41	24	30	16	70	190	163	86	28	20	31	745
MİLAS-BODRUM	0	5	24	303	1.445	1.731	2.355	2.363	1.832	1.504	44	10	11.616
2005 TOTAL NUMBER OF AIRCRAFT TRAFFIC (commercial)													
	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
ATATÜRK (İstanbul)	15.177	13.234	15.335	15.962	17.508	18.672	19.537	20.371	18.556	17.396	16.681	16.590	205.019
S. GÖKÇEN (İstanbul)	536	561	501	557	1.124	980	1.257	1.799	1.611	1.615	1.970	2.121	14.632
ESENBÖĞA (Ankara)	3.067	2.765	2.927	3.088	3.212	3.492	4.031	3.970	3.585	3.199	3.207	3.288	39.831
A.MENDERES (İzmir)	1.901	1.645	1.942	2.360	2.914	3.017	3.910	3.922	3.145	2.735	2.069	2.110	31.670
ANTALYA	3.136	3.127	4.503	6.222	11.089	11.466	14.565	14.492	11.871	12.019	5.068	2.859	100.417
DALAMAN	104	84	140	595	2.520	2.981	3.854	3.970	3.350	2.776	237	124	20.735
ADANA	966	900	1.118	1.111	1.286	1.352	1.418	1.474	1.325	1.214	1.317	1.424	14.905
TRABZON	659	579	645	681	706	793	983	1.014	868	747	870	902	9.447
MİLAS-BODRUM	102	86	123	535	1.927	2.529	3.528	3.592	2.645	1.974	289	227	17.557

2005 DOMESTIC CARGO TRAFFIC (ton)													
	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
ATATÜRK (İstanbul)	8.733	7.629	8.812	8.126	9.967	11.009	11.867	17.410	16.125	9.945	10.657	9.499	129.779
S. GÖKÇEN (İstanbul)	0	0	1.36	0	0	0	0,84	0	0	0,1	0,43	0,85	3,58
ESENBOĞA (Ankara)	3.202	3.094	3.089	3.161	3.341	3.389	3.723	3.686	3.582	2.926	3.088	3.045	39.326
A.MENDERES (İzmir)	2.180	1.968	2.418	2.312	2.333	3.307	2.651	2.886	2.541	2.208	2.482	2.396	29.682
ANTALYA	1.787	1.779	2.166	2.563	3.311	3.516	3.660	3.927	4.033	2.601	2.822	2.802	34.967
DALAMAN	93	78	114	152	284	476	659	763	542	309	118	87	3.675
ADANA	1.352	1.159	1.429	1.465	1.660	164	1.832	1.914	1.738	1.546	1.618	1.505	17.382
TRABZON	990	831	799	810	891	1.092	1.559	1.808	1.443	999	1.284	1.113	13.619
MİLAS-BODRUM	109	92	115	203	424	808	1.543	1.619	834	306	225	171	6.449
2005 INTERNATIONAL CARGO TRAFFIC (ton)													
	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
ATATÜRK (İstanbul)	34.752	31.057	33.887	39.340	42.518	43.701	42.574	43.516	44.771	45.953	40.032	39.863	481.964
S. GÖKÇEN (İstanbul)	1.550	1.459	586	957	287	613	1.221	2.049	819	664	1.887	1.504	13.595
ESENBOĞA (Ankara)	2.965	2.593	1.878	2.040	2.305	2.866	4.723	4.818	3.723	2.444	2.630	2.762	35.747
A.MENDERES (İzmir)	1.395	1.257	1.456	1.881	3.091	2.333	5.547	5.727	4.086	3.013	1.397	1.325	32.508
ANTALYA	6.660	7.069	11.778	16.498	32.093	34.253	43.167	43.616	37.358	35.994	11.623	4.986	285.095
DALAMAN	18	11	43	686	4.767	5.946	7.302	7.884	6.855	5.703	223	65	39.503
ADANA	904	1.072	487	466	661	891	1.303	1.684	1.143	728	613	1.144	11.096
TRABZON	100	136	86	118	25	148	346	438	228	67	32	97	1.821
MİLAS-BODRUM	0	7	38	593	3.647	427	5.563	5.850	4.839	3.647	72	18	24.701
2005 TOTAL CARGO TRAFFIC (ton)													
	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
ATATÜRK (İstanbul)	43.485	38.686	42.699	47.466	52.485	54.710	54.441	60.926	60.896	55.898	50.689	49.362	611.743
S. GÖKÇEN (İstanbul)	1.550	1.459	588	957	287	613	1.222	2.049	819	664	1.887	1.504	13.599
ESENBOĞA (Ankara)	6.167	5.687	4.967	5.201	5.646	6.255	8.446	8.504	7.305	5.370	5.718	5.807	75.073
A.MENDERES (İzmir)	3.575	3.225	3.874	4.193	5.424	5.640	8.198	8.613	6.627	5.221	3.879	3.721	62.190
ANTALYA	8.447	8.848	13.944	19.061	35.404	37.769	46.827	47.543	41.391	38.595	14.445	7.788	320.062
DALAMAN	111	89	157	838	5.051	6.422	7.961	8.647	7.397	6.012	341	152	43.178
ADANA	2.256	2.231	1.916	1.931	2.321	1.055	3.135	3.598	2.881	2.274	2.231	2.649	28.478
TRABZON	1.090	967	885	928	916	1.240	1.905	2.246	1.671	1.066	1.316	1.210	15.440
MİLAS-BODRUM	109	99	153	796	4.071	1.235	7.106	7.469	5.673	3.953	297	189	31.150

Source : DHMI
* SSM

C.3. STATISTICS OF SABIHA GÖKÇEN INTERNATIONAL AIRPORT

S. GÖKÇEN AIRPORT

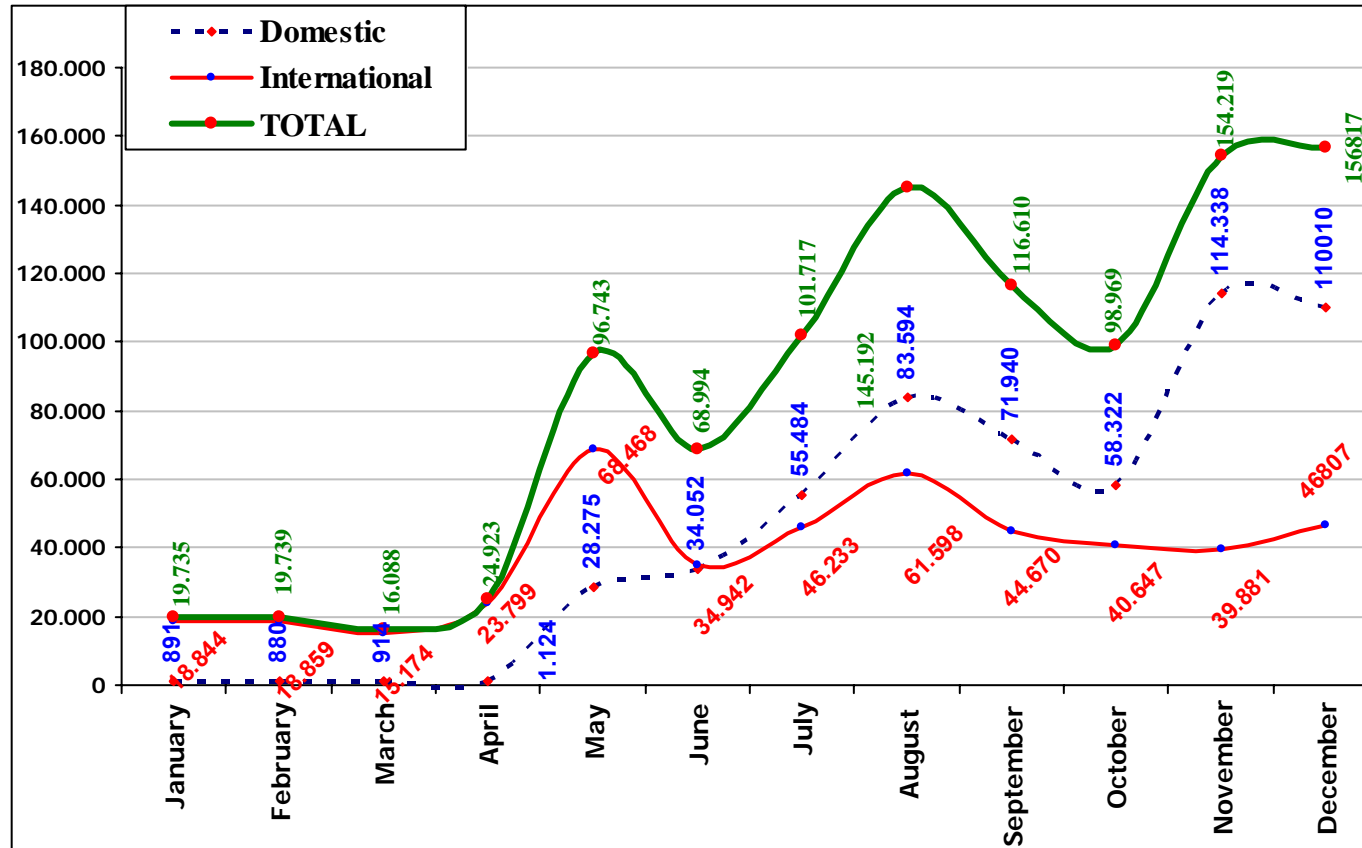
PASSENGER TRAFFIC (2005)

