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Potential Development of a New Direct Long Haul Flight Route for Turkey to Enhance Its Air Transport Connectivity: A QSI Analysis

By

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ABSTRACT

Air connectivity is an essential driver of economic growth in countries as it stimulates the demand for travel and enables businesses to access global marketplaces. In the last decade, with the developments in the aircraft technology and liberalisation of air space, intercontinental long-haul flights have become feasible to provide point-to-point connections with the world markets. As Turkey has a strategic geographical location on the map where it is located between Europe, Asia and Africa, the country has become a key player in providing connectivity among regions. However, this research study focuses on Turkey as a traffic origin rather than a gateway to the other regions, and aims to find whether opening a new direct long-haul flight route to intercontinental destinations would yield sufficient passenger demand and be feasible from Turkey. To that end, by using datasets of passenger bookings (Marketing Information Data Transfer) and airline schedules (OAG Airline Schedules) for June and December 2017, the research examines regions in order to discover indirect passenger demand which originate from Turkey to international destinations. Regarding the identified potential destinations, the study applies the quality of service index model to forecast the market share of the proposed new direct flights. The results indicate that opening direct flight routes to Australia and Japan would be financially viable and profitable for airlines to operate. Moreover, connecting with the most developed countries of the fast-growing Asia-Pacific region would enhance Turkey's air transport connectivity and facilitate international tourist flow and foreign direct investment between the countries. In this regard, the research study further investigates the factors which might affect the feasibility of new routes and discusses their potential implications.

Keywords: Air transport connectivity, airline networks, quality of service index, route development, Turkey

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1. INTRODUCTION

The purpose of this dissertation is to carry out a quantitative research to determine new direct flight routes from Turkey to destinations that are considered long haul flights. This area was found worthwhile to be investigated, as the available research on Turkey's air transportation is insufficient in the literature of the aviation sector. The reason for focusing on Turkey in this analysis is its substantial location in the worldwide air transportation network where it plays an important role in functioning as a hub between the Europe and Asia. However, the complex dynamics and structure of the air transportation market cannot be explained by only looking at the geographical location of countries, besides that, geopolitical considerations should also be taken into account while defining countries' global roles in the network (Guimerà et al., 2005). Therefore, the profitability assessment of new routes and their possible impacts on the Turkish economy will be examined thoroughly, to shed light on this missing area of the literature and Turkey's position in the complicated structure of the air transportation network.

1.1 Research Context

The Turkish Government envisions to become one of the top ten economies in the world by 2023 which coincides with the 100th anniversary of the foundation of the Republic of Turkey (Ernst & Young, 2013). The government makes huge investments into sectors such as financial services, transportation and tourism to develop the country as a whole, in order to reach their goal. For instance, there is an ongoing project which aims to transform Istanbul into a major global financial centre, and the government's vision of the project is defined as "Istanbul will become a regional, and then a global financial centre" (Istanbul International Finance Centre, 2018). In order to be considered a global financial centre, accessibility to foreign markets and clients is essential, and thanks to Turkey's strategic location, the country has a great potential to become one. Turkey provides a connection between the European and Asian continents, and it opens doors to a global market which is worth 24 trillion dollars within only 4 hours of flight range from Istanbul (Figure 1) (Istanbul Development Agency, 2017). Moreover, to further improve the country's air connectivity, there is a continuing construction project of Istanbul New Airport which will be the 3rd and largest airport in Istanbul. It is projected that the airport will have the capacity of 200 million passengers, and attract 150 airlines offering flights to over 350 destinations around the world, with having 6 runways, which will make the airport the greatest in the world (Igairport, 2016).

This project is likely to boost Turkey's economic development because air connectivity is key to draw the attention of foreign business investments and attract human capital to the country (Morphet & Bottini, 2014). Regarding the increase in air connectivity, the tourism sector will also flourish, which is crucial to countries' economic prosperity (Morphet & Bottini, 2014).

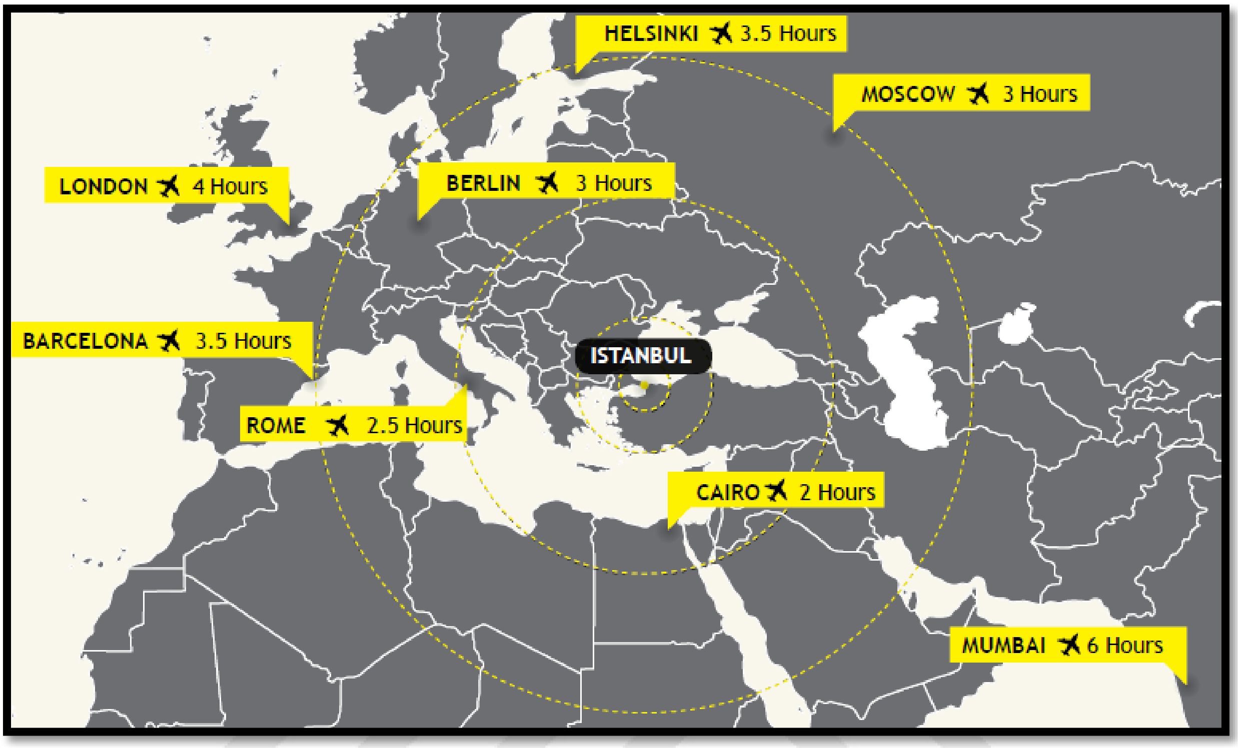

Figure 1 Turkey's proximity to global markets

Source: Istanbul Development Agency (2017)

Furthermore, as the Turkish Government aims to make Turkey the fifth[1] most-visited tourist destination by the year of 2023, investments on air transportation become the most important criteria regarding the wide geographical spread of Turkey (Ernst & Young, 2013). When considering Turkey as an emerging country, financial services and travel and tourism sectors constitute shares of 7% (5th) and 12% (2nd) respectively to country's total GDP, and they are expected to further grow in terms of their market share in the following years (WTTC, 2017).

1.2. Research Questions

On account of all of these recent developments, in the existing Turkish aviation literature, there are researches about either searching potential new destinations for some specific airlines or measuring the hub connectivity of particular airports in Turkey. However, there is limited literature on embracing the country wholly as a point for originating traffic, and investigating its air connectivity level. For that reason, this research study aims to assess the

[1] Currently, Turkey is the sixth most visited country in the world (Republic of Turkey Ministry of Culture and Tourism, 2007).

potential to open new airline routes out of Turkish airports, by examining the passenger demand size of the each location. Hence, this study seeks to fill the literature gap by searching for answers to the following research questions:

1. Would opening a new direct long haul flight route that is originating from Turkey be profitable and feasible?

2. How will the development of potential new direct long haul flight routes impact Turkey's economic development and growing strategy?

1.3. Research Objectives

In the light of the aforementioned research questions, the main motivation of this dissertation will be to find a new profitable direct long haul flight route, which originates from Turkey, to improve Turkey's air connectivity level and strengthen the country's intercontinental network structure. In order to determine feasible flight networks, the identification of possible new flight routes will be done as a first step by evaluating the demand data. Following that, forecasts will be conducted to assess the market share and passenger demand of potential new routes, by using the Quality of Service Index (QSI) model. After estimating the forecasted demand, the profitability of proposed routes will be determined, and the break-even load factor analysis will be held to assess routes' feasibility for a long-term period. In the end, proposing a feasible and direct new long haul flight route will contribute to operating airlines in Turkey, by offering them the possibility for expanding their flight network. Furthermore, the results of this dissertation will not only increase the air connectivity level of Turkey, but it will also impact positively on the country's economic development.

1.4. Dissertation Structure

This dissertation comprises of six sections to provide coherent and sufficient information in order to evaluate the proposed research study. Following the introduction, which takes place in the first section, the rest of this dissertation is organized as follows: Section 2 presents the background information and milestones of Turkey's aviation industry from past to present. Section 3 reviews the related literature on this subject by gathering information about air connectivity and its impact on the economy and tourism of countries. Additionally, this section elaborates the methods to measure air connectivity, and explains the principles behind route development and profitability analysis. Furthermore, while Section 4 describes the employed datasets (MIDT and OAG) and methodology to determine new direct flight routes, Section 5 demonstrates the findings and results. Lastly, Section 6 underlines the main conclusions and discusses the limitations of this dissertation, and suggests possible implications for a future research study.

2. BACKGROUND

Aviation in Turkey dates back to 1925 when the institution of Turkish Civil Aviation was established by the Turkish Government (DGCA, 2018). The first airline in Turkey, Turkish Airlines, was founded in 1933, and the first charter flight took place in the same year between Istanbul and Ankara (Turkish Airlines, 2018). Until 1983, airports were owned and operated by the government, and Turkish Airlines, the flag carrier of Turkey, dominated the both domestic and international air transport market in Turkey (Servantie, 2015; Artar et al., 2016). In 1983, which was an important milestone in the Turkish aviation history, the Turkish Government passed a law to liberalise the Turkish aviation market and allow the privatization of airlines, which led to an emergence of new airlines into the market as a consequence (Gerede, 2010; Servantie, 2015). Moreover, with the privatization process of Turkish Airlines[2], which began at the beginning of the 2000s, the growth of the aviation sector was further accelerated, as companies started to compete with each other to keep up with the global trends and satisfy passenger demand (Gerede, 2010; Servantie, 2015). Thereafter, the air transportation sector in Turkey has developed dramatically in the last decade, due to the impact of the liberalisation and overall economic growth in the country.

Between 2002 and 2015, the total number of airports increased from 26 to 55 and the size of the air fleet went up from 270 to 517 (DGCA, 2015, 2017). These significant developments in the air transportation infrastructure reflected on passenger and cargo traffic numbers as well. In 2017, compared to previous year, the total passenger traffic volume grew by 11.1% in Turkey, whereas a 21.6% increase recorded for the cargo traffic (DHMI, 2018a). While Istanbul Atatürk, Istanbul Sabiha Gökçen and Antalya Airports[3] have the largest passenger traffic in Turkey in that order, the majority of this traffic were covered by the two main carriers that are Turkish Airlines (Full service network carrier) and Pegasus Airlines (Low-cost carrier). Table 1 describes the air traffic figures in Turkey by comparing the years for 2008 and 2017 and showing the forecasts for 2020. According to the Directorate General of

[2] Currently, 50.88% of shares of Turkish Airlines are publicly traded, whereas 49.12% is owned by Turkey Wealth Group (sovereign wealth fund) (Turkish Airlines, 2018b)

[3] In 2015, the busiest airports were Istanbul Atatürk, Istanbul Sabiha Gökçen and Antalya Airports, which hosted 61, 28 and 27 million passengers respectively (Gleave, 2016).

Civil Aviation (2018), from 2008 to 2017, the total aircraft traffic rose by 8.1% on average each year, whereas the total passenger number and cargo traffic grew by 10.4% and 13.5% annually.

Table 1 : Key facts and figures of air traffic in Turkey

Indicators	2008	2017	2020 (Forecasts)	Average Annual Growth (2008 – 2017)	Percentage change (2008 – 2017)
Aircraft Traffic					
Domestic	385,764	909,332	1,068,864	10%	135.7%
International	356,001	591,125	677,671	5.8%	66%
Passenger Traffic					
Domestic	35,832,776	109,511,390	138,644,216	13.2%	205.6%
International	43,605,513	83,533,953	107,680,262	7.5%	91.6%
Cargo Traffic (in tons)					
Domestic	66,554	75,254	78,741	2.6%	13.1%
International	335,485	1,180,969	1,651,761	15%	252%

Source: DHMI (2018a), DGCA (2015, 2017)

It can be inferred from the above table that the growth in aircraft traffic numbers not only led to an increase in passenger flows, but also gave rise to the volume of cargo traffic in Turkey in both domestic and international channels. These numbers can be considered as indicators for the growth in international business and tourism links, which explain the economic development of Turkey with respect to its developing aviation sector (Duzgun & Tanyas, 2014). Furthermore, Turkey's aviation sector has registered an average annual growth of 15% between 2003 and 2015, whereas this rate only reached 5% on average in the rest of the world (DGCA, 2015).

As a result of this rapid expansion in the number of domestic and international flights as well as the surge in total passenger and cargo traffic, airports in Turkey, especially the ones in Istanbul, may face capacity problems in the upcoming years. Moreover, Istanbul Atatürk Airport currently operates at its full capacity, and hence fails to meet the demand of airlines in terms of scheduling additional flight frequencies or developing new flight routes (Duzgun & Tanyas, 2014). Also, the expansion of the airport, such as building an additional runway, is not a viable option due to its proximity to residential areas. For this reason, in order to solve the congestion problem of the Istanbul airports, the Turkish Government started the construction project of Istanbul New Airport, which is expected to be the largest airport in the world with its planned infrastructure and facilities (Igairport, 2016). Table 2 shows the planned capacity and traffic forecasts of Istanbul New Airport by comparing with the Istanbul Atatürk Airport.

Table 2: Comparison between the Istanbul Ataturk and Istanbul New Airport

Operational and Traffic Information (2017)	Istanbul Ataturk Airport	Istanbul New Airport*
Number of Runways	3	6
Passenger Capacity (in millions)	50	200
Number of Destinations Served	280	350
Number of Airlines Served	125	150
Domestic Passengers (in millions)	19.4	21.8
International Passengers (in millions)	44.3	48.3
Total Passenger Traffic (in millions)	63.7	70.1

* Regarding the Istanbul New Airport, the passenger traffic forecasts that are shown in the table are estimates from the growth scenario, which have been made for 2017 (Igairport, 2016).

Source: Igairport (2016), TAV Airports (2018)

According to the Istanbul New Airport Economic Impact Analysis report (2016), the forecasts have shown that the airport will reach an annual number of 120 million passengers by 2025, at which point the passenger traffic from international and domestic flights will constitute 69% and 31%, respectively (Igairport, 2016). As Turkey’s connectivity with international destinations has increased from 60 to 296 destinations between 2003 and 2017, the forecasts for Istanbul New Airport indicate that international connectivity of Turkey is expected to grow further with the increased capacity of the new airport (DGCA, 2017). The majority of the existing air connections of Turkey is provided by Turkish Airlines, which has the greatest country coverage in terms of the flight network in the world (Turkish Airlines, 2017). Currently, Turkish Airlines offers connections with 120 countries from Turkey, and the airline aims to expand this coverage by reaching a fleet of 500 aircraft in total by 2023 (Turkish Airlines, 2016). With the new airport, capacity restrictions are expected to be resolved, and both the Turkish Government and airlines in Turkey intend to improve the provision of air services and the quality of infrastructure. Therefore, the future of the Turkish aviation sector looks promising in light of these developments.

3. LITERATURE REVIEW

3.1. Air Connectivity and Economic Development

Connectivity enables passengers and the supply of goods and services to move from a one point to another by including the least number of necessary transit points (ICAO, 2018). The aviation industry plays an important role in providing this connectivity amongst destinations, and further supports countries to develop economically by affecting them both directly and indirectly (Perovic, 2013). In 2012, while the sector generated $606 billion via direct employment (9.9 million jobs) and economic activities in the air transportation domain, $697 billion were produced indirectly (11.2 million jobs) by the economic activities that provide supplies and services to the sector (Morphet & Bottini, 2014; ABBB, 2016). The more countries connect to global air transport networks, the more their overall productivity increases in the long term due to the positive impact of air connectivity (Perovic, 2013). This is because, improved air connectivity enables domestic firms to access global markets, and eventually stimulates freer movement of investment capital and labour force between countries (Perovic, 2013; Morphet & Bottini, 2014).

Brueckner (2003) provided evidence on the positive correlation between the frequency of good airline services and employment development in a metropolitan area. The frequency and variety of options for different destinations of airline services enables face-to-face interactions and collaboration between businesses, and fosters regional employment. His research results state that a 10% increase in passenger traffic in a metropolitan area generates a 1% improvement in employment in the service sector (Brueckner, 2003). Green (2007), further makes the connection clearer between airline services and economic growth by using broader explanatory variables, such as examining airport activities, passenger activities, and geographical location of hubs, considering both employment and population growth in his article. Consequently, although he uses a large set of specifications, his findings agree with Brueckner (2003) and shows the positive economic impact of airline services over regions by performing multiple regression analyses (Green, 2007).

Air transportation also plays an important role in the globalisation of businesses (McQuaid et al., 2004; Eddinghton, 2006). Since air transportation reduces travel times and provides a rapid transfer of goods and services, it becomes vital for businesses which operate on a multinational scale. Additionally, airport availability and air connectivity of regions are critical factors for both domestic and foreign companies to compete in different markets and allocate their investments according to accessible locations (McQuaid et al., 2004). In relation to that, Bel and Fageda (2008) found that the availability of direct intercontinental flights is vital for large firms when deciding on locations for their new headquarters. Also, results showed that large firms' headquarter numbers inclined to increase in 4%, for every 10% increase in the number of intercontinental flights in the associated area (Bel & Fageda, 2008). Therefore, the increase in new direct flights leads the establishment of international companies' headquarters and manages to exhilarate foreign direct investment (FDI) exchanges between the connected regions (Banno & Redondi, 2014). Furthermore, Banno and Redondi (2014) calculated an overall increase of 33.7% in FDIs 2 years after launching a new route for the targeted area.

Air connectivity's role in emerging countries, such as Turkey, is vital to their economic growth, as linkages with global air transportation networks stimulate the aforementioned effects. According to the Oxford Economics report (2016), in 2014, the air transport industry provided direct employment to 140,000 people in Turkey, while it contributed $9.7 billion to the GDP of the country. When the catalytic impacts[4] of air connectivity are taken into account the total figure reaches up to 6% of the national GDP (InterVISTAS, 2015; Oxford Economics, 2016). The estimates showed that a 10% improvement in the air transport networks of Turkey will attain a 0.07% increase in the GDP, which can help drive a long-term economic growth (Oxford Economics, 2011).

[4] The catalytic impact implies a surge in economic activities of a country, which is stimulated by air connectivity. The examples can be given as spending by tourists, foreign direct investments and taxes on international trade markets (export/import).

3.2. Air Connectivity and Tourism

Opening new direct routes not only strengthens businesses' interactions, but also gives rise to tourist flows between destinations. According to Bieger and Wittmer (2006), air transportation and tourism affect each other's development, and most of the time air transportation is considered as the main transportation option to tourist destinations. Moreover, in some cases air transportation can provide the transportation of tourists up to 100% for specific locations in the world such as Japan, Taiwan and Australia (Bieger & Wittmer, 2006). However, the provision of air transportation services is not the only driver for tourism growth. There are many different interrelated factors that influence the relationship between transportation and tourism, and academics have conducted researches, which aim to explain this causal relationship by determining the key factors that have effects on the tourism growth.