2005 PASSENGER TRAFFIC													
MONTHS	DOMESTIC					INTERNATIONAL					TOTAL (3+8)	TRANSIT TOTAL (4+9)	TOTAL (11+12)
	INBOUND	OUTBOUND	TOTAL (1+2)	TRANSIT	TOTAL (3+4)	INBOUND	OUTBOUND	TOTAL (6+7)	TRANSIT	TOTAL (8+9)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
JANUARY	845	46	891	0	891	11.646	7.188	18.834	10	18.844	19.725	10	19.735
FEBRUARY	503	377	880	0	880	11.393	7.051	18.444	415	18.859	19.324	415	19.739
MARCH	485	316	801	113	914	7.628	7.233	14.861	313	15.174	15.662	426	16.088
APRIL	444	512	956	168	1.124	12.089	11.534	23.623	176	23.799	24.579	344	24.923
MAY	13.746	14.423	28.169	106	28.275	35.656	32.681	68.337	131	68.468	96.506	237	96.743
JUNE	16.220	17.631	33.851	201	34.052	19.957	14.742	34.699	243	34.942	68.550	444	68.994
JULY	24.966	27.827	52.793	2.691	55.484	25.925	17.445	43.370	2.863	46.233	96.163	5.554	101.717
AUGUST	39.997	37.818	77.815	5.779	83.594	24.365	31.568	55.933	5.665	61.598	133.748	11.444	145.192
SEPTEMBER	37.607	34.015	71.622	318	71.940	19.258	25.002	44.260	410	44.670	115.882	728	116.610
OCTOBER	29.462	28.094	57.556	766	58.322	18.624	20.941	39.565	1.082	40.647	97.121	1.848	98.969
NOVEMBER	58.923	54.851	113.774	564	114.338	19.158	19.996	39.154	727	39.881	152.928	1.291	154.219
DECEMBER	56.628	53.255	109.883	127	110.010	19.356	27.311	46.667	140	46.807	156.550	267	156.817
TOTAL	279.826	269.165	548.991	10.833	559.824	225.055	222.692	447.747	12.175	459.922	996.738	23.008	1.019.746

Source : SSM

S. GÖKÇEN AIRPORT

PASSENGER TRAFFIC (2005)



Source : SSM

INTERNATIONAL PASSENGER TRAFFIC						
MONTHS	2004		2005		2004 / 2005	
	MONTH	CUMULATIVE TOTAL	MONTH	CUMULATIVE TOTAL	MONTH	CUM. TOTAL
JANUARY	15.031	15.031	18.844	18.844	25%	25%
FEBRUARY	16.709	31.740	18.859	37.703	13%	19%
MARCH	13.795	45.535	15.174	52.877	10%	16%
APRIL	11.758	57.293	23.799	76.676	102%	34%
MAY	12.567	69.860	68.468	145.144	445%	108%
JUNE	14.192	84.052	34.942	180.086	146%	114%
JULY	20.282	104.334	46.233	226.319	128%	117%
AUGUST	32.099	136.433	61.598	287.917	92%	111%
SEPTEMBER	24.910	161.343	44.670	332.587	79%	106%
OCTOBER	22.945	184.288	40.647	373.234	77%	103%
NOVEMBER	26.999	211.287	39.881	413.115	48%	96%
DECEMBER	24.049	235.336	46.807	459.922	95%	95%

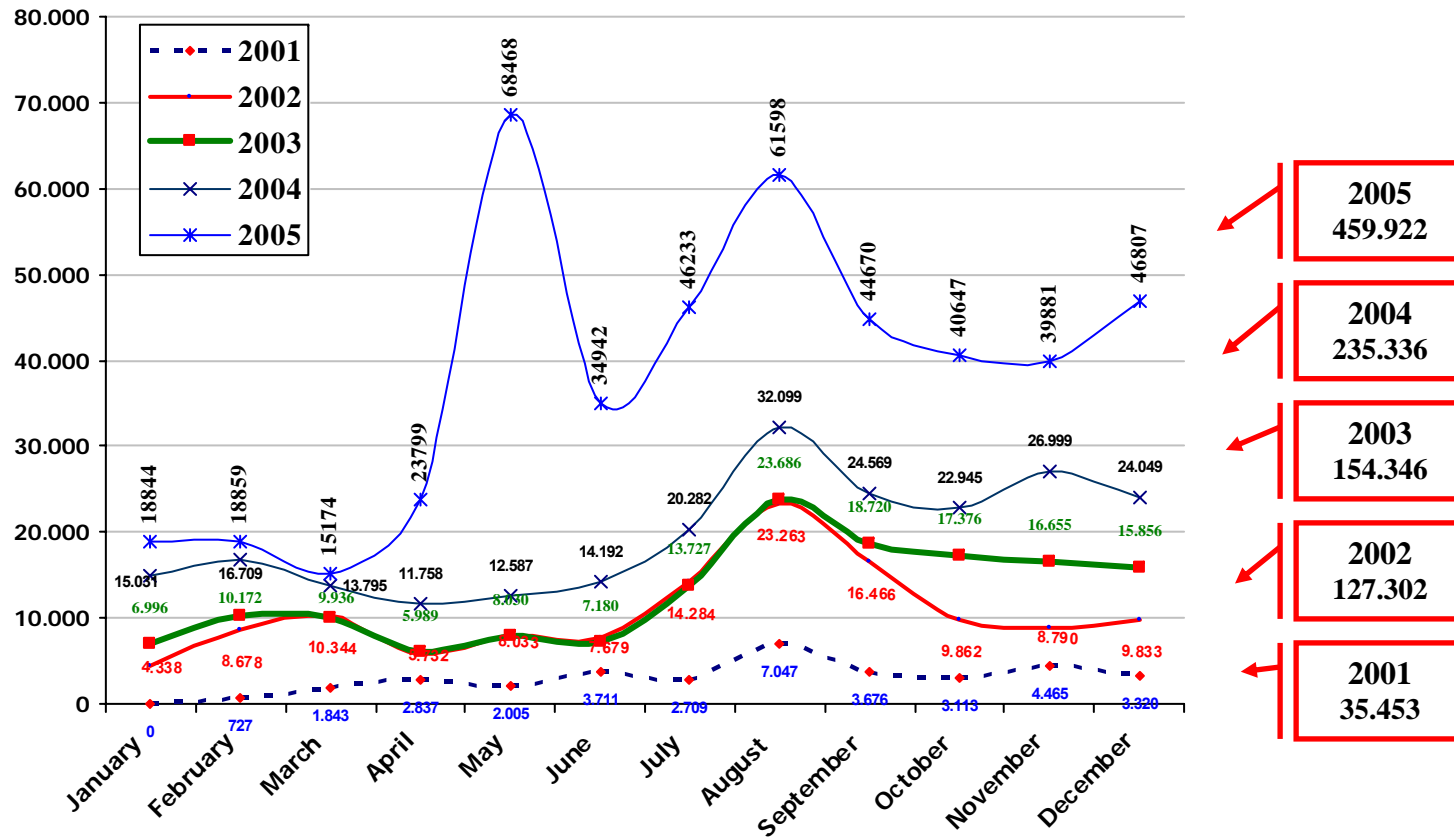
Source : SSM

DOMESTIC PASSENGER TRAFFIC						
MONTHS	2004		2005		2004 / 2005	
	MONTH	CUMULATIVE TOTAL	MONTH	CUMULATIVE TOTAL	MONTH	CUM. TOTAL
JANUARY	327	327	891	891	172%	172%
FEBRUARY	409	736	880	1.771	115%	141%
MARCH	94	830	914	2.685	872%	223%
APRIL	146	976	1.124	3.809	670%	290%
MAY	1.974	2.950	28.275	32.084	1332%	988%
JUNE	4.002	6.952	34.052	66.136	751%	851%
JULY	414	7.366	55.484	121.620	13302%	1551%
AUGUST	1.011	8.377	83.594	205.214	8168%	2350%
SEPTEMBER	341	8.718	71.940	277.154	20997%	3079%
OCTOBER	406	9.124	58.322	335.476	14265%	3577%
NOVEMBER	744	9.868	114.338	449.814	15268%	4458%
DECEMBER	455	10.323	110.010	559.824	24078%	5323%

Source : SSM

S. GÖKÇEN AIRPORT

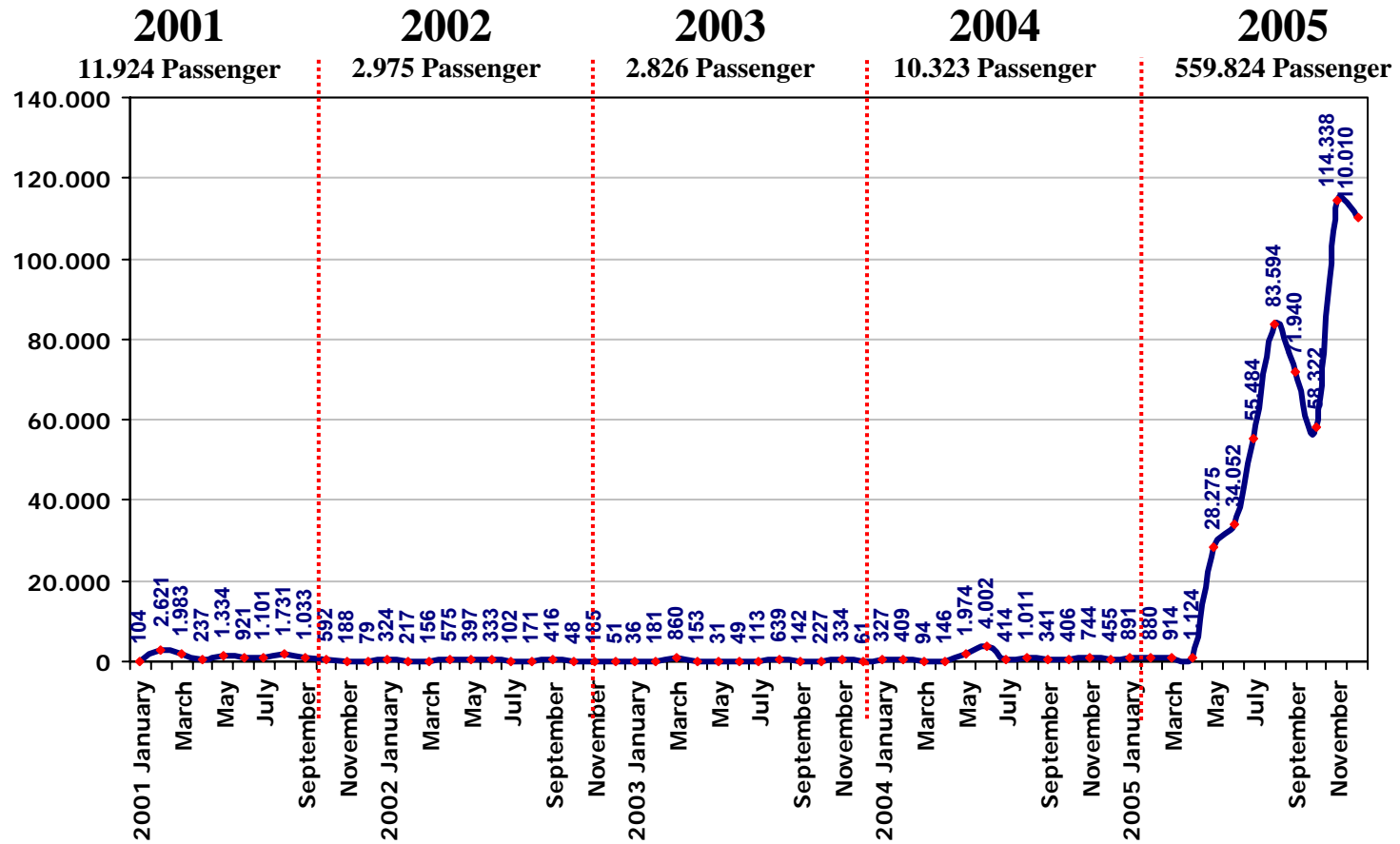
INTERNATIONAL PASSENGER TRAFFIC (2001-2002-2003-2004-2005)



Source : SSM

S. GÖKÇEN AIRPORT

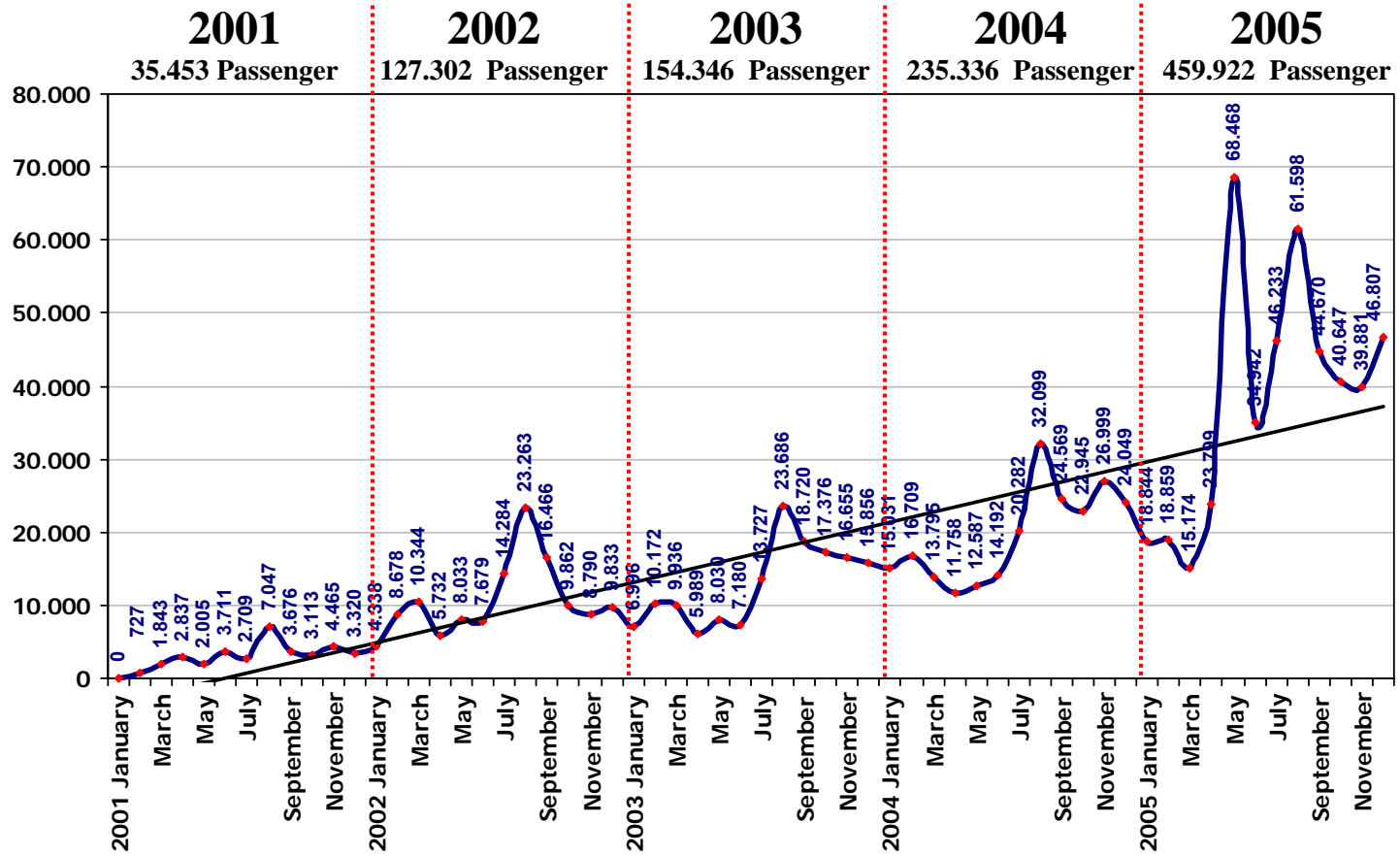
DOMESTIC PASSENGER TRAFFIC (2001-2002-2003-2004-2005)