According to Prideaux (2000), one of the significant determinants in the tourism development is the level of the transportation infrastructure of countries. Tourism development is reliant on the availability and quality of different transportation modes, networks and terminals to enable tourist flows between and within countries (Prideaux, 2000; Henderson, 2009). Furthermore, the attractiveness of the destination and its tourism growth also depend on the total time, distance and cost of the intended travel, along with the relative prices in the region (Khadaroo & Seetanah, 2007). Regarding all of these, in their research study, Khadaroo and Seetanah (2008) found that the tourism demand is considered to be both income and price elastic with respect to passengers' destination selection.

Considering air transport as the main transportation mode in facilitating international tourist flows[5], governments' aviation policies and liberalisation of air transport services become decisive factors in removing barriers between countries and stimulating the growth of international tourism. As stated previously, tourism demand is price elastic, and with the impact of air transport liberalisation, fares have declined over the years, whereas international tourist arrival numbers have increased in the meantime (Forsyth, 2006). Furthermore, liberalisation led new competitors to emerge and enter the market, and along with the increased competition, new air connections have been offered to passengers and prices have become competitive (Zajac, 2016). In this context, the abolishment of the visa requirement between particular member states

[5] From 2015 to 2016, the number of international tourist arrivals have increased from 1.19 to 1.23 billion. Over 54% of international tourists chose to travel their destination by air transportation (Statista, 2017; ABBB, 2018).

of the European Union (The Schengen Agreement[6]), and the development of low-cost carriers (LCCs) can be given as the beneficial examples of liberalisation (Forsyth, 2006; Zajac, 2016). Therefore, regional, multilateral and bilateral agreements among countries have an enormous effect on the growth of the tourism industry as new tourism markets arise consequently.

The increase of carriers in air transportation networks not only changed the dynamics of the tourism sector by reducing fares, but also eased the mobility of tourists between origins and destinations by increasing point-to-point connections (Dobruszkes, 2006, 2009). In order to understand the pattern of tourist flows regarding the connectivity level of airports, Iñiguez et al. (2014) carried out a research study analysing the connectivity between Spain and the other European countries through the network structure of Ryanair, which is one of the biggest low-cost carriers in Europe. The results of the study revealed that centralisation rates[7] are mostly high in Europe, and generally a one hub airport meets the air traffic of its linked country. This means, in an event of a central airport closure, every connection leaving from (or arriving to) that airport is exposed to potential damages, and this can affect the whole connectivity, as it can be seen in the incident of Brussels airport terror attack[8] (Belgocontrol, 2016). On the other hand, countries with lower centralisation rates, such as Italy, Spain and the United Kingdom turned out to have greater shares of tourist arrivals in Europe, due to airport and flight diversification in those countries. Therefore, this research study showed that air connectivity is not a sole factor to enhance the passenger traffic in a country, in addition to that, the availability of different flight options from different airports is also a great stimulus to both domestic and international tourist flows within a country (Vera-Rebollo, 2009; Iñiguez et al., 2014). Furthermore, the air traffic growth at secondary airports has an impact on fostering the regional tourism sector by bringing recognition to places that are normally not considered to be traditional tourist destinations (Castillo-Manzano et al., 2012; Iñiguez et al., 2014).

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[6] The Schengen Agreement grants the free movement right in Europe for European citizens. The Schengen Area comprises of 26 European countries, and Europeans make over 1.25 billion journeys within the Schengen area in each year (European Commission, 2014).

[7] The centralisation rate displays the connection degree of airports. If the connection ratio of an airport is high in a country, for instance the presence of a star network, it means the country is dependent on that airport. Contrarily, if the connection ratio is low, and the country has a mesh network, it means the network connectivity of that country is strong, and is not dependent on a single airport, in the case of an airport closure (Iñiguez et al., 2014).

[8] The bombing of the airport happened on the 22nd of March, 2016, and the airport remained closed for 12 days after the terrorist attack. It took 72 days to operate at its full capacity again, and in the meantime airlines' operations and air traffic affected adversely (Belgocontrol, 2016; Oxley, 2017).

The development of new generation wide body aircrafts with extended flight range have played an important role in enabling tourists to reach intercontinental and “exotic” destinations such as the Caribbean Islands, Maldives, and Australia (Kaspar, 1993 cited in Bieger & Wittmer, 2006). However, despite the provision of long-haul flight services, the behaviour of passengers becomes the decisive factor on air travel demand to distant destinations. This is because, passengers’ willingness or opportunity to travel is decreasing, as the distance to the final destination increases (McKercher, 2008a; Peng et al., 2015). Hence, the destination loses its attractiveness because of the decaying effect of distance and cumulative effects of it, such as increasing travel time, cost, risk and cultural distance (McKercher, 2008a). Furthermore, McKercher et al. (2008b) stated that international travel demand declines in destinations that are located more than 2,000 km from the origin market, and they capture less than 1% of the origin market’s outbound passenger traffic. In the light of these findings, Tveteras and Roll (2014) studied whether improving international air connectivity, through providing a non-stop long-haul flight between the origin and destination, can influence the volume of visitors and mitigate the negative effects towards distant markets. They investigated the number of tourist arrivals in Peru, and established a demand model by employing relevant drivers of international tourism such as the distance to the destination, average income of tourists, relative prices and exchange rate and the number of non-stop flights between the O-D market. Eventually, the results showed that a 1% increase in the number of international flights to Peru has achieved to attract additional visitors between the 0.3% and 0.5% (Tvetaras & Roll, 2014).

With the continuing economic growth, impact of globalisation, and improving connectivity, demand for point-to point long-haul flight services will further increase among regions (Weber and Williams, 2001). Although the isolated countries that are far away from the major markets like Europe and the US suffer from the competitive disadvantage in air transportation markets, the forecasts show that international passenger traffic will grow in regions such as Latin America, the Caribbean and Asia-Pacific in the following years. According to the International Air Transport Association (IATA) (2017), the growth in revenue passenger kilometers for international passenger traffic from 2016 to 2017 was recorded as 10.9% in the Asia-Pacific region and 8.2% in the Latin America region. Furthermore, forecasts for 2034 show that while Asia- Pacific and Latin America regions will grow by 4.9% and 4.7% annually, Europe (2.7%) and North America (3.3%) will have slower growth rates as the air transportation market has reached its maturity in those regions (IATA, 2015).

3.3. Methods to Measure Air Connectivity

During the last quarter of the 20th century, thanks to technological advances and deregulation in the airline industry, along with air space liberalisation, competition has become fierce in the aviation sector (Malighetti et al., 2011). This growing rivalry not only occurred among airlines, but also affected airports, and pushed them to develop new strategies with the purpose of attracting more carriers and passengers. Additionally, local authorities and governments gave further support to airlines, as regions' development levels correlate positively with the level of air connectivity provided to that region (Percoco, 2010). When all these changes are taken into account that occurred recently, airport and airline network benchmarking, performance evaluation and connectivity measurement models started to take place in the aviation literature in a wider context (Veldhuis, 1997; Burghouwt & Veldhuis, 2006; Malighetti et al., 2008). At first, competitiveness and attractiveness of airlines and airports were estimated mostly by examining point-to-point networks, which provide direct connectivity between the origin and destination. Size-based indicators, such as the number of destinations served and the frequency of direct flights provided, were used in the traditional measurement models (Burghouwt & Veldhuis, 2006; Burghouwt & Redondi, 2009). However, with the growth and widespread utilization of hub-and-spoke networks, the measurement of connectivity has become more complex, due to the impact of indirect flights and occurrence of multiple parameters that need to be taken into consideration for calculations (Redondi et al., 2011a; Burghouwt & Redondi 2013). Therefore, researchers have gradually developed a number of different models, and each measurement model included a different set of indicators, in order to provide information on the different aspects of air connectivity (Morphet & Bottini, 2014).

In this regard, there is no systematic structure to follow in air connectivity measurements. The reason is that airlines compete both in direct and indirect flight routes in air transportation networks. On the other hand, hub airports act as an intermediate gate to airlines and provide services to direct and indirect flights together, and compete with the other hub airports in the market. Consequently, all of these lead to various connectivity definitions, such as direct, indirect and hub connectivity, and new metrics, like the quality of the connections, occur in the presence of the usage of indirect and hubbing services (Airports Council International, 2018). Therefore, authors have reasoned that air connectivity calculations should factor in both direct and indirect connectivity indicators to provide a comprehensive analysis, regarding the assessment of air transportation networks (Burghouwt & Veldhuis, 2006; Zanin & Lillo, 2013; Arvis & Shepherd, 2016). In Table 3, commonly accepted connectivity measurement models, which have been employed in scientific publications over the years, are gathered and shown below.

Table 3: List of connectivity measures

Model	Definition	Indicators
Doganis and Dennis Connectivity (Doganis & Dennis, 1989).	The model considered direct and indirect flights by employing a binary measure to assess their connectivity	Minimum & maximum connecting time Flight frequency The level of schedule coordination
Bootsma Connectivity (Bootsma,1997)	The model considered direct and indirect flights by employing a discrete measure to assess their connectivity	Minimum & maximum connecting time Flight frequency The level of schedule coordination
WNX (Weighted Number of Connections) (Burghouwt & de Wit, 2005; Burghouwt, 2007)	The model considered direct and indirect flights by assigning weights to their connections' quality in terms of transfer and detour time. The model categorised connections as "excellent", "good", and "poor".	Minimum & maximum connecting time Routing factor
NETSCAN (Veldhuis,1997; IATA, 2000; Burghouwt & Veldhuis, 2006; Matsumoto et al., 2008)	The model considered direct and indirect flights by assigning quality indexes between 0 and 1 The results indicate the quality of direct/indirect flights and connectivity of each airport	Minimum connecting time Transfer time Flight frequency Routing factor

Source: Burghouwt & Redondi (2013), Sopadang & Suwanwong (2016)

After establishing an extensive review and comparison study amongst the existing connectivity indices in the literature, Burghouwt and Redondi (2009, 2013) stated that the selection of the measurement model depends on the scope and complexity of the intended research. On the other hand, it is also related to the available data for the study. However, above presented measurement models do not represent the whole employed connectivity measures in the literature, and variations can be applied to these models by modifying indicators, adjusting them into the desired objective of the study. Therefore, Burghouwt and Redondi (2013) identified six dimensions to classify measurement models according to the aspects that they do explain about air connectivity. The specified connectivity dimensions are as follows:

Accessibility versus centrality: Accessibility refers to the number and quality of direct and indirect flight connections available to a passenger at an airport, while centrality indicates the number of transfer options that an airport offers.

Temporal coordination: The level of schedule coordination is one of the indicators for the performance of airports. Departure and arrival times of flights need to be arranged coordinately in order to minimise waiting times of passengers at airports

Routing factor: The routing factor is the ratio between the total distance flown[9] to reach the destination and the direct distance (theoretical distance over the map) between the origin and destination (Redondi et al., 2011b; Burghouwt & Redondi, 2013).

Connection quality: The connection quality dimension measures the quality of variables (indicators) that help to compare flights on a general basis, by assigning coefficients (weights) to them.

Maximum number of steps allowed: It counts the number of legs on the path to reach the final destination. The itinerary can be a non-stop, single-stop or multi-stop connection, regarding the available flight options from airports.

Local versus global models: While local connectivity models only consider the quality of individual connections from an airport, global connectivity models measure the connection quality of every possible connection in the same O-D market.

As the main purpose of this dissertation is to open non-stop international flight routes from Turkey, the most relevant dimensions for this study are routing factor and connection quality. The reason is that, these indicators are not only being used in air connectivity measurements, but also being implemented in supply and demand forecasting methods in order to determine the feasibility and profitability of potential new routes (Tembleque-Vilalta & Suau-Sanchez, 2016).

[9] The total distance flown can mean either a direct flight to reach the destination or a number of indirect flights to complete the journey.

The routing factor is an important variable in determining the attractiveness of routes, because passengers' choice depends on factors that benefit them. As the routing factor increases, perceived quality from the flight decreases due to increased travel time (Veldhuis, 1997).

The measurement of the quality of connections is essential in understanding passengers' motives while choosing their flights. Determinants of the quality can be the frequency of flights, total flight time, transfer time (waiting time) between indirect flight connections, detour time, the total seat capacity, fares and so forth (Veldhuis, 1997; Malighetti et al., 2008; Burghouwt & Redondi, 2013). In the literature, three forms are available for calculations of connection quality. The first form is binary, and it assigns specific integer values to variables depending on their true or false outputs for a given condition. For instance, if there is a direct flight from an airport for a given O-D route, then that specific flight takes the value of "1" as its coefficient in the function, on the contrary, this value become "0" for indirect flights. The common thresholds for binary forms are the level of detour, transfer times and the type (direct/indirect) of flight connections (Malighetti et al., 2008). The second form is discrete, and it evaluates variables' values according the given range of conditions, in other words, according to connections' spatial[10] and temporal[11] attributes. Then, it categories them into quality levels such as "poor" and "good", or "low" and "high", with respect to connections' values (Danesi, 2006). The last form implements a continuous measurement for the connection quality, and assigns a different quality index for each connection, where they can take any value within a given range (Veldhuis, 1997; Burghouwt & de Wit, 2005; Burghouwt & Veldhuis, 2006).

According to Burghouwt and Redondi (2013), measurement models that employ continuous measurement of connection quality lose the least information during calculations. Furthermore, the continuous measurement form enables to carry out reliable comparisons between airports regarding the provided number of flights and quality of connections. Therefore, continuous measurements can be employed in complex analyses such as examining the individual origin-destination routes from an airport by establishing an appropriate regression model (Burghouwt and Redondi, 2013).

3.4. Route Development and Profitability

Before the transition of regulatory framework in air transportation networks and growth in international passenger numbers, air transportation networks were highly regulated and

[10] The level of network concentration of an airline at an airport.
[11] The level of flight schedule coordination of an airport.

controlled by governments for many years (Debbage, 1994). Airports were publicly operated, and governments decided flight routes, prices and competition levels as most of the carriers were partaking in activities under the government-owned status (Swan, 2002; Halpern & Graham, 2016). However, as both airlines and airports started to turn into private enterprises, competitiveness in markets has increased. Moreover, airports have gained a more important position within the sector than before, hence, marketing along with route development practices have become core activities of airports because of the increased competition and desire to draw more carriers to their airfields (Halpern & Graham, 2015). In their research study, which is based on a survey of 124 airports worldwide, Halpern and Graham (2016) found that route development activities have a statistically significant positive effect on airports' performance. Furthermore, while market growth has a substantial and direct impact on the performance of airports, airport constraints, such as legal or regulatory conditions, limited infrastructure and operating capabilities, have huge adverse effects (Halpern & Graham, 2016). This implies that, route development is dependent upon various factors and requires a strategic long-term consideration before a route being introduced. (Ouimet, 2010). Therefore, route development does not only mean opening new routes from airports to new O-D markets, but also means retaining the existing routes and improving them by adding flight frequencies or adjusting aircrafts according to passenger demand (Swan, 2002; Halpern & Graham, 2016).

Airports need to carry out a careful analysis in order to attract and encourage airlines to develop new routes, as new routes require huge investments and pose risks to airlines regarding whether the new routes will be a financial success (Ouimet, 2010). The size of the potential market, namely the total passenger demand, airports' catchment area and competition conditions are a few of the key metrics to consider in assessments of route development studies (Ouimet, 2010; Naylor, 2011). For instance, ASM's[12] survey (2013) examined important criteria while developing new routes from the perspective of airlines, and results showed that airlines value more to the catchment area, demographics and income data, along with the traffic seasonality and average fare predictions of potential routes.

In another survey of ASM (2009), airports' route development strategies were analysed through the responses received from 100 airports worldwide (cited in Halpern & Graham, 2015, 2016). The results revealed that 94 per cent of the airports are actively participating in marketing

[12] ASM (Airport Strategy & Marketing) is an organisation of route development consultants, and it helps airports, airlines, tourism agencies and governmental authorities in the development of new flight routes around the world (routesonline.com).

themselves to airlines, however, the allocated budget and the amount of expenses depend on the location and size of airports. When participation levels were examined in more depth, it was discovered that regional differences exist among airports, and Europe was found to be the most active and advanced region in route development practices (ASM, cited in Halpern & Graham, 2015, 2016). Furthermore, it was seen that while 74 per cent of the airports in Europe are focusing on short-haul flights, only 49 per cent of the airports are providing long-haul flight services. On the other hand, in the other regions' airports, these percentages change for short and long haul flights to 54 and 66 percentages respectively. In a more recent research study which is conducted by Boonekamp and Riddiough (2016), passenger booking data from 2005 to 2015 were analysed, and they detected 5,157 new direct flight routes that were developed from Europe to various European and intercontinental destinations. However, among these new routes, only 10 per cent of them provide flight services to intercontinental destinations (4% Africa, 2% North America, 1% Middle East, 1% Latin America and 1% Asia-Pacific). When the results of both studies, namely regional differences of airports and business models that airlines follow, are taken into consideration, all of these may be the consequences of flight distance differences[13] between origins and destinations among regions and policies and agreements[14] among countries.

Given that the aim of this dissertation is to open a new direct long-haul flight, in the light of the above mentioned findings, taking the advantage of the unexploited routes rather than competing in existing markets and fulfilling the indirect passenger demand to intercontinental destinations can be profitable when Turkey's location is considered.

In order to assess the demand and financial viability of new routes, the analysis should include the information of the suggested flight's market share, load factor, frequency and demand stimulation effect (Ouimet, 2010). To obtain these metrics, airline industry specialists commonly apply the QSI model which is an extensive forecasting technique in route development practices (Kayloe, 2010; Welch, 2012). Essentially, it assigns quality indexes to the specified explanatory variables which have effects on passengers when choosing their flights, and it estimates market shares of flight services by calculating the QSI scores of competing airlines in an O-D market (ACI, 2018). For instance, Tembleque-Vilalta and Suau-Sanchez (2016) employed the QSI model in their research study and analysed the profitability

[13] Distances among countries in the continent of Europe are shorter than the distances in Asian or American continents.

[14] Open-skies agreement among European countries removes entry barriers for airlines and increases competition (Boonekamp & Riddiough, 2016).

of a hypothetically direct Barcelona-Asian route by identifying the explanatory variables as capacity, stops, aircraft mix, frequency, travel time and fare. Also, the study managed to evaluate the results comprehensively by incorporating an integrated model for forecasting new flights' revenues and costs, and showed the viability of routes consequently (Tembleque-Vilalta & Suau-Sanchez, 2016).

3.5. Literature Gap

In the aviation literature, there are several researches on air connectivity, route development and their impacts on both economic and tourism development of cities, regions and countries. Also, as mentioned previously, researchers follow various methodologies on measuring air connectivity or assessing the feasibility of new routes by using either different datasets or implementing different models. However, there is limited literature on the Turkish aviation industry, and existing ones are either related to Turkish Airlines or Istanbul airports' hub connectivity.

For instance, Logothetis and Miyoshi (2016) investigate the network strategy of Turkish Airlines and Emirates, in order to understand their successful growth and positioning in the market by focusing on connectivity at their main hub airports. In the research study, they use their own methodology, the hub connectivity performance analyser, to assess the hub performance and efficiency of Istanbul Atatürk Airport and Dubai Airport, by examining flights of Turkish Airlines and Emirates. They take into consideration connectivity indicators such as minimum and maximum connecting time and maximum geographical detour, by using flight schedules released through the Official Airline Guide (OAG) Company. Moreover, they assess additional factors like seat and frequency rates of flights to measure the quality of connections at hubs in addition to their connectivity levels (Logothetis & Miyoshi, 2016).

To give another example, Voltes-Dorta et al. (2017) examine changing trends in global air traffic by analysing passengers' demand and major hub airports' connections. In order to assess the selected airports' connectivity and quality, indicators such as total frequency, average travel times and connecting times are taken into account (Voltes-Dorta, et al., 2017). The research study employed both demand (MIDT) and supply (OAG Flight Schedules) datasets to perceive hub airports' competition and connections' quality. By this way, they analysed the evolution of annual passenger traffic at the chosen airports between 2006 and 2015, and they found that, in the last three years, Istanbul (non-EEA airport) has surpassed the main EEA hubs like Amsterdam and Frankfurt regarding the intercontinental passenger numbers. Furthermore, Suau-Sanchez et al. (2015, 2017b) revealed Istanbul's crucial role in providing hub connectivity for worldwide markets, in the course of benchmarking regional airports' connectivity with demand data. While Istanbul Atatürk Airport enjoyed a massive network growth (number of destinations served) with a 105.3% increase from 2004 to 2013, the airport became one of the key hub airports in the region as it facilitated air transport between EEA and non-EEA European countries due to its strategic geographical position (Suau-Sanchez et al., 2015)

Therefore, on the account of the investigated literature, this research study aims to fill the literature gap of the Turkish aviation industry by focusing on Turkey and Turkey's air connectivity while addressing Turkey as a traffic origin rather than an intermediate hub. On the other hand, from a methodological perspective, this study will adopt the relevant indicators that have been traditionally employed for performance assessment studies of hub airports (e.g. the assessment of Istanbul's potential as a hub). Furthermore, this study will differentiate itself by conducting the QSI model to evaluate the profitability of developing new direct long haul routes from Turkey, by using up-to-date MIDT and OAG Flight Schedule datasets.

4. RESEARCH METHODOLOGY

This section explains the followed methodology in the dissertation. Firstly, a schematic representation of the analysis is shown (Figure 2), and then the employed datasets are described. In order to identify new direct flight routes, Turkey's outbound passenger traffic is examined thoroughly and potential destinations are chosen regarding the defined necessary conditions of developing new air services. After detecting promising locations that show adequate indirect passenger demand, the QSI model is carried out to calculate the market share of new flights, by using the relevant indicators that help to evaluate service quality of flights. Lastly, to assess the viability of new routes, a profitability analysis is conducted by considering the offered flight plans and benchmarking new flights' load factors against the break-even load factor of the selected operating airline.

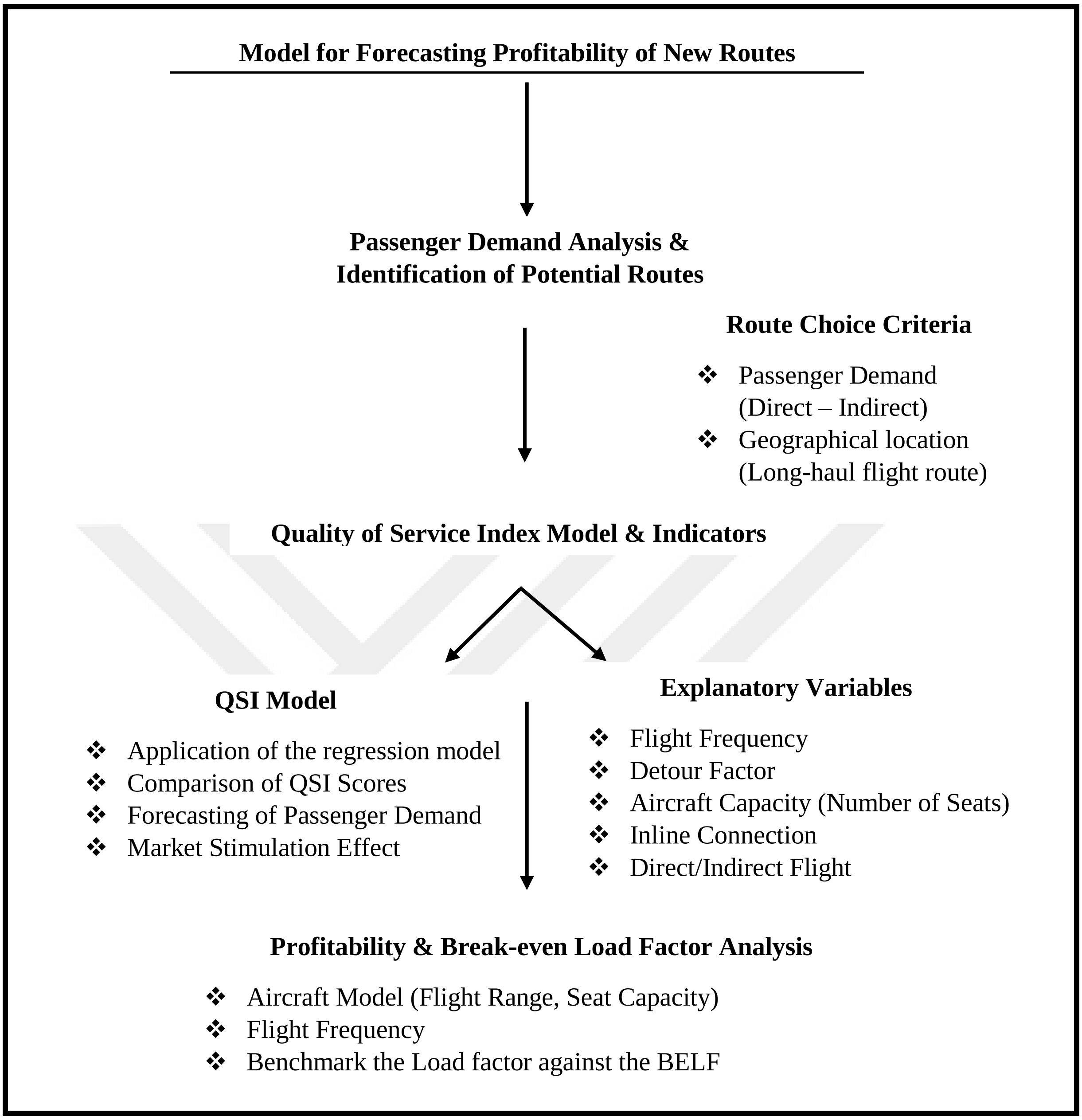

Figure 2: Representation of the methodological process

4.1. Datasets & Data Filtering

The necessary data for this dissertation is provided by the OAG Company which is a digital flight information supplier in the world (OAG, 2018). MIDT and OAG Flight Schedule datasets, which are employed for the analysis, are based on bookings that are made via the Global Distribution Systems[15] (GDS), and they deliver the information for demand and supply

[15] The Global Distribution System is a digital network system that stores booking information and allows transactions for travel agencies in terms of airline bookings, hotel reservations and car rentals globally. Central reservation systems like Galileo, Sabre and Amadeus are one of the major sources of MIDT demand datasets (Derudder & Witlox, 2005; Voltes-Dorta, et al., 2016).

sides of the aviation sector respectively (Voltes-Dorta, et al., 2016). MIDT data, which is typically used by the airline industry, covers passenger itineraries, by having records of passenger booking numbers, and provides information on passenger flows in the world. To be more precise, MIDT displays each record for the specific O-D route with the information of its operating airlines, connecting airports (showing up to two intermediate legs of the journey), average fares and total number of passengers. On the other hand, OAG Flight Schedule data includes details of the all scheduled flights of operating airlines in air transport markets around the world. OAG Flight Schedule, like the MIDT dataset, covers every scheduled flight entry, and provides the information of the operating airline for the specific O-D route by giving its frequency, seat capacity, flight distance and departure/arrival time figures. The practice of the both dataset is common in the aviation literature, considering that various authors employed them in their research studies to analyse the connectivity of airports or development of new routes (e.g. Suau-Sanchez et al., 2015; Tembleque-Vilalta & Suau-Sanchez, 2016; Voltes-Dorta, et al., 2017). Therefore, the MIDT data is applicable to this research study, as it enables the analysis and forecast of passengers' travel demand by delivering detailed information of individual flights, which depart from Turkey.

The obtained datasets are up-to-date and contain the information of June and December for the year of 2017. Analysing both months will give an indication for the winter and summer seasons' passenger demands, and eventually this will show whether the demand will be only seasonal or all year long (annual) for the promised route.

Before conducting the analysis, a number of adjustments have been made to the MIDT data, such as organising data records and making Turkey an originating point to international destinations, and it has been found that the dataset contains:

Table 4: Overview of the MIDT data, June - December 2017, data of Turkey

MIDT Data	June 2017	December 2017
Scheduled flight itineraries	23,130	20,926
Passenger bookings	4,855,784	4,657,521
Operating airlines	181	169
Operating airports	48	48

Source: MIDT (2017), Own elaboration

4.2. Passenger Demand Analysis

The first step in the analysis is to determine Turkey's current flight connections with the rest of the world through the examination of the MIDT data. In order to do this, first, each itinerary are matched with its related country and region, as data show flight records only with their departure, intermediate and arrival airport codes. Following that, international flights are taken into account, and they are categorised as either direct or indirect flight depending on their flown routes to reach their final destinations. Then, Turkey's overall connectivity level[16] with geographical regions, countries and airports are measured respectively by analysing the number of direct and indirect passengers of each itinerary. This measurement uses two indicators to assess the passenger flow, which originates from Turkey, and these are the share of departing total passenger number and indirect passenger numbers, with respect to international destinations. While the share of arriving total passenger number is found by dividing the regions' or countries' direct and indirect passenger numbers to Turkey's whole departing international passengers, the share of indirect passenger numbers is calculated by dividing the indirect arriving passengers of a country or region to its own total arriving passenger number. By doing so, the breakdown of Turkey's passenger demand is revealed in terms of regions, countries and airports, and it became easier to detect potential routes that have high indirect passenger demand.

Before determining the promising direct long-haul flight routes, the data is narrowed down from region to a country level on the basis of the proportion of indirect flights. After that, the top ten countries that possess the highest shares of indirect passengers are chosen according to two conditions, which have been specified in accordance with the purpose of this analysis. The first condition is the required flying distance to countries, namely final destinations, to be considered as a long-haul flight. Eurocontrol (2005, 2011), which is an international organisation operating to maintain coordinated air traffic management over Europe, states that flight routes which exceed 4,000 kilometers are accepted as long-haul flights. Therefore, this criteria is applied in the selection of top ten indirectly flown countries. The second condition is that countries need to attract more than 3,000 indirect passengers per month. The reason is that when the direct route is opened, there should be enough demand for the flight and it needs to capture an adequate market share from the existing operating airlines in that O-D market in order to have a sustainable return and be profitable in the long term.

[16] Here, this term indicates passengers' demand towards regions and countries, and how they are connected through their final destinations.

Finally, the chosen countries' airports are examined to discover their amount of indirect passenger demand, and to spot unserved airports from Turkey. Therefore, potential flight routes are identified depending on airports' arriving indirect passenger numbers[17], in order to evaluate their profitability.

4.3. Quality of Service Index Model & Indicators

To evaluate the identified potential routes, the QSI model is employed in this analysis. The method was found viable to implement in the direction of the aim of this dissertation as the QSI model is more comprehensive than linear or logistic models to interpret the feasibility of new direct long haul flight routes in unserved markets (Tembleque-Vilalta & Suau-Sanchez, 2016). The reason is that offering a new non-stop flight for an O-D market has the possibility to trigger competitive responses from other airlines and change the logistic regression parameters (Tembleque-Vilalta & Suau-Sanchez, 2016). Therefore, in order to accurately grasp dynamics of an O-D market and the behaviour of passengers in deciding for their flights, the QSI model is employed as it is based on the principle of forecasting market shares of flights through assessing their service quality. Indicators such as aircraft size, frequency, fares and connection type can be given as examples for commonly used service quality parameters, and the employed data in this study, MIDT, is an appropriate source for route development studies as it covers the needed records of flights regarding the analysis (Halpern and Graham, 2015; Tembleque-Vilalta & Suau-Sanchez, 2016; Suau-Sanchez et al., 2016).

The steps of the analysis are illustrated as follows:

1. Determine the factors that affect passengers' choices when selecting their flights for a particular itinerary among other existing flight options.
2. Find a reference route that has a direct flight and is similar to the potential new route in terms of the O-D distance. In this case, reference route should include a direct flight which departs from Turkey.
3. Carry out a regression analysis to detect and calibrate the weight of each factor (variable) on passenger demand of existing flights that operate in the specified reference route.
4. Multiply the computed coefficients with the related factors of each flight option that operates in the proposed itinerary, including the potential new direct route, to find out QSI scores.

[17] In this analysis, airports that have indirect passenger demand more than 1000 found worthwhile to be assessed.

5. Compare the QSI scores of flights to calculate the market shares that they will capture after introducing the new direct route for the promised O-D market.

In accordance with the available data, applicable explanatory variables which influence decision making of passengers in selecting their flights are chosen and elucidated below:

Flight frequency: The flight frequency signifies an airline's number of scheduled flights for an O-D market. While the flight frequency of direct routes, where non-stop flights operate, solely set by the operating airline, connecting flights' frequency to the final destination depends on multiple airlines. Equation 1 and Equation 2 show the calculation of the flight frequency for a particular route.

$$Flight\ frequency = MIN(\ Frequency\ of\ Leg\ 1 : Frequency\ of\ Leg\ 2 : Frequency\ of\ Leg\ 3) \quad (1)$$

or

$$Flight\ frequency = MIN(\ Frequency\ of\ Leg\ 1 : Frequency\ of\ Leg\ 2) \quad (2)$$

where the flight frequency equation is related to the number of stops which take place in the itinerary. To give an example, if there is one intermediate airport along the journey and the first leg of the flight is operated by an airline seven times a week, while a different airline operates the second leg of the journey ten times per week, then, only seven possible connecting flights are available to reach from origin to final destination. As the frequency of flight services plays an important role in passengers' choices, a large variety of available flight options for a particular route will receive a higher value in the QSI analysis (InterVISTAS, 2010; Suau-Sanchez et al., 2016).

Detour factor: It is the ratio between the flown distances of indirect flights and hypothetical distance of the direct flight over the map, in order to reach the final destination from an origin. The great circle distance[18], which is the shortest distance between two points on the Earth's spherical surface, is taken into consideration while calculating flight routes' detour factors. Essentially, it looks the latitude and longitude of airports to find the closest distance between

[18] The great circle distance is calculated by implementing the "Haversine formula" (Mwemezi & Huang,2011):

$$d = 2r * \arcsin\left(\sqrt{\sin^2(\frac{\varphi_2 - \varphi_1}{2} + \cos(\varphi_1)\cos(\varphi_2)\sin^2(\frac{\lambda_2 - \lambda_1}{2})}\right)$$

where:
d is the distance between two points
r is the radius of the Earth (6,371 km)
φ is the latitude of an airport
λ is the longitude of an airport

an O-D market. Equation 3 and Equation 4 demonstrate the measurement of the detour factor depending on a journey's number of legs.

$$Detour\ Factor = \frac{Distance\ of\ Leg\ 1 + Distance\ of\ Leg\ 2 + Distance\ of\ Leg\ 3}{Direct\ O - D\ Distance} \quad (3)$$

or

$$Detour\ Factor = \frac{Distance\ of\ Leg\ 1 + Distance\ of\ Leg\ 2}{Direct\ O - D\ Distance} \quad (4)$$

Figure 3: Sample representation of a route structure – Geographical detour effect

Source: Great Circle Mapper (gcmap.com), Own elaboration

Figure 3, illustrates an example of the geographical detour effect, where a comparison between the routes IST-ADE-CGK and IST-CGK is made. While the direct distance between the IST-CGK route is 9,443 km, IST-ADE-CGK itinerary's indirect distance finds 10,627 km in total, and this makes the detour factor as "1.12", which means passengers have to travel 12% more distance if they choose the indirect route to reach their final destination.

Generally, the attractiveness of connecting flights decreases with increasing detour factors, as higher detour factors lead to longer travel times (Veldhuis, 1997; Burghouwt & de Wit, 2005; Seredyńsk et al., 2014). Therefore, routes that have a detour factor close to "1" are expected to get a better QSI score in the analysis.

Aircraft capacity (Number of seats): This indicator refers the total available capacity, which is provided by carriers, for an itinerary. More specifically, it determines the maximum viable passenger carrying capacity of airlines by taking into consideration different legs of the journey if available along the route. For direct flights, the total number of seats, namely the number of carried passengers to the final destination only depends on the supplied aircraft's size. However, as indirect flights involve aircraft interchange at intermediate airports, the ultimate total capacity is calculated for a given O-D market as follows:

$$Total\ capacity = MIN(Max\ Capacity\ of\ Leg\ 1: Max\ Capacity\ of\ Leg\ 2: Max\ Capacity\ of\ Leg\ 3) \quad (5)$$

or

$$MIN(Max\ Capacity\ of\ Leg\ 1: Max\ Capacity\ of\ Leg\ 2) \quad (6)$$

As can be seen from the above, calculations depend on journeys' number of stops (1-stop or 2-stop itinerary). To illustrate, in a hypothetical journey, which includes one stopover at an intermediate airport, if the first leg of the flight is supplied with an aircraft that has a maximum 350 seat capacity, and the second flight delivers the second leg with a maximum 180 seater aircraft, then, the maximum passenger number that can be carried from origin to destination is 180.

Generally, passengers prefer larger aircrafts compared to smaller aircrafts due to perceived levels of comfort and safety, with respect to the provided larger cabin space and baggage capacity (Coldren et al., 2003; InterVISTAS, 2010; Kayloe, 2010). Therefore, in the analysis, itineraries that provide greater seat capacities are expected to receive positive coefficients.

Inline connection: The inline connection indicates that whether the flight is operated by under the same airline throughout the whole journey (including stopovers if there are any). If the itinerary is a non-stop flight, or involves connecting flights, namely the flight includes stopovers at intermediate airports and is still operating by the same airline, then "1" is given to these flights as their quality index. On the other hand, if passengers transferred to a different operating airline in any leg of the journey, then that flight receives "0" as its value. This is because passengers find the necessity of changing aircrafts inconvenient, as the risk of missing connecting flights and losing baggage increases accordingly (Veldhuis, 1997; Coldren et al., 2003; Suau-Sanchez et al., 2017a)

Direct / Indirect flight: This indicator denotes the flight's connection type depending on whether there are any intermediate stops while reaching the final destination. If a journey is completed through a non-stop flight, it takes the value of "1". On the contrary, if an itinerary includes stopovers at intermediate airports on the route to its destination, then it takes the value of "0". The reason is that passengers value non-stop itineraries more than indirect (connecting) flights, as perceived quality from the flight depends on the total travel time (Kayloe, 2010; Idrissi et al., 2017).