Source : SSM

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INTERNATIONAL PASSENGER TRAFFIC (2001-2002-2003-2004-2005)



Source : SSM

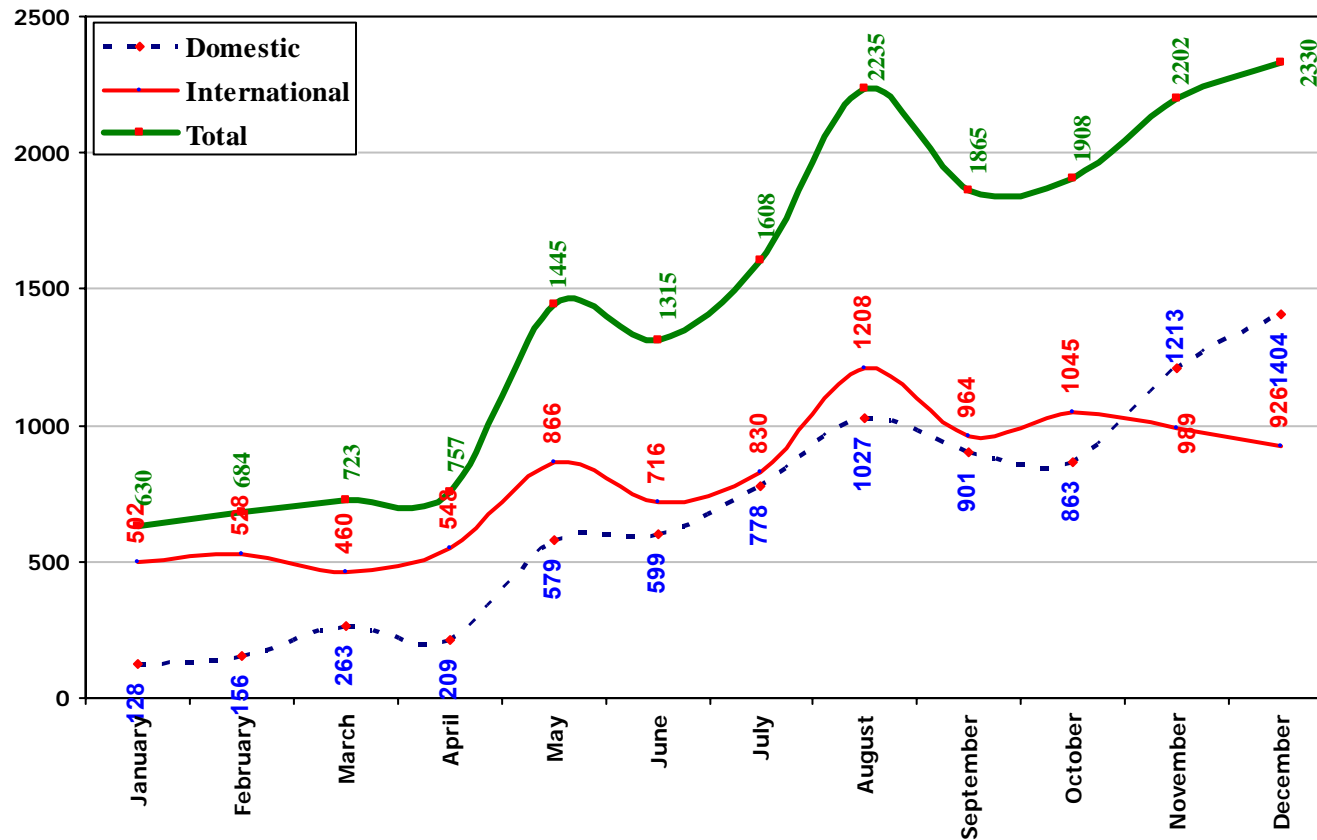
S. GÖKÇEN AIRPORT**AIRCRAFT TRAFFIC (2005)**

2005 AIRCRAFT TRAFFIC													
MONTHS	DOMESTIC						INTERNATIONAL						GENERAL TOTAL
	Civil Commercial Aircraft	Military	Training	General	Others	TOTAL	Civil Commercial Aircraft	Military	Training	General	Others	TOTAL	
JANUARY	69	16	10	33	0	128	467	20	0	15	0	502	630
FEBRUARY	61	21	12	62	0	156	500	19	2	7	0	528	684
MARCH	73	27	22	141	0	263	428	13	2	17	0	460	723
APRIL	51	15	21	122	0	209	506	17	0	25	0	548	757
MAY	316	25	41	197	0	579	808	19	0	39	0	866	1.445
JUNE	348	28	15	208	0	599	632	45	1	38	0	716	1.315
JULY	527	14	13	224	0	778	730	30	8	62	0	830	1.608
AUGUST	719	39	3	266	0	1.027	1.080	41	14	73	0	1.208	2.235
SEPTEMBER	710	28	0	163	0	901	901	14	5	44	0	964	1.865
OCTOBER	639	52	6	49	0	746	976	16	4	49	0	1.045	1.791
NOVEMBER	1.064	23	4	122	0	1.213	906	17	10	56	0	989	2.202
DECEMBER	1.266	40	0	98	0	1.404	855	32	2	37	0	926	2.330
TOTAL	5.843	328	147	1.685	0	8.003	8.789	283	48	462	0	9.582	17.585

Source : SSM

S. GÖKÇEN AIRPORT

AIRCRAFT TRAFFIC (2005)



Source : SSM

INTERNATIONAL CIVIL COMMERCIAL AIRCRAFT TRAFFIC						
MONTHS	2004		2005		2004 / 2005	
	MONTHS	Cumulative TOTAL	MONTHS	Cumulative TOTAL	MONTHS	Cumulative TOTAL
JANUARY	272	272	467	467	72%	72%
FEBRUARY	352	624	500	967	42%	55%
MARCH	396	1.020	428	1.395	8%	37%
APRIL	317	1.337	506	1.901	60%	42%
MAY	330	1.667	808	2.709	145%	63%
JUNE	301	1.968	632	3.341	110%	70%
JULY	405	2.373	730	4.071	80%	72%
AUGUST	528	2.901	1080	5.151	105%	78%
SEPTEMBER	490	3.391	901	6.052	84%	78%
OCTOBER	626	4.017	976	7.028	56%	75%
NOVEMBER	667	4.684	906	7.934	36%	69%
DECEMBER	589	5.273	855	8.789	45%	67%