After determining the explanatory variables, the next step is to choose a reference route and form an ordinary least squares (OLS) regression model. As there are multiple explanatory variables in this analysis, OLS method applied to predict their impact on the response variable (passenger demand), and calculate values of coefficients by minimizing the error of prediction. This is because, instead of assigning arbitrary values to flights' service attributes, each factor's weight is statistically calibrated, also by incorporating the passengers' perspective, the interpretation of the demand shifts among itineraries became easier and more consistent (Jacobs et al., 2012; Tembleque-Vilalta & Suau-Sanchez, 2016; Suau-Sanchez et al., 2017a). The following Equation 7 demonstrates the employed regression model:

$$Demand_i = \beta_0 + \beta_1 Frequency_i + \beta_2 Detour_i + \beta_3 Seats_i + \beta_4 Inline_i + \beta_5 Direct_i \qquad (7)$$

where $Demand_i$ represents the total passenger bookings of itineraries which operate in the specified reference route. The relative coefficients, which are found from the regression analysis, calibrated to each factor of the proposed route's flight options, along with the promising new direct route (Equation 8).

$$QSI_n = \beta_0 + \beta_1 Frequency_n + \beta_2 Detour_n + \beta_3 Seats_n + \beta_4 Inline_n + \beta_5 Direct_n \qquad (8)$$

Lastly, market shares are estimated by measuring the ratio between the QSI score of the new proposed route and the sum of the QSI scores of all the flight options (considering competing flight alternatives including the direct new flight) that exist in that O-D market (Equation 9).

$$Market\ Share_n = \frac{QSI_n}{\sum QSI} \qquad (9)$$

4.4. Market Stimulation Effect

After calculating QSI scores and the percentage of market share that new direct flights will capture from their competitors in the proposed O-D markets, projections for the potential passenger demand of new long-haul routes can now take place according to these findings. However, forecasts should not be based on the existing number of indirect passengers of the promised routes only, because calculations will not represent accurate figures in the end. The reason is that opening a new direct international flight route will be assumed to catch the passenger traffic from other airports, improve connectivity in the air transport network, and stimulate the market through the generated additional demand (Naylor, 2011). Therefore, it is important to evaluate the impact of the new direct flight as a driver of demand, and its effect should be taken into account when developing passenger traffic forecasts for new routes (Sismanidou et al., 2013).

In order to grasp the proposed non-stop flights' demand generation effect, the IATA's market stimulation curve (Figure 4) is applied to offered routes. Various researchers followed this approach in their research studies to assess the route feasibility (e.g. Sismanidou et al., 2013; Tembleque-Vilalta & Suau-Sanchez, 2016; Boonekamp & Riddiough, 2016). It can be accepted as a reliable method to implement since it is based on empirical evidence, historical passenger data, considering the traffic change at airports between before and after the development of new direct routes (Boonekamp & Riddiough, 2016). By analysing increases of original markets' size, after launching a direct service from airports, multiplication factors have been found through the regression analysis. Then, to calculate the passenger demand, multiplication factors paired up with new routes, according to their total number of indirect passengers that arrive to those determined destinations annually (Sismanidou et al., 2013; Boonekamp & Riddiough, 2016).

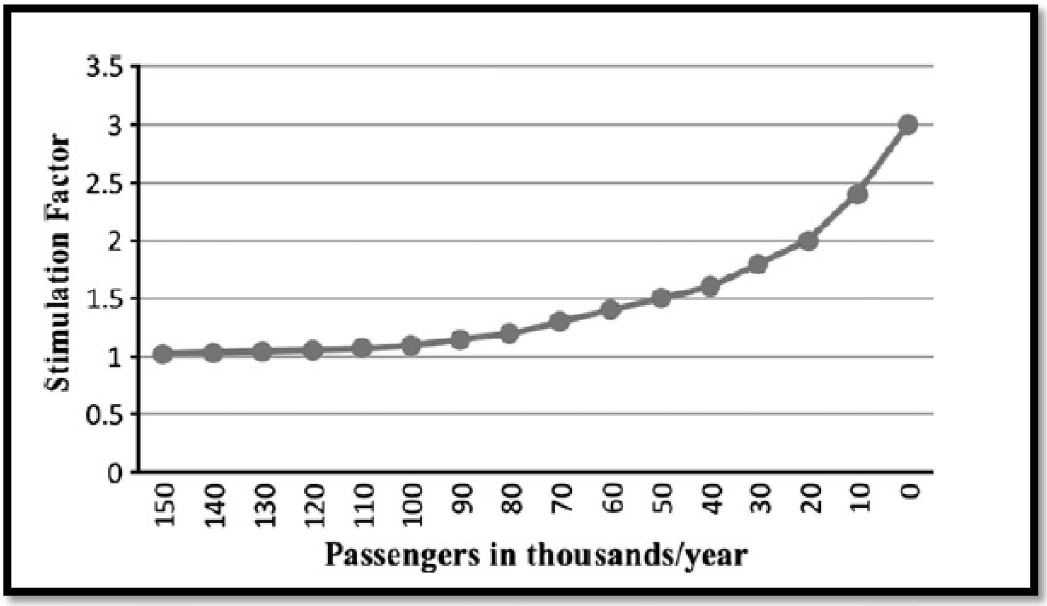

Figure 4: IATA market stimulation curve on indirect markets

Source: Sismanidou et al. (2013)

In the figure above, the stimulation curve is demonstrated, and it can be seen that the demand stimulation factor and the original O-D annual market size (indirect passenger demand) are inversely proportional to each other. Namely, the stimulation factor increases exponentially for the potential new routes as the indirect passenger demand of O-D markets decreases. As an illustration of the IATA's stimulation curve use, considering that two new direct routes will be introduced from two airports to different destinations where their total indirect passenger demand are 10,000 and 50,000 annually, the stimulation factor for those routes would be 2.50 and 1.50 respectively. Therefore, with the impact of new direct flights and the additional stimulated demand, forecasted total passenger numbers for those routes would be 25,000 and 75,000 per year.

4.5. Profitability and Break-even Load Factor Analysis

As a final step of the calculations, a profitability analysis will be held by looking at the load factor of new direct flights and comparing them with the break-even load factor of the airlines which are going to operate for those routes. While doing the analysis, three indices will be taken into consideration due to their significance in determining the profitability of a new route. These indices are the offered seat capacity of the aircraft, passenger load factor of the provided flight service, and the threshold for the break-even load factor of the airline. Ideally, before the implementation of a profitability assessment, carrying out an additional revenue analysis by employing revenue drivers like passenger yield[19], ancillary sales[20], and cargo revenues[21] would make the practice more comprehensive. Moreover, incorporating a cost analysis, such as forecasting the operating and maintenance costs of an aircraft in a given O-D market, into the profitability calculations would further strengthen the analysis in terms of the factuality and accuracy (e.g. Integrated Model for Forecasting New Routes, Tembleque-Vilalta & Suau-Sanchez, 2016). However, due to time and resource constraints within the given period, these parameters are beyond the scope of this dissertation. Therefore, in this analysis, to assess the financial viability of new routes, the relationship among the capacity, load factor and passenger demand will be focused on, as they are dependent on each other and their various combinations cause changes in the utilization rate of aircrafts (Stalnaker et al., 2016).

Capacity represents the total number of available seats for a route, and in the airline industry it is described in terms of the available seat miles[22], which is equal to the multiplication of the total number of available seats and total distance travelled (Wensveen, 2007). In the field of aviation, generally it is difficult to match the demand and supply simultaneously, as demand fluctuates with time, shows cyclical patterns, and changes according to time of the day, the day of the week and seasons (Wensveen, 2007). Hence, airlines need to check the capacity utilization of aircrafts regularly in order to avoid problems like the use of aircrafts below their capacity or excess their capacity. By this way, airlines minimize their empty seats and provide sufficient services through meeting the passenger demand (Wensveen, 2007; Stalnaker et al., 2016).

The **passenger load factor** is a useful indicator to discover the capacity utilization of aircrafts, it is also a good measure to evaluate the performance of airlines that operate in a particular route (Jenatabadi & Ismail, 2007; Wensveen, 2007). Essentially, it is the ratio between the number of passengers travelled to a destination (the total number of seats sold) and the total seat capacity of an aircraft, and it is shown as percentages (Wensveen, 2007; Stalnaker et al., 2017). On the other hand, in the context of the airline industry, the load factor is expressed by means of dividing the revenue passenger miles to available seat miles, and the revenue passenger miles is found by multiplying the number of ticketed passengers with the total distance travelled (Wensveen, 2007). The calculation of the passenger load factor is shown in detail with the following Equations 10 and 11:

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19 The average fare that passenger pays to travel per mile.
20 Additional services such as extra baggage fees, priority boarding or in-flight sales.
21 Freight transport.
22 Depending on the metric, it can be referred as available seat kilometres.

$$Passenger\ Load\ Factor = \frac{Revenue\ Passenger\ Miles\ (RPM)}{Available\ Seat\ Miles\ (ASM)} \quad (10)$$

$$Passenger\ Load\ Factor = \sum_{i=1}^{r} \left(\frac{Total\ Number\ of\ Travelled\ Passengers * Total\ Distance}{Available\ Seats * Total\ Distance}\right) \quad (11)$$

The Equation 11 further elaborates the load factor formula and shows the each leg of the flight, while *r* denotes the number of routes. The formula takes into account passenger numbers and flown distances separately, regarding the different legs of the flight (Jenatabadi & Ismail, 2007; Wensveen, 2007).

Determining and interpreting the load factor of flights are vital for airlines, as their strategic planning and decisions depend on it (Stalnaker et al., 2017). An increase in RPM for a route means a growth in passenger demand, and to meet this demand either a capacity increase (ASM) should be made or an efficient utilization of the existing capacity should be achieved. If optimal load factors cannot be captured in flight routes, airlines would not generate adequate return on investment, as the airline industry is highly capital-intensive and has huge fixed costs (Cederholm, 2014). Therefore, airlines determine a **break-even load factor** for their flight routes, to stay profitable in the market. The break-even factor is a metric that shows the percentage of seats that an airline needs to sell at a particular average price to offset its operating expenses (Goodfriend, 2003; Stalnaker et al., 2016). Equation 12 displays the calculation of the break-even load factor as follows:

$$Break - even\ Load\ Factor\ (BELF) = \frac{Cost\ per\ Available\ Seat\ Miles\ (CASM)}{Passenger\ Yield} \quad (12)$$

where CASM is the operating expenses per ASM, and passenger yield is the generated passenger revenue per RPM (Goodfriend, 2003).

In this analysis, the break-even factor for the proposed routes will be taken from the annual reports of Turkish Airlines and used as a point of reference, since the airline operates the majority of the long-haul flight routes that leave from Turkey. Following that, comparisons will be made between the estimated load factors of aircrafts and the break-even load factor, by changing the seat capacity and frequency of aircrafts to find the optimal value and to make the promising routes profitable.

5. RESULTS & DISCUSSION

This section presents the findings in the course of determining the potential routes, and shows the QSI analysis results of the chosen itineraries. After that, recommendations have been made for the viable itineraries regarding the selection of the airline, aircraft model and flight frequency, depending on the new routes' estimated potential market share and passenger demand volume. Lastly, a discussion about regulations and competition levels for the chosen markets has been provided, and their possible implications for the routes have been examined thoroughly.

5.1. Identification of the Potential Routes

In order to decide on the routes, MIDT datasets for both June and December were examined, and Turkey's overall outbound passenger demand distribution is shown in the Table 5 with respect to 15 global regions. According to passenger booking records, Turkey's vast majority of passenger traffic is connected with the "European Economic Area (EEA)" and "Rest of Europe (non-EEA)" countries, which constitute shares of 41.97% and 22.24%. Following that, "Middle East", "South East England" and "Central Asia" regions receive passenger shares of 16.91%, 4.13% and 2.90% respectively.

Table 5: Passenger traffic by regions

Region	Total Passenger Traffic	Share of Passenger Traffic
European Economic Area	1,547,460	41.97%
Rest of Europe	820,127	22.24%
Middle East	623,469	16.91%
South East England	152,316	4.13%
Central Asia	106,883	2.90%
Rest of UK	95,238	2.58%
Maghreb	87,665	2.38%
North America	65,901	1.79%
East Asia	62,942	1.71%
Sub-Saharan Africa	39,673	1.08%
South East Asia	39,561	1.07%
South Asia	25,444	0.69%
Oceania	8,294	0.22%
South America	7,675	0.21%
Central America and Caribbean	4,598	0.12%

Source: MIDT (June & December, 2017), Own elaboration

From the table above, it can be deduced that while Turkey is well connected with Europe and Middle East regions, current air transport networks to intercontinental destinations such as America, Oceania and Asia appear to be insufficient, regarding the number of travelling passengers.

When the regional share of indirect passengers was examined in depth, it was found that while Oceania is having 100% indirect passenger demand, America and Asia continents are getting over 50% indirect air traffic (Figure 5). The reason for this may be that direct flight services are either limited or do not exist to those destinations from Turkey. This indicates a potential for the development of new direct routes, as indirect flights' ratios are high, and flight distances are over 4,000 km to those regions.

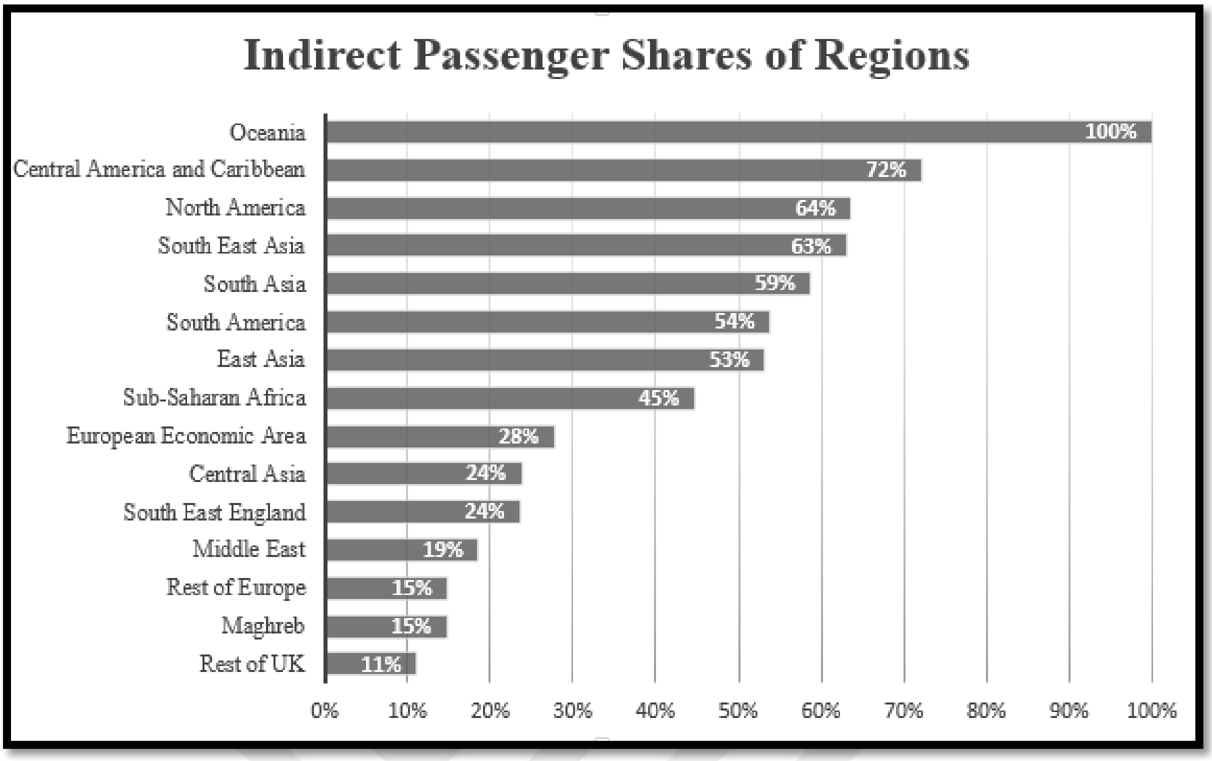

Figure 5: Indirect passenger traffic market shares by regions

Source: MIDT (June & December, 2017), Own elaboration

To illustrate direct and indirect passengers' spread over the regions visually, the ArcGIS software[23] was used with the purpose of mapping Turkey's air traffic flow for international destinations (Figure 6 and Figure 7). The dimension of circles are related to the total number of passengers that travel to a particular country from Turkey, by factoring in both direct and indirect passengers. On the other hand, the colour level of circles indicates the proportion of passengers that indirectly travel to a specific country from Turkey. It can be seen that North America, Australia and a great majority of Asian countries attract noticeable passenger demand from Turkey, and a huge volume of this demand come from indirect passengers. Therefore, North America, Oceania and East Asia regions are taken into consideration for a further analysis, while other regions are discarded.

[23] ArcGIS is a mapping software which helps to create maps and visualise the data by providing extensive analysis tools (arcgis.com, 2018).

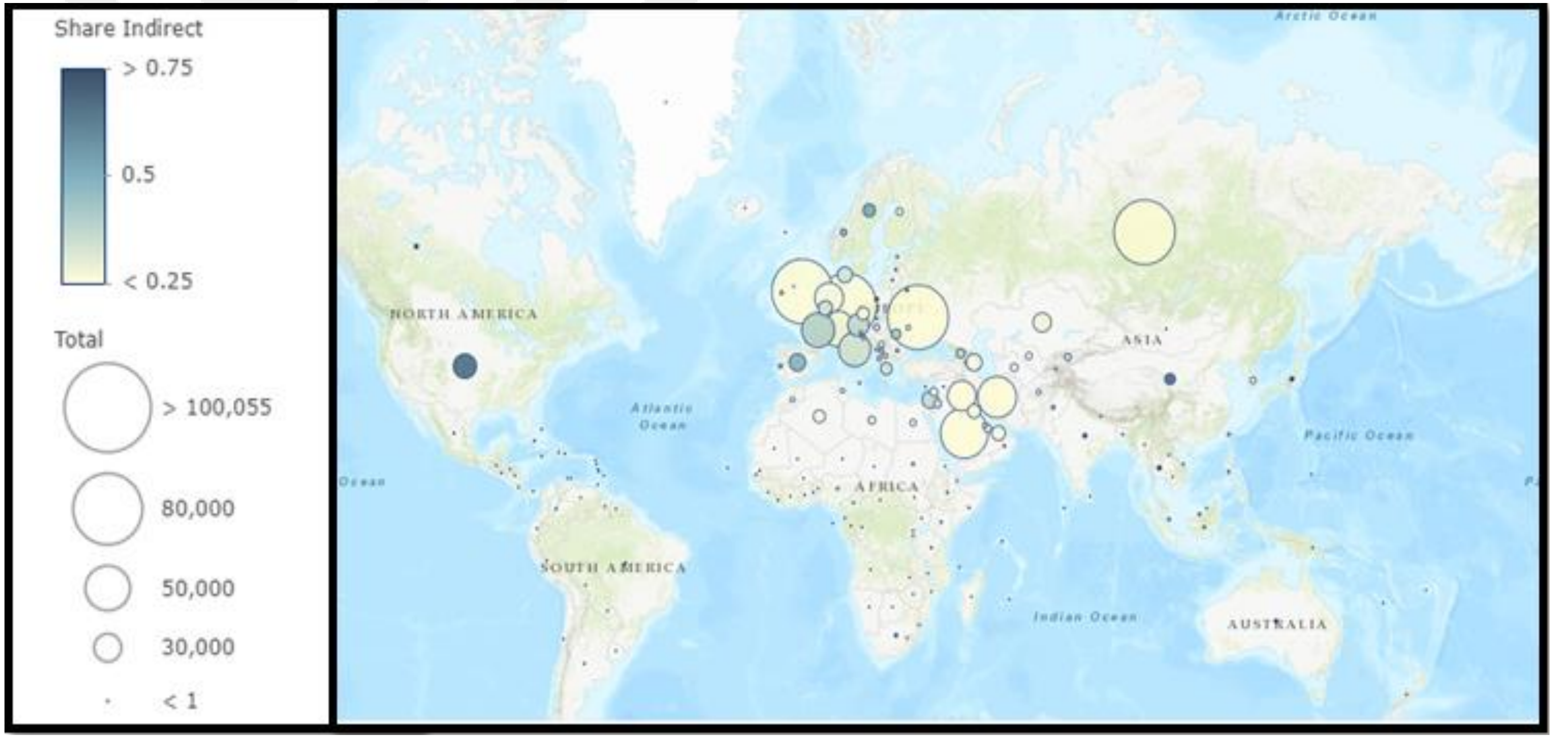

Figure 6: Map of destinations, departing from Turkey, June 2017

Source: ArcGIS, MIDT (June, 2017), Own elaboration

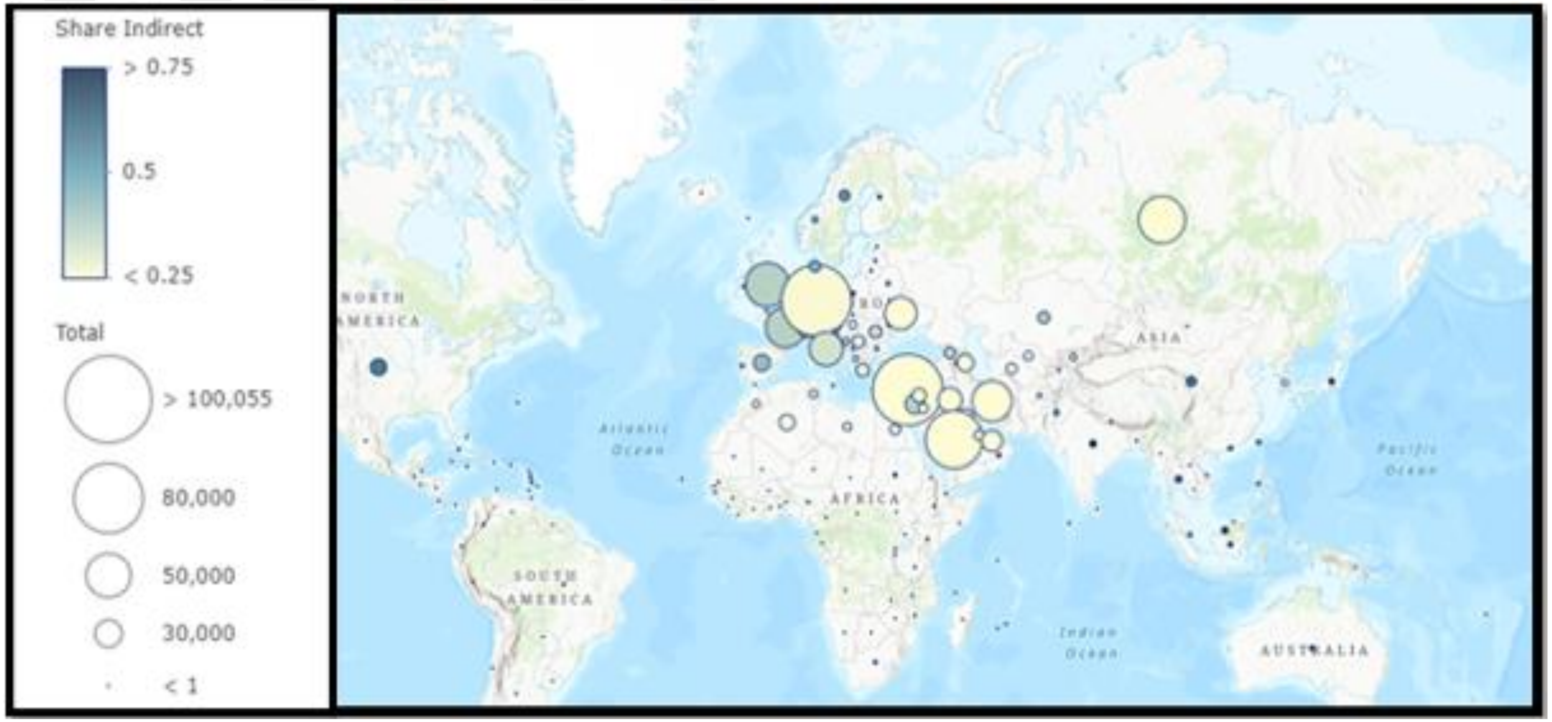

Figure 7: Map of destinations, departing from Turkey, December 2017

Source: ArcGIS, MIDT (December, 2017), Own elaboration

According to the chosen regions, Table 6 and Table 7 illustrate the top ten country and airport destinations that retain the highest indirect passenger proportions for June. As stated in the methodology section (Section 4.2), an O-D market needs to have more than 3,000 indirect passenger demand on a country level and receive more than 1,000 indirect passenger traffic at an airport level monthly in order to be considered in the QSI analysis as an eligible route.

Table 6: Top 10 destinations with highest indirect passenger shares, departing from Turkey, June 2017

Country	Direct Passenger Numbers	Indirect Passenger Numbers	Total Passenger Numbers	Share of Indirect Passengers/Flights
Australia	0	3,635	3,635	1.00
Japan	1,010	3,673	4,683	0.78
Canada	1,100	3,628	4,728	0.77
Thailand	1,324	3,910	5,234	0.75
India	1,459	3,437	4,896	0.70
Philippines	495	1,153	1,648	0.70
China	3,448	7,795	11,243	0.69
South Africa	1,116	2,243	3,359	0.67
Brazil	470	896	1,366	0.66
United States	13,141	23,569	36,710	0.64

Source: MIDT (June, 2017), Own elaboration

As it can be seen from the above table, Australia stands out as being the only country that has no direct flights and demonstrating worthwhile indirect passenger demand, which makes Australia a potential market. On the other hand, the Philippines, South Africa and Brazil were removed from the analysis because of their insufficient number of indirect passengers. Therefore, Table 7 shows the airports in the remaining countries, and although each airport (except India) manages to draw more than 1,000 indirect passengers monthly, only Australia and Japan are deemed appropriate for the QSI analysis due to the given aim of this dissertation. The reason for this is that the new flight needs to operate in an O-D market where a direct flight has not established from Turkey before.

Table 7: Airports with highest indirect passenger traffic, June 2017

Country	Airport	Direct	Indirect
Australia			
	Melbourne Airport (MEL)	0	1,321
	Sydney Kingsford Smith Apt (SYD)	0	1,208
Japan			
	Tokyo Narita Apt (NRT)	1,010	1,475
	Osaka Kansai International Airport (KIX)	0	1,309
Canada			
	Toronto Lester B Pearson Intl Apt	836	1,435
Thailand			
	Bangkok Suvarnabhumi International Apt	1,324	3,323
China			
	Beijing Capital Intl Apt (PEK)	1,061	3,265
	Shanghai Pudong International Apt (PVG)	1,307	2,598
United States			
	Los Angeles International Apt	2,058	1,394
	New York J F Kennedy International Apt	3,925	4,968
	Washington Dulles International Apt	982	1,481

Source: MIDT (June, 2017), Own elaboration

The highest indirect passenger ratios for December are shown in Table 8, and the results revealed that three countries differ from June due to the seasonal variation in terms of passenger numbers. Taiwan, Malaysia and Indonesia replaced the Philippines, South Africa and Brazil as they attract more passengers in December compared to June. However, as Taiwan, Indonesia and Canada generated volumes of indirect passengers lower than 3,000, they were excluded from the airport review analysis.

Table 8: Top 10 destinations with highest indirect passenger shares, departing from Turkey, December 2017

Country	Direct Passenger Numbers	Indirect Passenger Numbers	Total Passenger Numbers	Share of Indirect Passengers/Flights
Australia	0	4,121	4,121	1.00
Japan	1,010	3,673	4,683	0.77
India	1,861	5,478	7,339	0.75
Canada	932	2,378	3,310	0.72
Malaysia	1,957	4,862	6,819	0.70
Indonesia	1,556	2,841	4,397	0.65
Thailand	2,627	4,701	7,328	0.64
Taiwan	1,161	1,934	3,095	0.62
China	4,965	7,050	12,015	0.59
United States	8,803	12,350	21,153	0.58

Source: MIDT (December, 2017), Own elaboration

Table 9 indicates the airports in the selected countries and their arriving indirect passenger numbers for December. However, since countries, except from Malaysia, remained unchanged with respect to June, any new airport, which has more than 1,000 indirect passenger volume, could not be found as expected. Eventually, two potential countries, Australia (MEL & SYD) and Japan (KIX), were identified as potential markets for annual routes, and the development of direct flights to those countries' unserved airports were examined through the QSI analysis.

Table 9: Airports with highest indirect passenger traffic, December 2017

Country	Airport	Direct	Indirect
Australia			
	Melbourne Airport (MEL)	0	1,555
	Sydney Kingsford Smith Apt (SYD)	0	1,433
Japan			
	Tokyo Narita Apt (NRT)	1,311	1,746
	Osaka Kansai International Airport (KIX)	0	1,308
India			
	Delhi (DEL)	918	1,360
	Mumbai (BOM)	943	1,542
Malaysia			
	Kuala Lumpur International Airport (KUL)	1,957	4,595
Thailand			
	Bangkok Suvarnabhumi International Apt (BKK)	2,096	3,458
China			
	Beijing Capital Intl Apt (PEK)	1,328	2,808
	Shanghai Pudong International Apt (PVG)	1,775	2,568
United States			
	New York J F Kennedy International Apt (JFK)	2,489	2,617

Source: MIDT (December, 2017), Own elaboration

Table 10: Chosen potential routes' indirect passenger distribution by months

Potential Routes	Indirect Passenger Numbers	
Australia	**June**	**December**
Melbourne Airport (MEL)	1,321	1,555
Sydney Kingsford Smith Apt (SYD)	1,208	1,433
Japan Osaka Kansai International Airport (KIX)	1,309	1,308

Source: MIDT (June & December, 2017), Own elaboration

5.2. Australia Air Transport Market

To develop a direct route from Turkey to Australia, the distance between the countries was considered in order to choose the applicable operating carrier. While a hypothetical direct route from Istanbul to Melbourne is measured as 14,618 km in total, this distance becomes 14,956 km between Istanbul and Sydney (Great Circle Mapper, 2018). According to these flight distances, among the airlines in Turkey, Turkish Airlines was found eligible, due to the fact that it is the only airline that can serve that flight distance along the route with its extensive fleet (Table 11). Therefore, Turkish Airlines was evaluated as the main operating carrier for the potential Melbourne and Sydney routes in QSI analyses.

Table 11: Turkish Airline's long-haul fleet list

Manufacturer	Aircraft type	Flight Range	Capacity
Airbus	A340-300	13,500 km	270 - 354
Airbus*	A350-900	15,000 km	325 - 440
Boeing	B777-300 ER	14,490 km	349 - 400
Boeing*	B787-9	14,800 km	290 - 330

* Note: A350-900 and B787-D wide body aircrafts are expected be delivered between 2019 and 2023 (Turkish Airlines, 2018c).

Source: Turkish Airlines (investor.turkishairlines.com), Boeing (boeing.com), Airbus (airbus.com)

In order to assess the financial viability of the new routes, the break-even load factor of Turkish Airlines was extracted from the annual reports of the airline. It was found that Turkish Airlines set the BELF threshold as 57% for international long-haul flights (Turkish Airlines, 2015). As the benchmark for the BELF in the airline industry changes between 62% and 66%, Turkish Airlines percentage seems to be very low to cover the flight's operating expenses, and the airline is still being operational on long-haul routes by flying below of its aircraft's full capacity (Goldberg, 2015; Pearce, 2017). However, this might be linked to the possibility that Turkish Airlines handle their operating costs better compared to the other long-haul airlines. In particular, the lower costs might be linked to the modern fleet of Turkish Airlines, whose fleet age is 7.7 years on average, and utilises the fuel consumption efficiently (Turkish Airlines, 2018). Additionally, workforce is relatively cheaper in the region of Turkey in comparison to Europe and North America (Pearce, 2017).

Regarding the passenger load factor of Turkish Airlines, the airline utilises its aircrafts' capacity at an average of 77% for international flights (Table 12). Higher passenger load factors make easier to cover expenses, and eventually increase the chance to yield greater profits (Vernon, 1969). Therefore, by adjusting the flight frequency and capacity of aircraft, various combinations of new routes' passenger load factors were examined and compared with respect to the BELF and traffic figures of Turkish Airlines.

Table 12: International traffic figures of Turkish Airlines

International Traffic Figures	2017	2016	2015	2014
Revenue Passenger (000)	38,487	35,457	34,944	31,967
Available Seat-Km (million)	150,712	149,328	133,594	117,773
Revenue Passenger-Km (million)	118,148	109,768	103,001	92,539
Load Factor (%)	78.4	73.5	77.1	78.6

Source: Turkish Airlines (2016, 2017)

5.2.1. MEL Route

In order to apply the QSI analysis to the IST - MEL route with the aim of forecasting passenger demand of the O-D market, as remarked before (Section 4.3), a reference route was required to calculate the weights of the explanatory variables and calibrate them to the new route. From the datasets, the direct route between Turkey (Istanbul) and the capital of Indonesia, Jakarta (CGK) was found as the most comparable itinerary regarding Australia's location (Figure 8).

Figure 8: Sample representation of the reference and proposed route (IST – CGK, IST – MEL)

Source: Great Circle Mapper (gcmap.com)

Initially, the MIDT June, 2017 dataset was analysed, and the chosen reference route comprised 10 different passenger itineraries (1 direct and 9 indirect). It was seen that, mostly Middle Eastern carriers, such as Qatar Airways, Saudia and Emirates, operate in the market, because of the strategic location of airports in Middle East serving as a hub and providing connectivity between the route Istanbul and Jakarta. After that, the regression model was established by using the carriers' quality indicators (detour factor, airline capacity, flight frequency, inline connection and direct/indirect flight), and their coefficients were calculated accordingly (Appendix A). Table 13 shows the output of the corresponding regression analysis of the route.

Table 13: Regression results of the reference route IST – CGK (June, 2017)

Regression Statistics	
Multiple R	0.978546628
R Square	0.957553503
Adjusted R Square	0.904495381
Standard Error	14.97891651
Observations	10

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	89.2279888	63.6780631	1.401235912	0.233758831
Weekly Frequency	0.454998161	1.332365171	0.341496589	0.749915539
Detour	-74.82905034	53.97305566	-1.386414933	0.237890484
Seats	-0.058527218	0.088822747	-0.658921506	0.545946419
Inline Connection	19.22938226	19.22326195	1.00031838	0.373764299
Direct Flight	146.0676894	16.85519667	8.666032932	0.000975592

Source: MIDT (June, 2017), Excel Data Analysis

Based on the regression statistics above, the measure of R-squared possesses a 95% value, which means that the model seems to fit the data well with the set of 10 observations. A high R-squared value signs that the model is capable of explaining the variability of the response variable regarding the changes in explanatory variables (Stone et al., 2013; Frost, 2017a).

On the other hand, to describe the relationship between the flight's features and passenger demand, the interpretation of the p-values of the model's coefficients is necessary to understand whether these correlations are statistically significant and exist in the larger population other than the sample of this analysis (Frost, 2017b). The common threshold for the significance level, in statistics, is accepted as "0.05", and the p-values, which are lower than this limit are considered to be statistically significant (Frost, 2017b). Lastly, the sign and magnitude of a coefficient play an important role in evaluating the degree of the coefficients' effect on passenger demand. The value of the coefficient indicates that how much passenger demand would change by changing the value of the associating while holding other explanatory variables constant in the model (Frost, 2017b).

According to the regression output (Table 13), it can be seen that "inline connection" and "direct flight" variables have remarkable positive coefficients, whereas "detour factor" has a large negative weight. When p-values are examined, only the "direct flight" variable appears to be statistically significant in the model as its p-value is below than "0.05". However, this does not mean that the other explanatory variables' effects, that have higher p-values than the significance level, are negligible and should be removed from the model. Instead of having an individual effect on passenger demand, their interactions with each other possibly generate a joint effect, and correlate with passenger demand. Therefore, every information, either possessing a single or joint effect, is important on evaluating the passenger demand of the new route.

For the IST – MEL route, 8 different itineraries (6 one-stop and 2 two-stop indirect flights) were detected, and the computed coefficients from the regression analysis were used on the carriers that serve along the route to calculate their QSI scores. Based on the MIDT data (June, 2017), it was found that there were 894 indirect passengers on average that travelled to Melbourne from Turkey during the month, and eventually this number corresponds to 10,728 indirect passengers annually. Thereby, according to IATA's market stimulation curve, the stimulation factor was taken as "2.5", and the weekly passenger forecast for the new direct flight was calculated by taking into account the additional stimulated passenger demand.

Table 14 presents the results of the QSI analysis for the IST-MEL direct flight route. Estimations revealed that by choosing a Boeing 777-300ER Passenger as the aircraft model and providing the flight service once a week, 335 passengers would be carried per week through utilising the capacity of the aircraft with 96%. The reason for selecting the Boeing 777-300ER Passenger was that from the OAG Flight Schedule dataset, it was seen that Turkish Airlines typically operates intercontinental routes with a 349 seater aircraft. As an alternative, the Airbus A350-900 (new wide body aircraft order of Turkish Airlines), with a seating capacity of 325 passengers, could have been chosen as well, but that would have increased the load factor to 105%, which is impossible as it indicates the excess usage of the aircraft's capacity. On the other hand, scheduling an additional flight service (twice a week in total) would make the load factor of the itinerary as 49%, which makes the route infeasible again since the BELF of Turkish Airlines requires at least 57% capacity utilisation. Therefore, the planned arrangement for the IST-MEL route appears to be profitable within the existing conditions. The results of the regression analysis, QSI score and passenger forecast for December, 2017 can be found in the Appendix B and C.

Table 14: QSI analysis of IST – MEL route (June, 2017)

Origin - Destination	Operating Airline (Leg 1)	Operating Airline (Leg 2)	Operating Airline (Leg 3)	Gateway Airport (1)	Gateway Airport (2)	Total Est. Pax*	Weekly Frequency	Detour	Seats	Inline Connection	Direct Flight	QSI Score
IST - MEL	**TK**						**1**	**1**	**349**	**1**	**1**	**159.725**
IST - MEL	TK	EY	EY	FCO - Italy	AUH – U.A.E	4	7	1.1879	178	0	0	0.000
IST - MEL	KL	KL	MH	AMS - Netherlands	KUL - Malaysia	6	10	1.2828	142	0	0	0.000
IST - MEL	EK	EK		DXB – U.A.E		202	11	1.0019	354	1	0	17.771
IST - MEL	EK	QF		DXB – U.A.E		12	7	1.0019	354	0	0	0.000
IST - MEL	TK	JQ		SIN - Singapore		4	6	1.0053	335	0	0	0.000
IST - MEL	QR	QR		DOH - Qatar		237	7	1.0045	260	1	0	21.256
IST - MEL	EY	EY		AUH – U.A.E		188	7	1.0030	174	1	0	26.404
IST - MEL	SQ	SQ		SIN - Singapore		241	5	1.0053	264	1	0	20.058

Proposed O-D Market	IST - MEL	**QSI Score**	**Market Share**	**Forecast (Weekly)**	**Load Factor**
Operating Airline	Turkish Airlines	159.725	65%	335.4564	96%
Aircraft Type	Boeing 777-300ER Passenger	Annual Passenger Demand	10728		
Aircraft Capacity	349	Market Stimulation Effect	2.5		
Weekly Frequency	1	Weekly Passenger Demand	206		

*Note: “Pax” is the term to refer passengers (number of carried passengers) in the airline industry.

Source: MIDT (June, 2017), OAG (2017), Own elaboration

5.2.2. SYD Route

As it can be seen from the Figure 9, Sydney is located on the south-eastern coast of Australia and close to Melbourne on the map. For this reason, Jakarta (CGK), which is the only similar direct route along the path to the final destination (SYD) from Turkey, was taken as the reference route again. The computed coefficients of the IST-CGK route for June and December were applied to the IST-SYD route in the same way, considering the two different months.

Figure 9: Sample representation of the reference and proposed route (IST – CGK, IST – SYD)

Source: Great Circle Mapper (gcmap.com)

Table 15 summarises the QSI scores of both direct and indirect flights for the O-D market of Sydney with respect to June, 2017. 10 different available flight options (7 one-stop and 3 two-stop) were discovered from Istanbul to Sydney. Regarding the existing flights, Asian airlines (e.g. Singapore Airlines) seem to possess a higher market share along the Sydney route than they had before in the Melbourne route, yet, Middle Eastern carriers preserve their dominance in the flight network. For the period of June, the total number of indirect passengers was recorded as 789, which equals the annual market size of 9,468 indirect passengers and makes the stimulation factor as "2.75".