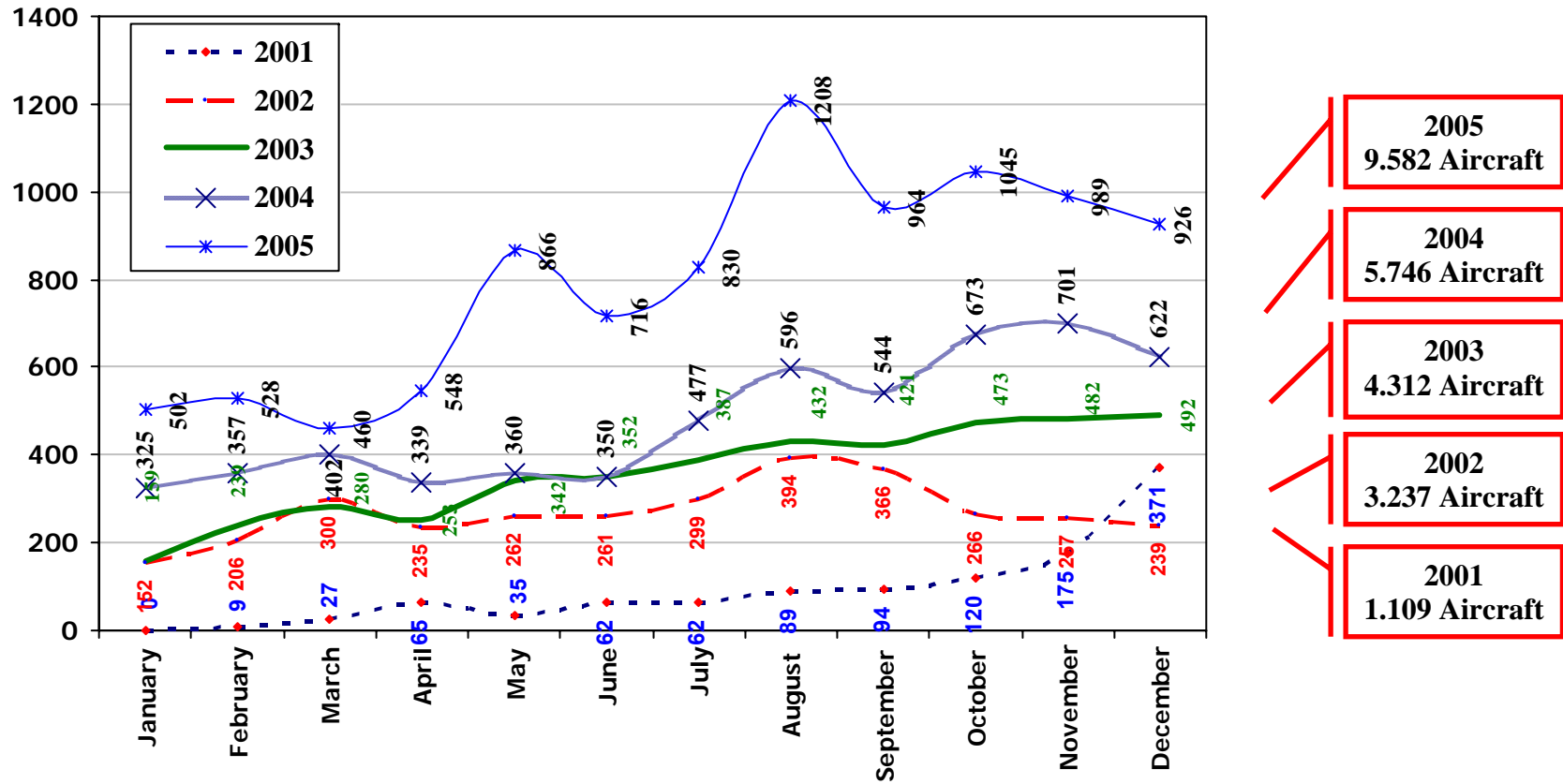
Source : SSM

DOMESTIC CIVIL COMMERCIAL AIRCRAFT TRAFFIC						
MONTHS	2004		2005		2004 / 2005	
	MONTHS	Cumulative TOTAL	MONTHS	Cumulative TOTAL	MONTHS	Cumulative TOTAL
JANUARY	34	34	69	69	103%	103%
FEBRUARY	36	70	61	130	69%	86%
MARCH	42	112	73	203	74%	81%
APRIL	17	129	51	254	200%	97%
MAY	83	212	316	570	281%	169%
JUNE	112	324	348	918	211%	183%
JULY	87	411	527	1.445	506%	252%
AUGUST	120	531	719	2.164	499%	308%
SEPTEMBER	77	608	710	2.874	822%	373%
OCTOBER	105	713	639	3.513	509%	393%
NOVEMBER	128	841	1064	4.577	731%	444%
DECEMBER	79	920	1266	5.843	1503%	535%

Source : SSM

S. GÖKÇEN AIRPORT

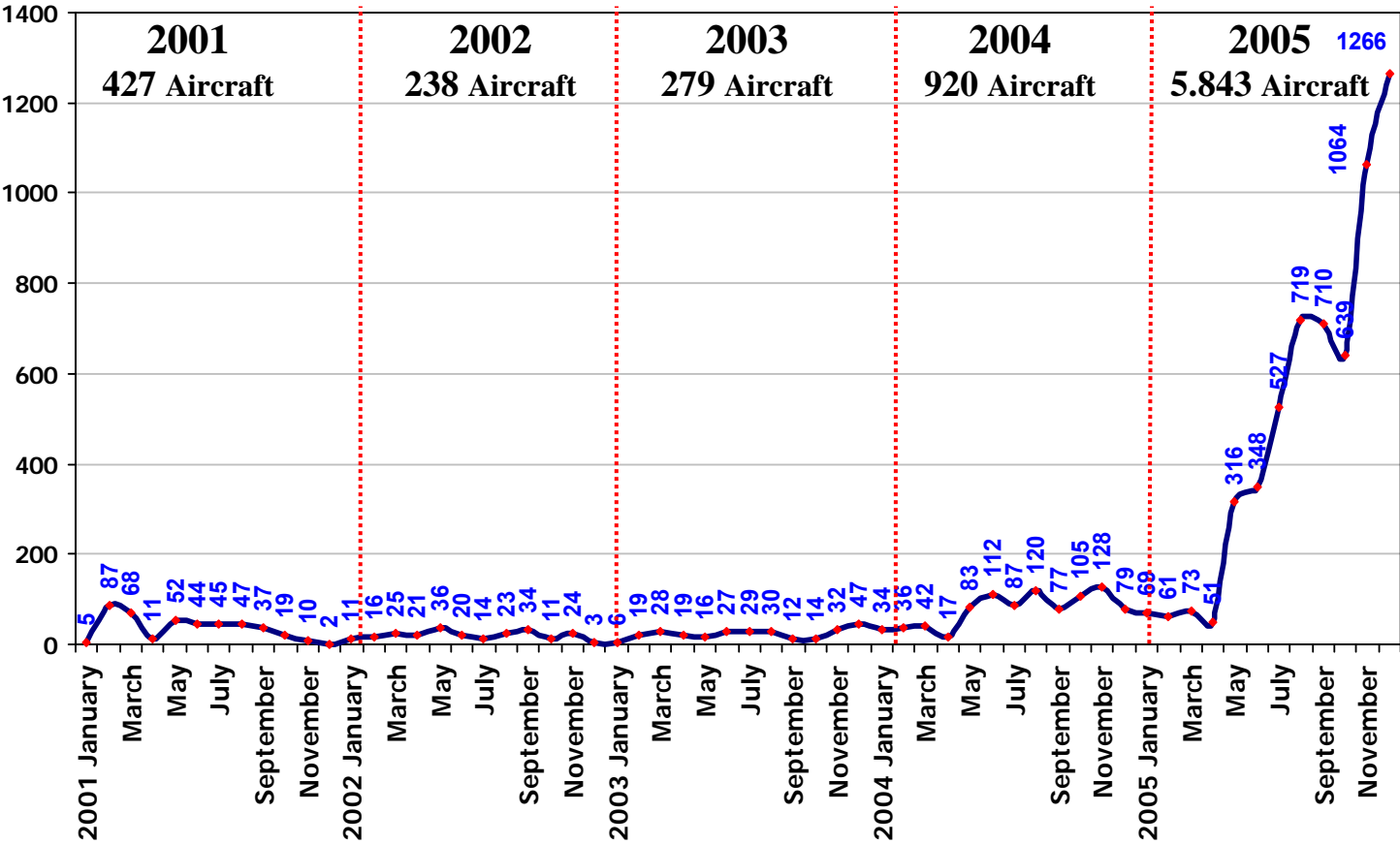
INTERNATIONAL AIRCRAFT TRAFFIC (2001-2002-2003-2004-2005)