Among the competing alternatives for the SYD route, the proposed operating carrier is Turkish Airlines Boeing 777-300ER Passenger with the scheduled flight frequency of once a week. According to the suggested flight plan, the estimations showed that the direct flight would capture a market share of 58% in the O-D market. In this way, the flight is projected to attract 291 passengers weekly, while it will maintain an 83% load factor, which is well above the BELF limit of Turkish Airlines. On the other hand, in the future, 325 seater Airbus A350-900 aircraft model can be an alternative for the route as well, and it would fill up its capacity better by reaching up to a 90%. December results of the QSI analysis for the direct route of Sydney are presented in the Appendix D.

Table 15: QSI analysis of the IST – SYD route (June, 2017)

Origin - Destination	Operating Airline (Leg 1)	Operating Airline (Leg 2)	Operating Airline (Leg 3)	Gateway Airport (1)	Gateway Airport (2)	Total Est. Pax	Weekly Frequency	Detour	Seats	Inline Connection	Direct Flight	QSI Score
IST - SYD	**TK**						**1**	**1**	**349**	**1**	**1**	**159.725**
IST - SYD	EY	EY	VA	AUH – U.A.E	MEL - Australia	7	7	1.0277	174	0	0	5.326
IST - SYD	LH	LH	QF	FRA - Germany	BKK - Thailand	4	7	1.2286	150	0	0	0
IST - SYD	QR	QR	QF	DOH - Qatar	ADL - Australia	3	5	1.0173	174	0	0	5.192
IST - SYD	QR	QR		DOH - Qatar		183	7	1.0100	260	1	0	20.850
IST - SYD	SQ	SQ		SIN - Singapore		313	5	1.0002	264	1	0	20.440
IST - SYD	TK	SQ		SIN - Singapore		4	7	1.0002	264	0	0	2.121
IST - SYD	TK	SQ		SIN - Singapore		5	7	1.0002	264	0	0	2.121
IST - SYD	EY	EY		AUH – U.A.E		167	7	1.0079	174	1	0	26.035
IST - SYD	EK	EK		DXB – U.A.E		86	11	1.0061	354	1	0	17.455
IST - SYD	KE	KE		ICN – South Korea		17	3	1.0882	218	1	0	15.634

Proposed O-D Market	IST - SYD	**QSI Score**	**Market Share**	**Forecast (Weekly)**	**Load Factor**
Operating Airline	Turkish Airlines	159.725	58%	290.8064	83%
Aircraft Type	Boeing 777-300ER Passenger	Annual Passenger Demand	9468		
Aircraft Capacity	349	Market Stimulation Effect	2.75		
Weekly Frequency	1	Weekly Passenger Demand	182		

Source: MIDT (June, 2017), OAG (2017), Own elaboration

5.3 Japan Air Transport Market

A hypothetical direct flight distance from Turkey to Japan was calculated as 8,780 km in total (Great Circle Mapper, 2018). Although this distance appears to be shorter than the direct route to Australia, the analysis was continued with Turkish Airlines, since the airline is the most likely to open new long-haul routes from Turkey. However, the fleet list of Turkish Airlines was updated for this route, as more aircrafts have become eligible to serve the route depending on the altered flight distance to the destination (Table 16).

Table 16: Turkish Airline's long-haul fleet list

Manufacturer	Aircraft type	Flight Range	Capacity
Airbus	A340-300	13,500 km	270 - 354
Airbus	A330-300	11,750 km	277 - 295
Airbus	A330-200	13,450 km	235 - 257
Airbus*	A350-900	15,000 km	325 - 440
Boeing	B777-300 ER	14,490 km	349 - 400
Boeing*	B787-9	14,800 km	290 - 330

* Note: A350-900 and B787-D wide body aircrafts are expected be delivered between 2019 and 2023 (Turkish Airlines, 2018).

Source: Turkish Airlines (investor.turkishairlines.com), Boeing (boeing.com), Airbus (airbus.com)

5.3.1 KIX Route

After examining the datasets, a direct route to Tokyo (NRT) was found in line with the Istanbul (IST) – Osaka (KIX) route (Figure 10). Despite the availability of a direct flight option from Turkey to Japan, the volume of indirect passenger traffic to Osaka yield enough passenger demand to consider opening a new direct route through that itinerary. Therefore, existing flights' itineraries (1 direct and 14 indirect) to NRT Airport were analysed and by applying the regression model, corresponding coefficients of quality attributes of flights were detected in order to calculate QSI scores of the new route.

Figure 10: Sample representation of the reference and proposed route (IST – NRT, IST – KIX)

Source: Great Circle Mapper (gcmap.com)

Table 17 shows that, the model exhibits a good fit of the data by having a 98% R-Squared value for the data in June, 2017. While the “detour” variable appears to have a negative coefficient and effect on the passenger demand, “inline connection” and “direct flight” indicators have positive impacts on passengers’ choices regarding the generation of demand. However, from the sample size (15 observations), only the direct flight variable was found to be statistically significant in the model because of its p-value, which is lower than “0.05”. Still, the effects of other explanatory variables are not negligible as their interactions with each other might affect passengers’ criteria on choosing their flights.

Table 17: Regression results of the reference route IST – NRT (June, 2017)

Regression Statistics	
Multiple R	0.992746
R Square	0.985544
Adjusted R Square	0.977513
Standard Error	8.952798
Observations	15

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	8.389215	23.01973	0.364436	0.723948
Weekly Frequency	0.990323	1.187317	0.834085	0.425817
Detour	-14.2682	18.08903	-0.78878	0.450520
Seats	0.019931	0.045367	0.439329	0.670782
Inline Connection	10.47446	5.857127	1.788327	0.107355
Direct Flight	218.7122	10.85528	20.148	8.51E-09

Source: MIDT (June, 2017), Excel Data Analysis

According to the MIDT dataset (June, 2017), 15 different itineraries (12 one-stop and 3 two-stop) were discovered relating to the IST-KIX route. While Turkish Airlines mostly operate in the first leg of the journey, Asian airlines, such as Korean Air and Asiana Airlines, seem to control the journey's second leg and take the majority of the market share. During the month, existing carriers delivered 1,153 indirect passengers to the final destination, and when this number was adjusted into a yearly figure, it constituted a market size with 13,836 indirect passengers, which corresponds to a factor of "2.3" in IATA's market stimulation curve.

Referring the IST – KIX route, with the suggested flight plan, it was found to be a feasible route based on the results, which support the launch of the direct flight service. Despite the dominance of Asian Airlines resulting from the geographical location advantage of ICN Airport (Seoul, South Korea) along the route, by developing a direct route, Turkish Airlines was predicted to capture a 69% market share from its competitors. The flight frequency was planned twice a week for the operating carrier, as the estimates pointed out that there will be demand of 434 passengers on average for the itinerary on a weekly basis. Therefore, through offering a flight service twice a week to Osaka, an Airbus A330-300[24] would be able to fill up its 75% of the capacity, while an A330-200[25] would achieve a load factor of 87%. The details of the IST – KIX route for December are provided in the Appendix F and G.

[24] Turkish Airlines typically fills A330-300 capacity with 289 passengers and serves to NRT (Tokyo) Airport by this aircraft model. For this reason, Airbus A330-300 has been taken as a basis in the QSI analysis (OAG, 2017).

[25] Turkish Airlines typically fill A330-200 capacity with 250 passengers (OAG, 2017).

Table 18: QSI analysis of the IST – KIX route (June, 2017)

Origin - Destination	Operating Airline (Leg 1)	Operating Airline (Leg 2)	Operating Airline (Leg 3)	Gateway Airport (1)	Gateway Airport (2)	Total Est. Pax	Weekly Frequency	Detour	Seats	Inline Connection	Direct Flight	QSI Score
IST - KIX	**TK**						**2**	**1**	**349**	**1**	**1**	**232.244**
IST - KIX	PS	PS	AY	KBP - Ukraine	HEL - Finland	3	7	1.1365	180	0	0	2.693
IST - KIX	W5	W5	CA	IKA - Iran	PEK - China	3	4	1.0788	177	0	0	0.486
IST - KIX	W5	W5	MU	IKA - Iran	PVG - China	3	7	1.1178	180	0	0	2.960
IST - KIX	OZ	TW		ICN – South Korea		13	4	1.0043	189	0	0	1.788
IST - KIX	OZ	OZ		ICN – South Korea		301	4	1.0043	171	1	0	11.903
IST - KIX	KE	KE		ICN – South Korea		511	3	1.0043	218	1	0	11.850
IST - KIX	KE	ZE		ICN – South Korea		11	3	1.0043	189	0	0	0.797
IST - KIX	SQ	SQ		SIN - Singapore		43	5	1.5495	271	1	0	7.109
IST - KIX	LH	LH		FRA - Germany		14	7	1.2702	150	1	0	10.661
IST - KIX	AF	AF		CDG - France		3	5	1.3541	143	1	0	7.345
IST - KIX	TK	UO		HKG – Hong Kong		6	6	1.1970	230	0	0	1.836
IST - KIX	EK	EK		DXB – U.A.E		207	7	1.2085	354	1	0	15.609
IST - KIX	TK	ZE		ICN – South Korea		6	11	1.0043	189	0	0	8.720
IST - KIX	TK	KE		ICN – South Korea		17	11	1.0043	248	0	0	9.896
IST - KIX	TK	OZ		ICN – South Korea		12	11	1.0043	171	0	0	8.361

Proposed O-D Market	IST - KIX	**QSI Score**	**Market Share**	**Forecast (Weekly)**	**Load Factor**
Operating Airline	Turkish Airlines	231.0484	69%	433.6383	75%
Aircraft Type	Airbus A330-300	Annual Passenger Demand	13836		
Aircraft Capacity	289	Market Stimulation Effect	2.35		
Weekly Frequency	2	Weekly Passenger Demand	266		

Source: MIDT (June, 2017), OAG (2017), Own elaboration

5.4. Relevant Factors in the Process of Route Development

The results showed that the development of three direct routes to the specified destinations is applicable from Turkey. Table 19 summarises the findings of the QSI analysis by months, which helps to determine whether there will be a seasonal variation in passenger numbers regarding the routes throughout the year.

Table 19: Proposed routes by months

	June			December		
Proposed O-D Market	**Market Share**	**Forecast (Weekly)**	**Load Factor**	**Market Share**	**Forecast (Weekly)**	**Load Factor**
IST - MEL	65%	335.4564	96%	59%	301.9306	87%
IST - SYD	58%	290.8064	83%	49%	235.8920	68%
IST - KIX	69%	433.6383	75%	80%	499.2973	86%

Source: MIDT (June & December, 2017), OAG (2017), Own elaboration

From the table above, it can be seen that, while passenger numbers fall from June to December in Australian routes, this noticeable drop turns into an increase for the same months regarding the routes for Japan. This difference in numbers is expected to be associated with geographical locations of countries, because of the occurrence of seasonal differences (summer/winter) between Northern and Southern hemispheres. However, with the provided recommendations, the routes are projected to yield adequate passenger demand for both months and be financially viable year-round from the load factor ratios. Yet, the possible external factors and their implications need to be further discussed regarding the feasibility of routes.

The first factor that can have an effect on a route's feasibility is airports' marketing activities, which encourage airlines to operate on the new proposed routes and draw passengers to use commercial air services from their airports. Therefore, as mentioned before (Section 3.4), besides detecting new routes, airports need to undertake extensive research to understand the dynamics, like political, financial and socio-cultural, of the external business environment of both the origin and destination (Halpern & Graham, 2016). Then, airports can target airlines and passengers with appropriate marketing techniques according to the objective of the air service. Depending on the type of the air service to be offered, which might be a tourism charter or intercontinental flight, different stakeholders such as regional development and travel agencies can join the route development processes to collaborate with airports in order to increase business connectivity or inbound tourism of regions (Halpern & Graham, 2015; 2016). A survey by ASM (cited in Halpern & Graham, 2015) revealed that, while tourism agencies are chosen as the most collaborative organisations (87%) regarding route development practices, this is followed by local authorities (56%) and regional development institutions (47%) respectively. Based on these findings, airports in Turkey can work closely with potential partners such as the Ministry of Culture and Tourism and Association of Turkish Travel Agencies, to promote the proposed routes for Australia and Japan. The reason for this, the promotion of Turkey to international destinations with the aim of attracting tourists and foreign investments to the country, coincides with the objectives of the 2023 vision. While keeping up with the global trends and becoming the fifth most-visited country were specified as the primary objectives of the 2023 vision, focusing on tourist groups with high incomes and giving special attention to fast-growing East Asia-Pacific regions were also included in the tourism agenda of Turkey (Republic of Turkey Ministry of Culture and Tourism, 2007). Therefore, offering flight routes to advanced countries like Australia and Japan[26] might draw the interest of Turkish authorities and make it easier to ensure funding, promotional campaigns and incentives regarding the planned flight routes. The common examples of incentives in the aviation sector can be given as airport charge discounts, joint marketing programs and revenue guarantees (Weatherill, 2005). For instance, Istanbul Atatürk Airport applies discounts from 5% to 20% to landing charges of international flights regarding the landing number of airlines within the year (DHMI, 2018b).

Another important factor that can affect the feasibility of new routes is the existing price competition in the proposed O-D markets. Passengers tend to choose cheaper flights, as demand for air travel is sensitive to changes in prices and incomes (Gillen et. al, 2008; Smyth & Pearce, 2008). On the other hand, the total flight distance and ticket prices are correlated to each other, which means, when the travelled distance increases, depending on the operating costs, fares of airlines typically increase as well (McKercher, 2008a). This implies, airlines need to consider a broad range of factors, from overall conditions of global air transportation markets to behaviours of passengers, which may affect demand of passengers regarding the offered air service.

[26] In 2017, the gross disposable household income (GDHI) of Australia and Japan were measured as $33,147 and $28,641 respectively, where the GDHI indicates the level of welfare and purchasing power of citizens (OECD, 2017a; 2017b). Moreover, outbound visitors from Australia and Japan spent $34 billion (6th) and $18.2 billion (18th) in 2017 around the world, where the Asia-Pacific region constituted 34% of the total outbound tourism expenditure (The Word Bank, 2016; UNWTO, 2018).

Table 20 shows the average fares of the available flight options for the proposed routes. In general, itineraries to Australia ($1,120) appear to be more expensive than flights for Japan ($1,041), which is reasonable, as the flight distance from Turkey to Australia is longer when it is compared to Japan, and this reflects on ticket prices. Therefore, in order to compete with the other alternative operating airlines, Turkish Airlines need to proactively manage their pricing strategy and offer competitive prices to its passengers by taking the pricing scheme of O-D markets into consideration.

Table 20: Ticket prices of competing alternatives for the proposed routes

Proposed O-D Market	**IST – KIX**			**IST – MEL / SYD**		
Airline	**1-stop**	**2-stops**	**Average Ticket Prices**	**1-stop**	**2-stops**	**Average Ticket Prices**
Air France		CDG, AMS	$1,683			
Asiana Airlines	ICN		$1,105			
Emirates	DXB		$753	DXB	DXB,SIN	$852
Etihad		AUH,ICN	$889		AUH,SYD	$908
Korean Air	ICN		$959			
Lufthansa	FRA	FRA,HND	$1,287			
Qantas Airways				DXB		$900
Qatar Airways		DOH,HKG	$784	DOH		$971
Royal Dutch Airlines					AMS,AUH	$2,275
Singapore Airlines	SIN		$872	SIN		$920
Average Total Price			**$1,041**			**$1,120**

* The average ticket prices are taken from search engines of Google Flights and Skyscanner for months of June and December (2018). The given prices are the average of both months only and subject to change. There might be more airlines that operate along the routes, the displayed itineraries are the ones that are extracted from the MIDT dataset.

Source: Google Flights (google.com/flights), Skyscanner (skyscanner.com), MIDT (June & December, 2017)

As a third factor, bilateral air service agreements can be considered due to their importance in building relationships and developing flight routes between countries. As these agreements ease opportunities for businesses to make investments and for passengers to move freely, they are beneficial to both parties since this joint channel creates a mutual long-term economic growth in countries. Regarding this dissertation, the information on allowed capacity[27] levels for air services is crucial in determining the viability of the suggested flight plans with respect to the context of agreements.

The air service agreement with Australia was signed on 28 April 2010, and the agreed terms gave rights to both countries in terms of designating as many operating airlines and flight frequencies as they wish (DGCA, 2010). Moreover, there is no restriction in planning a flight route at any points within the borders of the countries and making any stops[28] in countries' territories. On the other hand, Turkey and Japan finalized a bilateral air service agreement on July 20 1989, and the agreement granted privileges to both parties in the provision of air services in equal conditions (DGCA, 1989). This means that the specification of the capacity of services is subject to be mutually agreed upon between the countries in the case of the development of air services. Also, unlike the treaty with Australia, this agreement limits the routes to be operated in both directions by allowing the designated airlines to operate only in two points beyond Istanbul or Tokyo. However, despite the availability of a direct flight route from Istanbul to Tokyo, this does not affect the possibility of the introduction of a second route, which is Istanbul – Osaka, within the agreed terms. Therefore, in the light of the designated terms in the agreements, for the proposed routes, it appears to be no barriers with regards to the specified traffic rights and valid to introduce with the proposed flight plans.

To elaborate on the impact of the proposed new direct flights in improving tourism and business links of Turkey, as air travel stimulates economic and social linkages between countries, it is assumed that international passenger flow and international trade will increase in return relating to these new connections. However, demand for travelling is volatile and depends on numerous factors such as the attractiveness, accessibility, safety, health and hygiene conditions of a destination. That being said, World Economic Forum provides a comprehensive report (The Travel & Tourism Competitiveness Report), which analyses the development and competitiveness level of countries, every year by covering most of the regions that account the

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[27] Here the "capacity" indicates the permitted services between the countries. The definition involves the number of flights (frequencies), seats or tonnes of cargo, or a route map of an itinerary.

[28] This term refers both traffic and non-traffic purposes, which means that air services have right to load/unload passengers or cargo, or make an emergency landing within the territory of country.

98% of total GDP of the world (World Economic Forum, 2017). The report gives an overview of a country's overall performance in its core sectors that contribute to the national economy, and helps to benchmark countries by taking into account a set of indicators and measuring countries' policies and actions toward the areas that are relevant to travel and tourism sector. According to global rankings of the Travel and Tourism Competitiveness Index report (2017), while Japan and Australia took 4th and 7th places respectively, Turkey ranked as the 44th amongst 136 countries. The rankings of Australia and Japan agree with the forecasts regarding Asia-Pacific region which is projected to surpass North America and Europe in international passenger traffic by 2030 (World Economic Forum, 2017). Therefore, with reference to shifting spending patterns of tourists, improving Turkey's air connectivity with growing tourism markets is likely to foster the economic growth in the country, as a research study revealed that one new job opportunity is created for every 30 new tourists that connect to a destination (World Economic Forum, 2017).