Source : SSM

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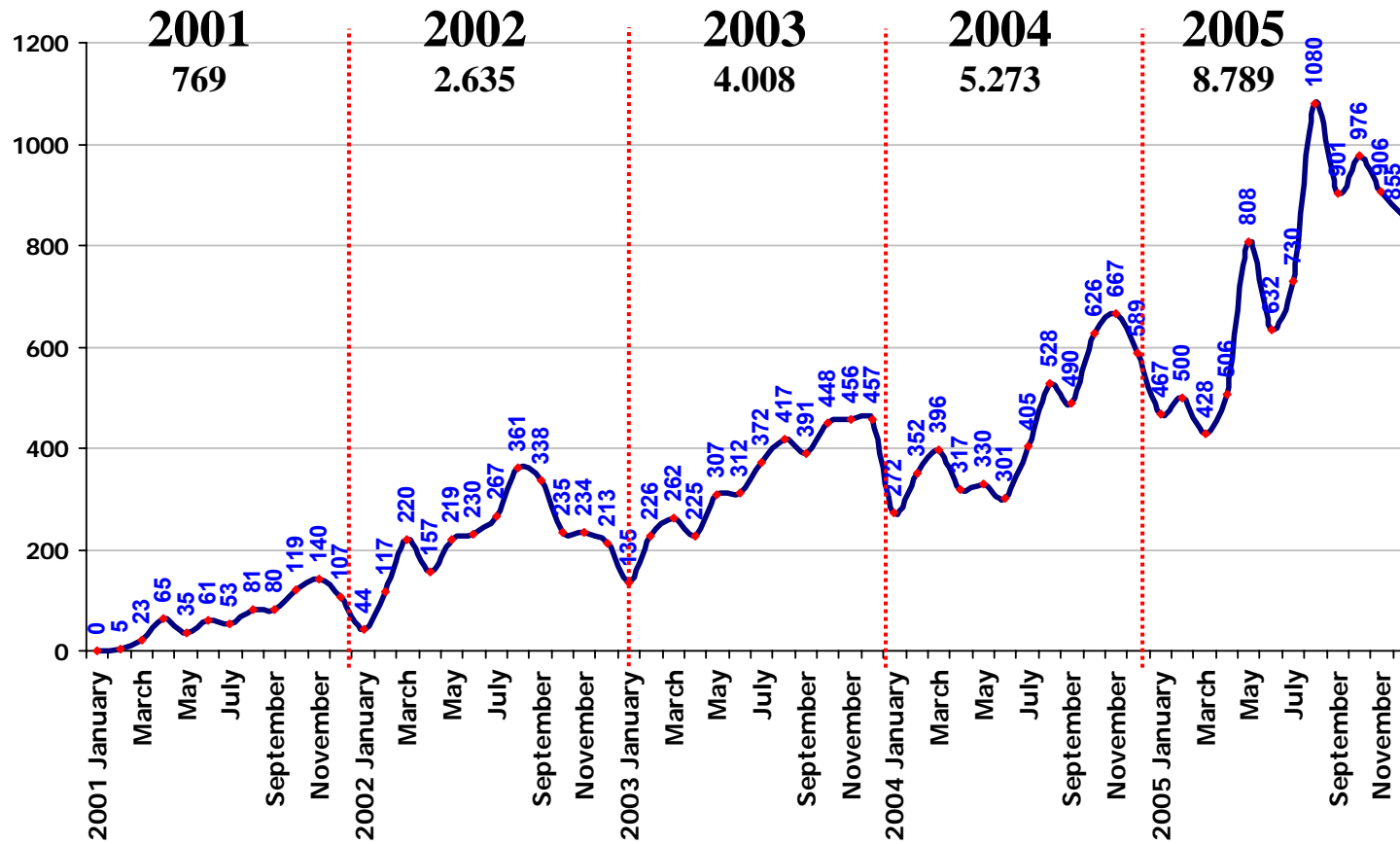
DOMESTIC CIVIL COMMERCIAL AIRCRAFT TRAFFIC



Source : SSM

S. GÖKÇEN AIRPORT

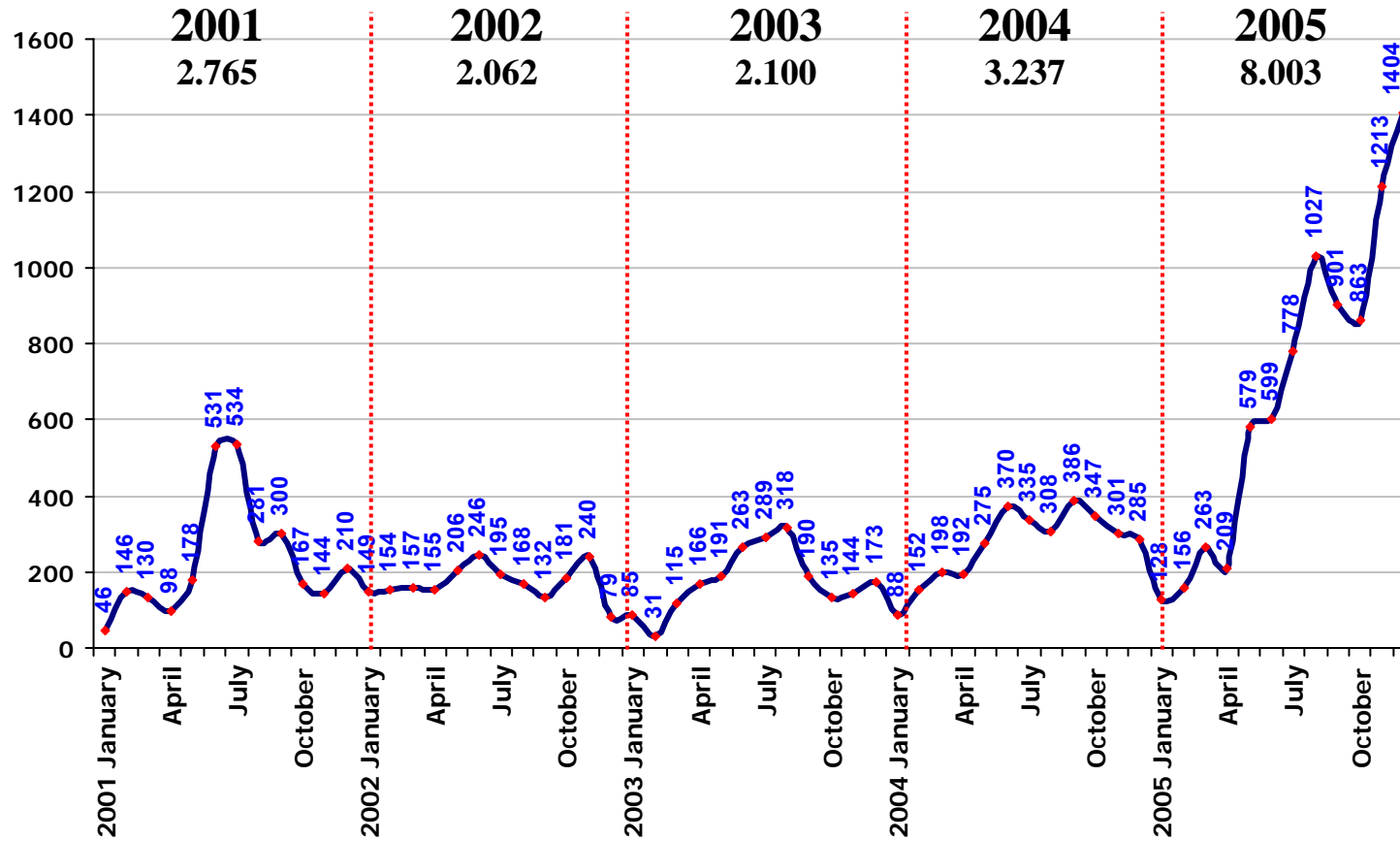
INTERNATIONAL CIVIL COMMERCIAL AIRCRAFT TRAFFIC



Source : SSM

S. GÖKÇEN AIRPORT

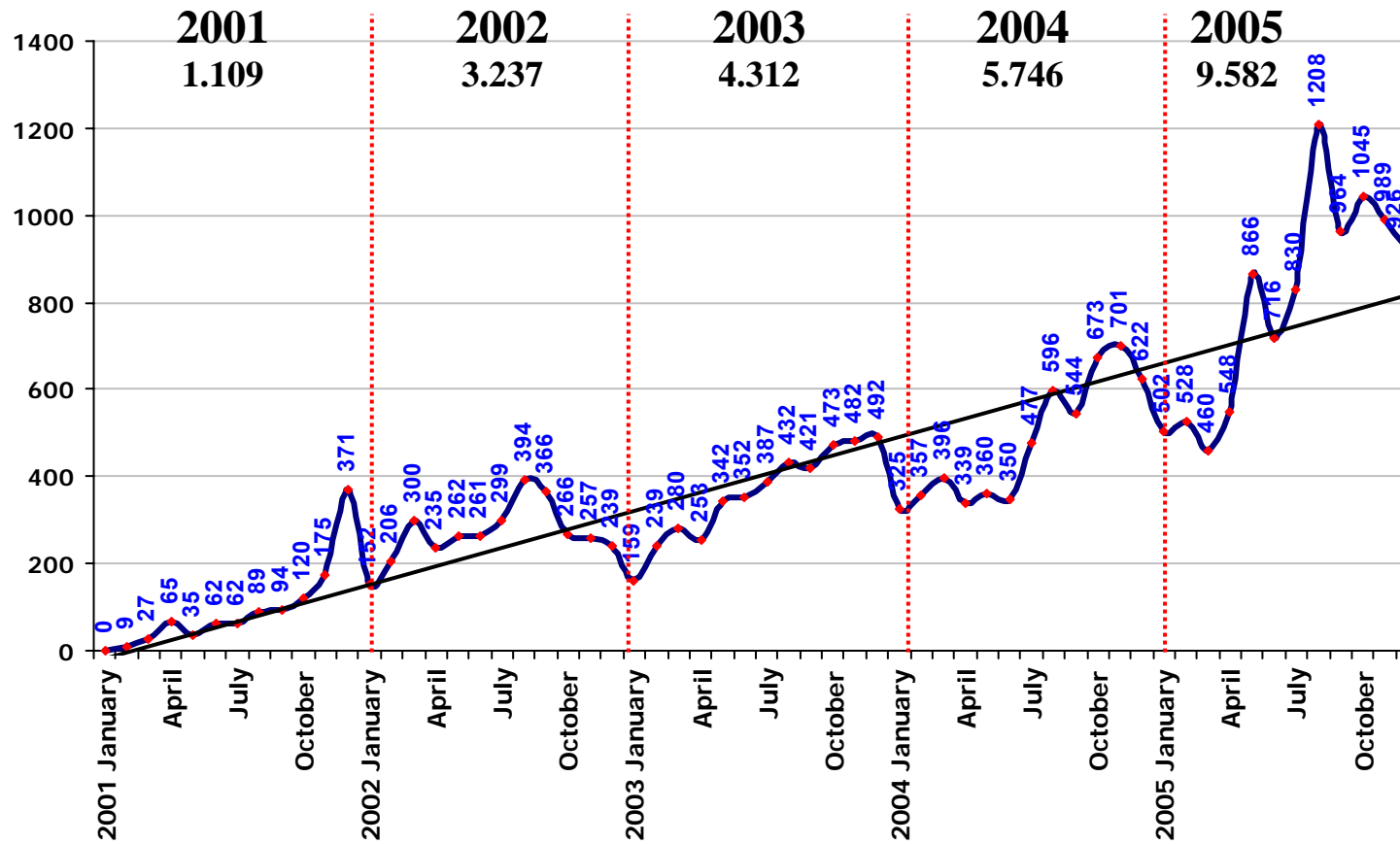
DOMESTIC AIRCRAFT TRAFFIC (2001-2002-2003-2004-2005)



Source : SSM

S. GÖKÇEN AIRPORT

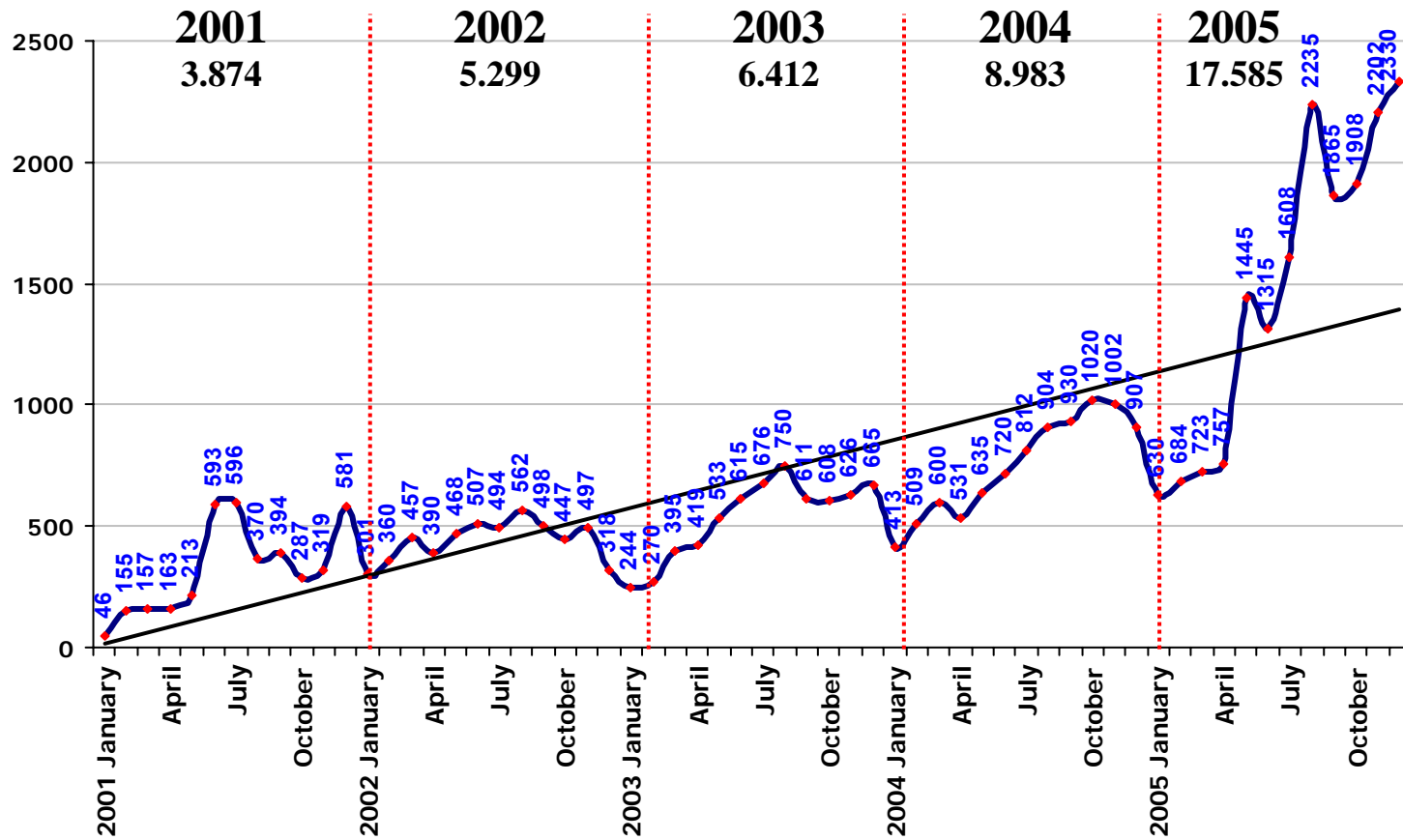
INTERNATIONAL AIRCRAFT TRAFFIC (2001-2002-2003-2004-2005)



Source : SSM

S. GÖKÇEN AIRPORT

TOTAL AIRCRAFT TRAFFIC (2001-2002-2003-2004-2005)



Source : SSM

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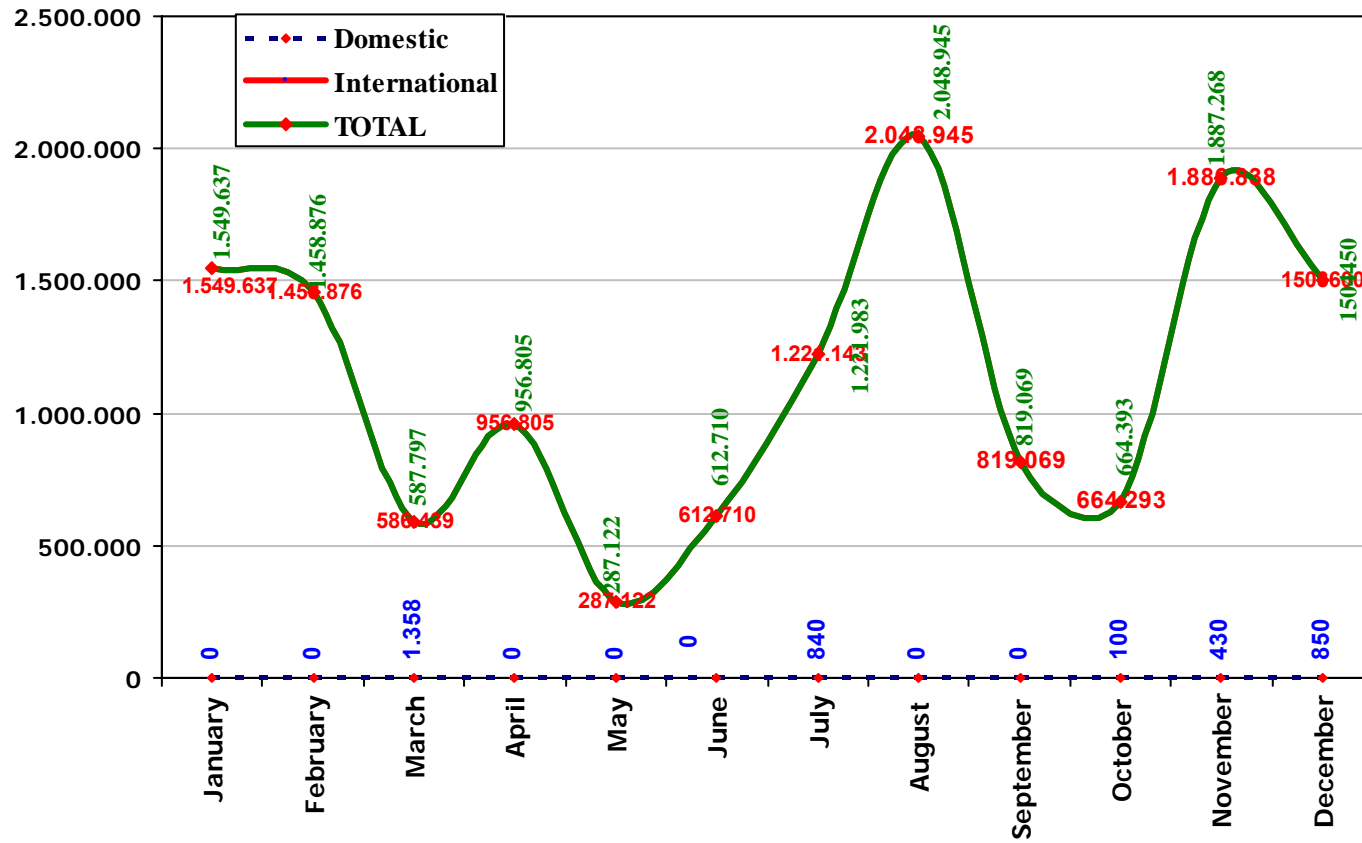
CARGO (2005)