When the development and competitiveness level of Turkey were analysed in detail, the index components, except the "air transport infrastructure", were found to exhibit poor performances compared to Australia and Japan (Appendix H). The air transport infrastructure comprises indicators such as available seat kilometers, the number of operating airlines, and the overall quality of the air transport infrastructure, and this component can be considered as the main indicator that evaluates air connectivity of countries (World Economic Forum, 2017). Although Turkey is situated in the 14th position in the air transport infrastructure rankings, the country is still behind the major countries in the region (Germany 12th, Spain 9th, the United Kingdom 8th and the United Arab Emirates 3rd), and if Turkey aims to take the place of traditional tourism markets and be ranked as one of the major tourist destinations, the provision of direct air services to the Asia-Pacific region can serve the direction of this purpose and enhance connectivity of Turkey. Turkey's 2023 vision does not sound unrealistic, when considering the recent events that took place around the world such as Brexit, where countries are becoming more inward-looking, and the dynamics are constantly changing. However, there are barriers ahead of Turkey[29], such as the economic instability and security concerns, which need to be solved, otherwise they might adversely affect the aim of the country. The recent incidents like the Istanbul Atatürk Airport terrorist attack (28 June 2016), attempt of military

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[29] According to the T&T Competitiveness report, various areas of Turkey show very poor performances. Business environment (63th), safety and security (116th) and prioritization of T&T sector (87th) can be given as examples for areas which needs to be improved in order to draw passenger traffic and foreign investments to Turkey (World Economic Forum, 2017).

coup (15 July 2016) and declaration of the state of emergency (20 July 2016) not only harmed Turkey's political stability and image in the international arena, but also damaged the market sentiment and country's economy unfavourably (Investment Support and Promotion Agency of Turkey, 2016).

In the light of this information, in order to build linkages and have a sustainable economic growth with Australia and Japan, where they enjoy a robust economy, advanced safety and health conditions and a world-class infrastructure, Turkey needs to solve its problems instantly and improve the sectors that drive the economic growth in the country.

6. CONCLUSIONS, LIMITATIONS & FUTURE RESEARCH

This dissertation is aimed to investigate whether developing a new direct long-haul flight route from Turkey would be feasible while considering the country as a traffic origin.
In order to determine potential destinations, the research study followed a quantitative approach and employed MIDT and OAG airline schedules datasets for June and December 2017. By analysing the datasets, the current international air transportation network of Turkey was revealed and Turkey's outbound passenger traffic was examined by narrowing down from region to country and airport levels respectively. Following that, the potential destinations, namely Australia (100%) and Japan (78%), were chosen according to their proportions of arriving indirect passenger numbers. Regarding these countries, the unserved airports which have worthwhile indirect passenger demand from Turkey were found as Melbourne (MEL), Sydney (SYD) and Osaka Kansai International (KIX) Airports. After that, the QSI model was implemented to forecast the market share of new routes by identifying flight frequency, detour factor, aircraft capacity, inline connection and direct/indirect type of the flight as air services' quality indicators, which can impact on the passenger demand. On the other hand, Turkish Airlines was selected as the operating carrier due to its eligible fleet, which can serve long-haul flights from Turkey. In doing so, the optimal flight plans were attempted to be offered for the new direct flights in order to capture enough market share from the competing alternatives in the O-D market and satisfy the passenger demand for destinations.

The results of this research study suggested that opening direct flight routes to Melbourne, Sydney and Osaka would be financially viable all year round, as load factors of new flights were projected to hold higher percentages than the break-even load factor of Turkish Airlines. Despite the decline in passenger numbers for Melbourne and Sydney routes from June to December, passenger demand show increase for Osaka regarding the same months. Nonetheless, the market share and load factor of these routes were estimated to yield sufficient ratios for both months on average: IST-MEL 62% and 91.5%, IST – SYD 53.5% and 75.5%, IST – KIX 74.5% and 80.5%. These ratios also indicate that, from the viewpoint of Turkey, the tourism season will be extended throughout the year by providing diversified tourism options (summer/winter) for passengers at any time of the year due to seasonal differences in the proposed destinations. Furthermore, the study took into account possible factors that might affect the feasibility of routes, and by elaborating on them, the potential impacts of new routes on Turkey's economic development and growth strategy found to be beneficial.

As for the limitations of this study, it is worth noting to mention the shortcoming of the utilised model. Although the model fulfils the purpose for benchmarking the load factors of new flights against the BELF and is a good indicator for the profitability of new routes, incorporating revenue and cost analyses would make the analysis more comprehensive and strengthen the results. On the other hand, as demand for air travel is price elastic, integrating ticket prices of the existing itineraries into the QSI model could have given more accurate forecasts regarding the market share of new flights. Another limitation of the study is that the results of the analysis are only based on two months. As the research study only took the MIDT dataset for June and December as the basis, more observations would support generalising the results regarding the other months of the year.

To further improve this study, future research should focus on a detailed assessment of the profitability of new routes. In addition to that, factoring in much more broader indicators to the QSI model, such as including the total travel time and ticket prices, would make the analysis more precise. In order to achieve these, adjustments need to be made to the MIDT data or a more extensive dataset should be employed which contains the information on the total travel time and ticket prices of itineraries. Therefore, airlines would be informed better regarding the potential development of new routes, which would give them a chance to expand their flight network.

In the light of this research study, proposing new direct long haul flight routes to the Asia-Pacific region, which is anticipated to be one of the leading economies in the future, will not only enhance Turkey's air connectivity, but also increase the country's international value regarding the tourism and business environment. Hence, it is believed that further investigation of Turkey's air transportation network is deemed to be valuable as it can benefit both the Turkish Government and operating airlines in Turkey.

BIBLIOGRAPHY

Airbus (2018) Airbus Home. [Online] Available at: https://www.airbus.com/ [Accessed 8 August 2018].

Airports Council International (ACI) (2018) Quality of Service Index (QSI). [Online] Available at: https://www.aci-na.org/sites/default/files/berchelmann-sat.pdf [Accessed 8 August 2018].

Airport Strategy & Marketing (ASM) (2013) The next era of route development e what airlines are telling us. In R. Maslen (Ed.), ASM survey provides guidance to world routes airport delegates. [Online] Available at: http://www.routesonline.com/news/29/breaking-news/216583/asm-survey-provides-guidance-to-world-routes-airport-delegates-/ [Accessed 8 August 2018].

Arcgis.com (2018) [Online] Available at: https://www.arcgis.com/index.html [Accessed 8 August 2018].

Artar, O. K., Uca, N., & Taşçı, M. E. (2016) The impact of the airline freight transportation on GDP in Turkey. *Journal of International Trade, Logistics and Law*, *2*(2), 143-148.

Arvis, J. F., & Shepherd, B. (2011) The Air Connectivity Index: Measuring Integration in the Global Air Transport Network. Policy Research Working Paper 5722.

Arvis, J. F., & Shepherd, B. (2016) Measuring Connectivity in a Globally Networked Industry: The Case of Air Transport. *The World Economy*, *39*(3), 369-385.

Aviation Benefits Beyond Borders (ABBB) (2016) Powering global economic growth, employment, trade links, tourism and support for sustainable development through air transport. Available at: https://aviationbenefits.org/media/149668/abbb2016_full_a4_web.pdf [Accessed 31 March 2018].

Aviation Benefits Beyond Borders (ABBB) (2018) Employment. [Online] Available at: https://aviationbenefits.org/economic-growth/employment/ [Accessed 31 March 2018].

Banno, M., & Redondi, R. (2014) Air connectivity and foreign direct investments: economic effects of the introduction of new routes. European Transport Research Review, Volume 6(4), pp. 355-363.

Bel, G., & Fageda, X. (2008) Getting there fact: globalization, intercontinental flights and location of headquarters. Journal of Economic Geography, Volume 8(4), pp. 471-495.

Belgocontrol (2016) Safety at the top. Annual report. [Online] Available at: https://www.belgocontrol.be/documents/10180/11113/Annual-report-2016_EN.pdf/da8b8b6e-6d89-45a1-9b46-e465e70d563d [Accessed 8 August 2018].

Bieger, T., & Wittmer, A. (2006) Air transport and tourism - Perspectives and challenges for destinations, airlines and governments. Journal of Air Transport Management. Volume 12(1), pp. 40-46.

Boeing.com (2018) Boeing: The Boeing Company. [Online] Available at: http://www.boeing.com/ [Accessed 8 August 2018].

Boonekamp, T., & Riddiough, H. (2016) Market stimulation of new airline routes, Discussion Paper, Amsterdam:*SEO Amsterdam Economics*.

Brueckner, J. (2003) Airline traffic and urban economic development. Urban Studies, Volume 40(8), pp. 1455-1469.

Burghouwt, G., & De Wit, J. (2005) Temporal configurations of European airline networks. *Journal of Air Transport Management*, *11*(3), 185-198.

Burghouwt, G., & Veldhuis, J. (2006) The competitive position of hub airports in the transatlantic market. *Journal of Air Transport*, 11(1), pp. 106-130

Burghouwt, G., & Redondi, R. (2009) Connectivity in air transport networks: models, measures and applications. Working Paper, Department of Economic and Technology Management, University of Bergamo.

Burghouwt, G., & Redondi, R. (2013) Connectivity in air transport networks: An assessment of models an applications. Journal of Transport Economics and Policy, Volume 47(1), pp. 35-53.

Castillo-Manzano, J. I., López-Valpuesta, L., & Pedregal, D. J. (2012) What role will hubs play in the LCC point-to-point connections era? The Spanish experience. *Journal of Transport Geography*, *24*, 262-270.

Cederholm, T. (2014) Market Realist. [Online] Marketrealist.com. Available at: https://marketrealist.com/2014/10/why-major-us-airlines-increased-domestic-airfare-in-2014 [Accessed 29 July 2018].

Coldren, G. M., Koppelman, F. S., Kasturirangan, K., & Mukherjee, A. (2003) Modeling aggregate air-travel itinerary shares: logit model development at a major US airline. *Journal of Air Transport Management*, *9*(6), 361-369.

Danesi, A. (2006) Measuring airline hub timetable co-ordination and connectivity: definition of a new index and application to a sample of European hubs. *European Transport*, 34, 54-74.

Debbage, K. G. (1994) The international airline industry: globalization, regulation and strategic alliances. *Journal of Transport Geography*, *2*(3), 190-203.

Derudder, B., & Witlox, F. (2005) An appraisal of the use of airline data in assessing the world city network: a research note on data. *Urban Studies*, *42*(13), 2371-2388.

Directorate General of Civil Aviation (DGCA) (1989) Agreement between the Republic of Turkey and Japan for Air Services. pp 8-23. [Online] Available at: http://web.shgm.gov.tr/umevzuat/asya/ikili/japonya.pdf [Accessed 14 August 2018].

Directorate General of Civil Aviation (DGCA) (2010) Air Services Agreement between the Government of Australia and the Government of the Republic of Turkey. pp 18-33. [Online] Available at: http://web.shgm.gov.tr/umevzuat/asya/ikili/avustralya.pdf [Accessed 14 August 2018].

Directorate General of Civil Aviation (DGCA) (2015) Annual Report 2015. [Online] Available at: http://web.shgm.gov.tr/documents/sivilhavacilik/files/pdf/kurumsal/raporlar/2015_Faaliyet_raporu_en.pdf [Accessed 14 August 2018].

Directorate General of Civil Aviation (DGCA) (2017) Annual Report 2017. [Online] Available at: http://web.shgm.gov.tr/documents/sivilhavacilik/files/pdf/kurumsal/faaliyet/2017.pdf [Accessed 14 August 2018].

Directorate General of Civil Aviation (DGCA) (2018) History | Directorate General of Civil Aviation. [Online] Available at: http://web.shgm.gov.tr/en/kurumsal/1-history [Accessed 21 August 2018].

Dobruszkes, F. (2006) An analysis of European low-cost airlines and their networks. *Journal of Transport Geography*, *14*(4), 249-264.

Dobruszkes, F. (2009) New Europe, new low-cost air services. *Journal of Transport Geography*, *17*(6), 423-432.

Duzgun, M., & Tanyas, M. (2014) The Importance of Istanbul Grand Airport (IGA) for Turkey and Its Influence on Widely Regional Air Traffic Around. In *XII. International Logistics and Supply Chain Congress, October* (pp. 30-31).

Eddinghton, R. (2006) The Eddington Transport Study The case for action: Sir Rod Eddington’s advice to Government. HM Treasury.

Ernst & Young (2013) Ernst & Young’s attractiveness survey, Turkey 2013: The shift, the growth and the promise. 2013. Istanbul: EYGM Limited.

Eurocontrol (2005) Glossary for Flight Statistics & Forecasts. [Online] Available at: https://www.eurocontrol.int/sites/default/files/article/attachments/eurocontrol-glossary-for-flight-statistics-and-forecasts.pdf [Accessed 8 August 2018].

Eurocontrol (2011) Study into the impact of the global economic crisis on airframe utilisation. [Online] Available at: https://www.eurocontrol.int/sites/default/files/content/documents/official-documents/facts-and-figures/coda-reports/study-impact-global-economic-crisis-2011.pdf [Accessed 29 July 2018].

European Commission (2014) Europe without borders – The Schengen area. [Online] Available at: https://ec.europa.eu/home-affairs/sites/homeaffairs/files/e-library/docs/schengen_brochure/schengen_brochure_dr3111126_en.pdf [Accessed 31 March 2018].

Forsyth, P. (2006) Martin Kunz memorial lecture. Tourism benefits and aviation policy. *Journal of Air Transport Management*, *12*(1), 3-13.

Frost, J. (2017a) How To Interpret R-squared in Regression Analysis - Statistics by Jim. [Online] Available at: http://statisticsbyjim.com/regression/interpret-r-squared-regression/ [Accessed 8 August 2018].

Frost, J. (2017b) How to Interpret P-values and Coefficients in Regression Analysis - Statistics by Jim. [Online] Available at: http://statisticsbyjim.com/regression/interpret-coefficients-p-values-regression/ [Accessed 8 August 2018].

General Directorate of State Airports Authority (DHMI) (2018a) Statistics – Flights, Passengers, Cargo. Dhmi.gov.tr. [Online] Available at: http://www.dhmi.gov.tr/istatistik.aspx [Accessed 20 August 2018].

General Directorate of State Airports Authority (DHMI) (2018b) Charges Tariff. Dhmi.gov.tr. [Online] Available at: http://www.dhmi.gov.tr/dairebaskanliklari.aspx?BaskanlikID=31&DetayID=132#.W3rMK-hKjIU [Accessed 20 August 2018].

Gerede, E. (2010) The Evolution of Turkish Air Transport Industry: Significant Developments and the Impacts of 1983 Liberalization. *Journal of Management & Economics*, *17*(2).

Gillen, W. D., Morrion, G. W., Stewart C. (2008) Air Travel Demand Elasticities: Concepts, Issues and Measurement. Department of Finance Canada. [Online] Available at: https://www.fin.gc.ca/consultresp/Airtravel/airtravStdy_-eng.asp [Accessed 14 August 2018].

Gleave, D., S. (2016) Study on airport ownership and management and the ground handling market in selected non-EU countries. Final report 2016. DG Move, European Commission. [Online] Available at: https://ec.europa.eu/transport/sites/transport/files/modes/air/studies/doc/2016-06-airports-and-gh.pdf [Accessed 21 August 2018].

Goldberg, C. (2015) Break Even Load Factor Snapshot – Aircraft Operating Series. [Online] Available at: http://www.opshots.net/2015/02/4936/ [Accessed 31 March 2018].

Goodfriend, J. (2003) Rising breakeven load factors threaten airline finances. Bureau of Transportation. Statistics. U.S. Department of Transportation. [Online] Available at: https://www.bts.gov/sites/bts.dot.gov/files/legacy/publications/special_reports_and_issue_briefs/issue_briefs/number_08/pdf/entire.pdf [Accessed 8 August 2018].

Google Flights. [Online] Available at: https://www.google.com/flights [Accessed 20 August 2018].

Great Circle Mapper (2018) [Online]. Available at: http://www.gcmap.com/ [Accessed 8 August 2018].

Green, R. K. (2007) Airports and economic development. *Real estate economics*, *35*(1), 91-112.

Guimera, R., Mossa, S., Turtschi, A., & Amaral, L. N. (2005) The worldwide air transportation network: Anomalous centrality, community structure, and cities' global roles. *Proceedings of the National Academy of Sciences*, *102*(22), 7794-7799.

Halpern, N., & Graham, A. (2015) Airport route development: A survey of current practice. *Tourism Management*, *46*, 213-221.

Halpern, N., & Graham, A. (2016) Factors affecting airport route development activity and performance. *Journal of Air Transport Management*, *56*, 69-78.

Henderson, J. (2009) Transport and tourism destination development: An Indonesian perspective. *Tourism and Hospitality Research*, *9*(3), 199-208.

Idrissi, A. K., Malapert, A., & Jolin, R. (2017) The Route Network Development Problem based on QSI Models. In *The 6th International Conference on Operations Research and Enterprise Systems (ICORES 2017)*, 7, 3-11.

Igairport (2016) Istanbul New Airport Economic Impact Analysis. Available at: http://igairport.com/documents/Kurumsal_Yayinlar/istanbulnewairporteconomicimpactanalysis.pdf [Accessed 31 March 2018].

Iñiguez, T., Plumed, M., & Martínez, M. P. L. (2014) Ryanair and Spain: Air connectivity and tourism from the perspective of complex networks. *Tourism & Management Studies*, *10*(1), 46-52.

International Air Transport Association (IATA) (2015) IATA Air Passenger Forecast Shows Dip in Long-Term Demand. [Online] Available at: https://www.iata.org/pressroom/pr/Pages/2015-11-26-01.aspx [Accessed 20 August 2018].

International Air Transport Association (IATA) (2017) Air Passenger Market Analysis. [Online] Available at: https://www.iata.org/whatwedo/Documents/economics/passenger-analysis-jan-2017.pdf [Accessed 20 August 2018].
International Civil Aviation Organization (ICAO) (2018) Connectivity. [Online] Available at: https://www.icao.int/sustainability/Pages/Connectivity.aspx [Accessed 31 March 2018].

InterVISTAS (2010) The Effect of the Alliance on Passenger Traffic. InterVISTAS Consulting Group [Online] Available at: https://www.transport.govt.nz/assets/Import/Documents/Annexure-E-InterVISTAS-Report.pdf [Accessed 8 August 2018].

InterVISTAS (2015) Economic Impact of European Airports A Critical Catalyst to Economic Growth. InterVISTAS Consulting Group. [Online] Available at: http://www.intervistas.com/downloads/reports/Economic%20Impact%20of%20European%20Airports%20-%20January%202015.pdf [Accessed 11 August 2018].

Istanbul Development Agency (2017) Istanbul Fact Sheet 2017. Istanbul, Turkey. Available at: http://invest.istanbul/media/59872/istanbul-fact-sheet-2017.pdf [Accessed 31 March 2018].

Istanbul International Finance Centre (2018). [Online] Available at: http://www.borsaistanbul.com/data/kilavuzlar/Istanbul_International_Financial_Center.pdf [Accessed 31 March 2018].

Jacobs, T. L., Garrow, L. A., Lohatepanont, M., Koppelman, F. S., Coldren, G. M., & Purnomo, H. (2012) Airline planning and schedule development. In *Quantitative Problem Solving Methods in the Airline Industry* (pp. 35-99). Springer, Boston, MA.

Jenatabadi, H. S., & Ismail, N. A. (2007) The determination of load factors in the airline industry. *International Review of Business Research Papers*, *3*(4), 125-133.

Kayloe, J. (2010) Quality of service index fundamentals. Diio. Available at: https://www.aci-na.org/static/entransit/qsi_fundamentals_kayloe.pdf [Accessed 8 August 2018].

Khadaroo, J., & Seetanah, B. (2007) Transport infrastructure and tourism development. *Annals of tourism research*, *34*(4), 1021-1032.

Khadaroo, J., & Seetanah, B. (2008) The role of transport infrastructure in international tourism development: A gravity model approach. *Tourism management*, *29*(5), 831-840.

Logothetis, M., & Miyoshi, C. (2016) Network performance and competitive impact of the single hub e a case study on Turkish Airlines and Emirates. Journal of Air Transport Management. Volume 64, pp. 3-14.

Malighetti, P., Paleari, S., & Redondi, R. (2008) Connectivity of the European airport network:“Self-help hubbing” and business implications. *Journal of Air Transport Management*, *14*(2), 53-65.