2005 CARGO (Kg)													
MONTHS	DOMESTIC					INTERNATIONAL					TOTAL CARGO (3+8)	TRANSIT CARGO TOTAL (4+9)	TOTAL CARGO (11+12)
	INBOUND	OUTBOUND	TOTAL (1+2)	TRANSIT	TOTAL CARGO (3+4)	INBOUND	OUTBOUND	TOTAL (6+7)	TRANSIT	TOTAL CARGO (8+9)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)			
JANUARY	0	0	0	0	0	50.952	1.316.105	1.367.057	182.580	1.549.637	1.367.057	182.580	1.549.637
FEBRUARY	0	0	0	0	0	28.804	1.134.661	1.163.465	295.411	1.458.876	1.163.465	295.411	1.458.876
MARCH	0	0	0	1.358	1.358	113.654	158.057	271.711	314.728	586.439	271.711	316.086	587.797
APRIL	0	0	0	0	0	165.046	91.478	256.524	700.281	956.805	256.524	700.281	956.805
MAY	0	0	0	0	0	53.085	115.733	168.818	118.304	287.122	168.818	118.304	287.122
JUNE	0	0	0	0	0	69.416	157.809	227.225	385.485	612.710	227.225	385.485	612.710
JULY	0	0	0	840	840	119.483	219.161	338.644	882.499	1.221.143	338.644	883.339	1.221.983
AUGUST	0	0	0	0	0	17.738	541.802	559.540	1.489.405	2.048.945	559.540	1.489.405	2.048.945
SEPTEMBER	0	0	0	0	0	69.910	123.868	193.778	625.291	819.069	193.778	625.291	819.069
OCTOBER	0	100	100	0	100	100.240	156.886	257.126	407.167	664.293	257.226	407.167	664.393
NOVEMBER	100	330	430	0	430	282.912	227.270	510.182	1.376.656	1.886.838	510.612	1.376.656	1.887.268
DECEMBER	40	810	850	0	850	277.645	911.663	1.189.308	314.292	1.503.600	1.190.158	314.292	1.504.450
TOTAL	140	1.240	1.380	2.198	3.578	1.348.885	5.154.493	6.503.378	7.092.099	13.595.477	6.504.758	7.094.297	13.599.055

Source : SSM

S. GÖKÇEN AIRPORT

CARGO (2005)



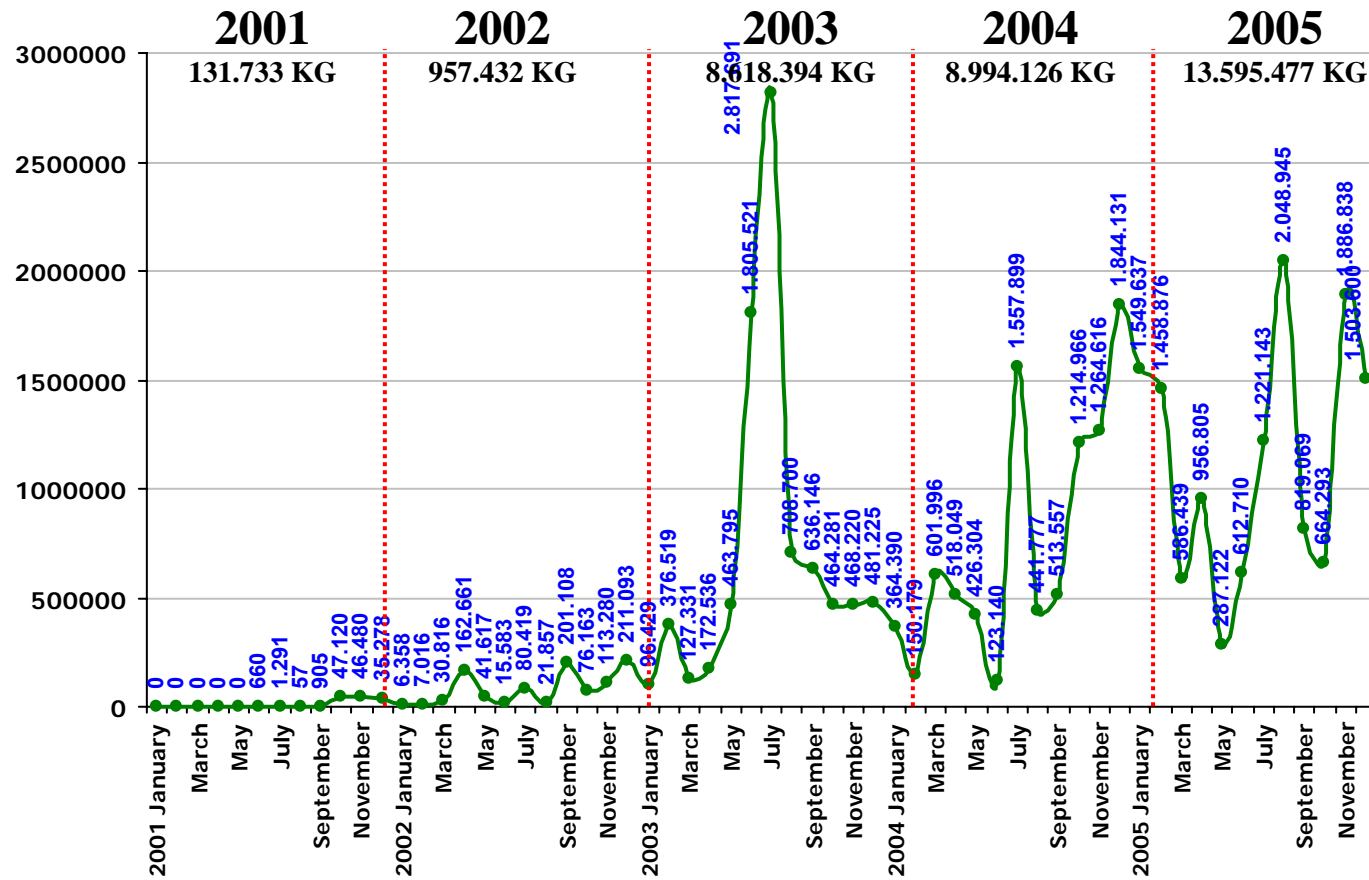
Source : SSM

INTERNATIONAL CARGO						
MONTHS	2004		2005		2004 / 2005 DEĞİŞİMİ	
	MONTH	CUMULATIVE TOTAL	MONTH	CUMULATIVE TOTAL	MONTH	CUM. TOTAL
JANUARY	364.390	364.390	1.549.637	1.549.637	325%	325%
FEBRUARY	150.179	514.569	1.458.876	3.008.513	871%	485%
MARCH	601.996	1.116.565	586.439	3.594.952	-3%	222%
APRIL	518.049	1.634.614	956.805	4.551.757	85%	178%
MAY	426.304	2.060.918	287.122	4.838.879	-33%	135%
JUNE	96.262	2.157.180	612.710	5.451.589	537%	153%
JULY	1.557.899	3.715.079	1.221.143	6.672.732	-22%	80%
AUGUST	441.777	4.156.856	2.048.945	8.721.677	364%	110%
SEPTEMBER	513.557	4.670.413	819.069	9.540.746	59%	104%
OCTOBER	1.214.966	5.885.379	664.293	10.205.039	-45%	73%
NOVEMBER	1.264.616	7.149.995	1.886.838	12.091.877	49%	69%
DECEMBER	1.844.131	8.994.126	1.503.600	13.595.477	-18%	51%

Source : SSM

S. GÖKÇEN AIRPORT

INTERNATIONAL CARGO (2001-2002-2003-2004-2005)



Source : SSM