Malighetti, P., Meoli, M., Paleari, S., & Redondi, R. (2011) Value determinants in the aviation industry. *Transportation Research Part E: Logistics and Transportation Review*, *47*(3), 359-370.

Malighetti, P., Redondi R., & Paleari S. (2011) New routes and airport connectivity. Netw Spat Econ. Volume 11, pp. 713 - 725.

Matsumoto, H., Veldhuis, J., de Wit, J., & Burghouwt, G. (2008) Network performance, hub connectivity potential, and competitive position of primary airports in Asia/Pacific region. 12th Air Transport Research Society (ATRS) World Conference.

McKercher, B. (2008a) The implicit effect of distance on tourist behavior: A comparison of short and long haul pleasure tourists to Hong Kong. Journal of Travel & Tourism Marketing, 25(3-4), 367-381.

McKercher, B., Chan, A., & Lam, C. (2008b) The impact of distance on international tourist movements. Journal of Travel Research, 47(2), 208-224.

McQuaid, R.W., Smyth, A., & Cooper, J. (2004) The Importance of Transport in Business' Location Decisions. Napier University Press, Edinburgh.

Morphet, H., & Bottini, C. (2014) Air Connectivity: Why it matters and how to support growth. PwC.

Mwemezi, J. J., & Huang, Y. (2011) Optimal facility location on spherical surfaces: algorithm and application. *New York Science Journal*, *4*(7), 21-28.

Naylor, J. (2011) Traffic Forecasts and Route Development. Avia Solutions [Online] Available at: http://www.aci.aero/Media/aci/file/2011%20Events/Statistics_and_Forecasting_Workshop/NAYLOR_Jonathan_Presentation.pdf [Accessed 8 August 2018].

O'Kelly, E. M. (2010) Routing traffic at hub facilities. Netw Spat Econ, Volume 10, pp. 173 – 191

OAG (2018). Available at: https://www.oag.com/ [Accessed 31 March 2018].

OECD (2016) OECD Tourism Trends and Policies 2016. OECD Publishing, Paris. [Online] Available at: https://www.oecd-ilibrary.org/docserver/tour-2016-en.pdf?expires=1534278308&id=id&accname=guest&checksum=E54E5613BB2E1B1332FE282E608D395E [Accessed 14 August 2018].

OECD (2017a) Australia - OECD Better Life Index. [Online] Available at: http://www.oecdbetterlifeindex.org/countries/australia/ [Accessed 14 August 2018].

OECD (2017b) Japan - OECD Better Life Index. [Online] Available at: http://www.oecdbetterlifeindex.org/countries/japan/ [Accessed 14 August 2018].

OECD (2018) OECD Tourism Trends and Policies 2018. OECD Publishing, Paris. [Online] Available at: https://www.oecd-ilibrary.org/docserver/tour-2018-en.pdf?expires=1534278335&id=id&accname=guest&checksum=AF42E18902BB18BFE49CE9AF4E671AB3 [Accessed 14 August 2018].

Ouimet, P. (2010) Airline Routes: How You Can Influence Their Development. InterVISTAS Consulting Group. [Online] Available at:
https://www.iccaworld.org/cnt/progmdocs/ME302%20-%20Paul.pdf [Accessed 8 August 2018].

Oxford Economics (2011) Economic Benefits from Air Transport in Turkey. [Online] Available at: https://www.iata.org/policy/Documents/Benefits-of-Aviation-Turkey-2011.pdf [Accessed 31 March 2018]

Oxford Economic (2016) The Importance of Air Transport to Turkey. [Online] Available at: https://www.iata.org/policy/Documents/benefits-of-aviation-turkey-2017.pdf [Accessed 11 August 2018].

Oxley, D. (2017) Estimating the Impact of Recent Terrorist Attacks in Western Europe. [Online] Available at: https://www.iata.org/publications/economic-briefings/European-terrorism-impact.pdf [Accessed 3 August 2018].

Paleari, S., Redondi, R., & Malighetti, P. (2010) A comparative study of airport connectivity in China, Europe and US: which network provides the best service to passengers? Transportation Research Part E: Logistics and Transportation Review. Volume 46(2), pp. 198-210.

Pearce, B. (2017) Economic Performance of the Airline Industry. Mid-year Report. IATA Economics. [Online] Available at:
https://www.iata.org/whatwedo/Documents/economics/IATA-Economic-Performance-of-the-Industry-mid-year-2017-report.pdf [Accessed 8 August 2018].

Peng, B., Song, H., Crouch, G. I., & Witt, S. F. (2015) A meta-analysis of international tourism demand elasticities. Journal of Travel Research, 54(5), 611-633.

Percoco, M. (2010) Airport activity and local development: evidence from Italy. *Urban Studies*, *47*(11), 2427-2443.

Perovic, J. (2013) The economic benefits of aviation and performance in the travel & tourism competitiveness index. International Air Transport Association (IATA). The travel and tourism competitiveness report 2013. pp. 57-61.

Prideaux, B. (2000) The role of the transport system in destination development. *Tourism management*, *21*(1), 53-63.

Redondi, R., Malighetti, P., & Paleari, S. (2011a) New routes and airport connectivity. Networks and Spatial Economics, 11(4), 713-725.

Redondi, R., Malighetti, P. & Paleari, S. (2011b) Hub competition and travel times in the world-wide airport network. Journal of Transport Geography, Volume 19(6), pp. 1260-1271.

Republic Of Turkey Ministry Of Culture and Tourism (2007) Tourism Strategy of Turkey – 2023. T.R. Ministry of Culture and Tourism Publications. Kultur.gov.tr. Available at:
http://yigm.kulturturizm.gov.tr/Eklenti/906,ttstratejisi2023pdf.pdf?0 [Accessed 31 March 2018].

Routesonline (2018) Routes aviation conference, events, networking | aviation news | airport and airline profiles. [Online] Available at:
https://www.routesonline.com/ [Accessed 8 August 2018].

Saunders, M., Lewis, P., & Thornhill, A. (2016) Research methods for business students. 7th ed. Harlow: Pearson Education Ltd.

Seredyński, A., Rothlauf, F., & Grosche, T. (2014) An airline connection builder using maximum connection lag with greedy parameter selection. *Journal of Air Transport Management*, *36*, 120-128.

Servantie, D. (2015) A comparative analysis of EU and Turkish aviation policies. Economic Development Foundation. IKV Brief. Available at:
https://www.ikv.org.tr/images/files/A%20COMPARATIVE%20ANALYSIS%20OF%20EU%20AND%20TURKISH%20AVIATION%20POLICIES%202%20(edited).pdf [Accessed 21 August 2018].

Sismanidou, A., Tarradellas, J., Bel, G., & Fageda, X. (2013) Estimating potential long-haul air passenger traffic in national networks containing two or more dominant cities. *Journal of Transport Geography*, *26*, 108-116.

Skyscanner.net. (2018). [Online] Available at: https://www.skyscanner.net/ [Accessed 20 August 2018].

Smyth, M. & Pearce, B. (2007) Measuring the economic rate of return on investment in the aviation industry.

Smyth, M., & Pearce, B. (2008) Air Travel Demand. IATA Economics Briefing No 9. Available at: https://www.iata.org/whatwedo/documents/economics/air_travel_demand.pdf [Accessed 14 August 2018].

Sopadang, A. & Suwanwong, T. (2016) Airport connectivity evaluation: The study of Thailand. In *International Conference on Industrial Engineering and Operations Management* (pp. 188-195).

Stalnaker, T., Usman, K., & Taylor, A. (2016) Airline economic analysis. Oliver Wyman. Available at: http://www.oliverwyman.com/content/dam/oliver-wyman/v2/publications/2017/jan/aea/NEW_NYC-MKT59202-002_AirlineEconomicAnalysis_2016-17_web.pdf [Accessed 29 July 2018].

Stalnaker, T., Usman, K., & Taylor, A. (2017) Airline economic analysis. Oliver Wyman. Available at: http://www.oliverwyman.com/content/dam/oliver-wyman/v2/publications/2018/January/Airline_Economic_Analysis_AEA_2017-18_web.pdf [Accessed 29 July 2018].

Statista (2017) Number of International Tourist Arrivals Worldwide from 1950 to 2016. [Online] Available at: https://www.statista.com/statistics/262750/number-of-international-tourist-arrivals-worldwide/ [Accessed 8 August 2018].

Stone, K. B., Scibilia, B., Pammer, C., Steele, C., & Keller, D. (2013) Regression Analysis: How Do I Interpret R-squared and Assess the Goodness-of-Fit? Blog.minitab.com. [Online] Available at: http://blog.minitab.com/blog/adventures-in-statistics-2/regression-analysis-how-do-i-interpret-r-squared-and-assess-the-goodness-of-fit [Accessed 8 August 2018].

Suau-Sanchez, P., Voltes-Dorta, A., & Rodríguez-Déniz, H. (2015) The role of London airports in providing connectivity for the UK: regional dependence on foreign hubs. *Journal of Transport Geography*, *50*, 94-104.

Suau-Sanchez, P., Voltes-Dorta, A., & Rodríguez-Déniz, H. (2016) Measuring the potential for self-connectivity in global air transport markets: Implications for airports and airlines. *Journal of Transport Geography*, *57*, 70-82.

Suau-Sanchez, P., Voltes-Dorta, A., & Rodríguez-Déniz, H. (2017a) An assessment of the potential for self-connectivity at European airports in holiday markets. *Tourism Management*, *62*, 54-64.

Suau-Sanchez, P., Voltes-Dorta, A., & Rodríguez-Déniz, H. (2017b) Benchmarking Worldwide Airport Connectivity with Demand Data: Global Hub Competition, New Players, and the Hidden Potential of Self-connectivity. Emerald Publishing Limited. In The Economics of Airport Operations. pp. 387-423.

Swan, W. M. (2002) Airline route developments: a review of history. *Journal of Air Transport Management*, *8*(5), 349-353.

TAV Airports (2018) Prime Location Global Gateway IST Ataturk Airport. [Online] Available at: http://www.tavhavalimanlari.com.tr/en-EN/Documents/IST-Airport-Profile.pdf [Accessed 21 August. 2018].

Tembleque-Vilalta, M. & Suau-Sanchez, P. (2016) A model to analyse the profitability of long-haul network development involving non-hub airports: The case of the Barcelona-Asian market. Case Studies on Transport Policy, 4(2), pp. 188-197.

The World Bank (2016) World Development Indicators: Travel and Tourism. [Online] Available at: http://wdi.worldbank.org/table/6.14# [Accessed 14 August 2018].

Turkish Airlines (2015) Company Presentation. Investor Relations. [Online] Available at: http://investor.turkishairlines.com/documents/ThyInvestorRelations/CALGEM_PRESENTATION.pdf [Accessed 8 August 2018].

Turkish Airlines (2016) Turkish Airlines Annual Report 2016. [Online] Available at: http://investor.turkishairlines.com/documents/ThyInvestorRelations/THY_2016_ANNUAL_REPORT-v2.pdf [Accessed 22 August 2018].

Turkish Airlines (2017) Fact Sheet 2017 [Online] Available at: http://investor.turkishairlines.com/documents/ThyInvestorRelations/download/fact-sheet-31-12-2017.pdf [Accessed 22 August 2018].

Turkish Airlines (2018) History. [Online] Available at: http://investor.turkishairlines.com/en/turkishairlines/history [Accessed 21 August 2018].

Turkish Airlines (2018b) Shareholding Structure. [Online] Available at: http://investor.turkishairlines.com/en/turkishairlines/shareholding-structure [Accessed 21 August 2018].

Turkish Airlines (2018c) Board Activity Report. [Online] Available at: http://investor.turkishairlines.com/documents/ThyInvestorRelations/YK_Faaliyet_Raporu_1Q2018_ING.pdf [Accessed 3 August 2018].

Turkish Airlines (2018d) Fleet. [Online] Available at: http://investor.turkishairlines.com/en/financial-operational/fleet [Accessed 3 August 2018].

Tveteras, S. & Roll, K. H. (2014) Non-stop flights and tourist arrivals. *Tourism Economics*, *20*(1), 5-20.

United Nations World Tourism Organisation (UNWTO) (2018) Strong outbound tourism demand from both traditional and emerging markets in 2017. UNTWO World Tourism Barometer. [Online] Available at: http://cf.cdn.unwto.org/sites/all/files/pdf/unwto_barom18_02_mar_apr_excerpt__0.pdf [Accessed 14 August 2018].

Veldhuis, J. (1997) The competitive position of airline networks. Journal of Air Transport Management, Volume 3(4), pp. 181-188.

Vera-Rebollo, J. F., & Ivars Baidal, J. A. (2009) Spread of low-cost carriers: tourism and regional policy effects in Spain. *Regional Studies*, *43*(4), 559-570.

Vernon, T., H. (1969) Airlines and the Elusive BE Point. *Financial Analysts Journal*, *25*(3), 51-57.

Voltes-Dorta, A., Rodriquez-Deniz, H., and Suau-Sanchez, P. (2016) Passenger recovery after an airport closure at tourist destinations: A case study of Palma de Mallorca airport. Tourism Management, Volume 59, pp. 449-466.

Voltes-Dorta, A., Piltz, C., and Suau-Sanchez, P. (2017) A comparative analysis of hub connections of European and Asian airports against Middle Eastern hubs in intercontinental markets. Journal of Air Transport Management. Volume 66, pp. 1-12.

Weatherill, J. (2005) Airline Incentive Programs. InterVISTAS Consulting Group. [Online] Available at: http://www.intervistas.com/downloads/CAIR/articles/07_jul2005_d.pdf [Accessed 14 August 2018].

Weber, M., & Williams, G. (2001) Drivers of long-haul air transport route development. *Journal of Transport Geography*, *9*(4), 243-254.

Welch, A. (2012) Quality of service index. InterVISTAS Consulting Group. Available at: https://www.aci-na.org/sites/default/files/welch_qsi_fundamentals.pdf [Accessed 8 August 2018].

Wensveen, J., G. (2007) The significance of airline passenger load. In: Air transport – A management perspective. Sixth ed. Hampshire: Ashgate Publishing Limited.

World Economic Forum (2017) The Travel & Tourism Competitiveness Report 2017, paving the way for a more sustainable and inclusive future. Insight Report. World Economic Forum. Available at: http://www3.weforum.org/docs/WEF_TTCR_2017_web_0401.pdf [Accessed 16 August 2018].

World Travel & Tourism Council (WTTC) (2017) How does travel & tourism compare to other sectors? Available at: https://www.wttc.org/-/media/files/reports/benchmark-reports/country-reports-2017/turkey.pdf [Accessed 31 March 2018].

Zajac, G. (2016) The Role of Air Transport in the Development of International Tourism. *Journal of International Trade, Logistics and Law*, *2*(1), 1-8.

Zanin, M., & Lillo, F. (2013) Modelling the air transport with complex networks: A short review. *The European Physical Journal Special Topics*, *215*(1), 5-21.

APPENDICES

Appendix A - Regression results of the reference route IST – CGK (June, 2017)

Origin - Destination	Operating Airline (Leg 1)	Operating Airline (Leg 2)	Gateway Airport (1)	Total Est. Pax	Total Est. Pax (Weekly)	Weekly Frequency	Detour	Seats	Inline Connection	Direct Flight
IST- CGK	**TK**			**696**	**162**	**6**	**1.000**	**349**	**1**	**1**
IST- CGK	TK	EY	AUH	26	6	7	1.016	178	0	0
IST- CGK	QR	QR	DOH	157	37	10	1.019	254	1	0
IST- CGK	KL	KL	AMS	3	1	14	1.436	142	1	0
IST- CGK	EY	EY	AUH	39	9	7	1.016	174	1	0
IST- CGK	SQ	SQ	SIN	150	35	5	1.011	271	1	0
IST- CGK	SV	SV	RUH	67	16	3	1.035	330	1	0
IST- CGK	EK	EK	DXB	53	12	11	1.012	354	1	0
IST- CGK	SV	SV	MED	4	1	2	1.068	330	1	0
IST- CGK	SV	SV	JED	40	9	15	1.093	330	1	0

Regression Statistics			***Coefficients***	***Standard Error***	***t Stat***	***P-value***
Multiple R	0.978546628	Intercept	89.2279888	63.6780631	1.401235912	0.233758831
R Square	0.957553503	Weekly Frequency Destination	0.454998161	1.332365171	0.341496589	0.749915539
Adjusted R Square	0.904495381	Detour	-74.82905034	53.97305566	-1.386414933	0.237890484
Standard Error	14.97891651	Seats Destination	-0.058527218	0.088822747	-0.658921506	0.545946419
Observations	10	Inline Connection	19.22938226	19.22326195	1.00031838	0.373764299
		Direct Flight	146.0676894	16.85519667	8.666032932	0.000975592

Appendix B - Regression results of the reference route IST – CGK (December, 2017)

Origin - Destination	Operating Airline (Leg 1)	Operating Airline (Leg 2)	Operating Airline (Leg 3)	Gateway Airport (1)	Gateway Airport (2)	Total Est. Pax	Total Est. Pax (Weekly)	Weekly Frequency	Detour	Seats	Inline Connection	Direct Flight
IST - CGK	**TK**					**1556**	**351**	**7**	**1**	**349**	**1**	**1**
IST - CGK	EK	EK	MH	DXB – U.A.E	KUL - Malaysia	5	1	11	1.0255	160	0	0
IST - CGK	EY	EY		AUH – U.A.E		49	11	7	1.0156	188	1	0
IST - CGK	EK	EK		DXB – U.A.E		293	66	11	1.0117	352	1	0
IST - CGK	SQ	SQ		SIN - Singapore		229	52	4	1.0112	271	1	0
IST - CGK	SV	SV		RUH – Saudi Arabia		189	43	3	1.0347	330	1	0
IST - CGK	SV	SV		JED – Saudi Arabia		660	149	19	1.0934	330	1	0
IST - CGK	SV	SV		MED – Saudi Arabia		7	2	2	1.0680	330	1	0
IST - CGK	QR	QR		DOH - Qatar		233	53	10	1.0194	254	1	0

Regression Statistics			*Coefficients*	*Standard Error*	*t Stat*	*P-value*
Multiple R	0.988266926	Intercept	-159.1171753	415.5037783	-0.382950008	0.727279877
R Square	0.976671517	Weekly Frequency Destination	6.662512681	2.07463921	3.211407868	0.04890366
Adjusted R Square	0.937790712	Detour	52.30808424	426.1732145	0.122739024	0.910074602
Standard Error	27.65600402	Seats Destination	0.207410128	0.216667027	0.957275923	0.409048468
Observations	9	Inline Connection	44.43595383	40.71503402	1.091389333	0.354911823
		Direct Flight	294.3494138	37.39276666	7.87182763	0.004271411

Appendix C - QSI analysis of the IST – MEL route (December, 2017)

Origin - Destination	Operating Airline (Leg 1)	Operating Airline (Leg 2)	Operating Airline (Leg 3)	Gateway Airport (1)	Gateway Airport (2)	Total Est. Pax	Weekly Frequency	Detour	Seats	Inline Connection	Direct Flight	QSI Score
IST - MEL	**TK**						**1**	**1**	**349**	**1**	**1**	**311.0249**
IST - MEL	EK	EK		DXB – U.A.E		114	11	1.0019	354	1	0	86.3727
IST - MEL	TK	EY		AUH – U.A.E		4	7	1.0030	178	0	0	-23.0945
IST - MEL	EY	EY		AUH – U.A.E		246	7	1.0030	188	1	0	23.4156
IST - MEL	EY	EY	VA	AUH – U.A.E	PER - Australia	7	7	1.0088	188	0	0	-20.7185
IST - MEL	QR	QR		DOH - Qatar		275	7	1.0045	412	1	0	69.9552
IST - MEL	SQ	SQ		SIN - Singapore		149	4	1.0053	264	1	0	19.7385
IST - MEL	EK	QF		DXB – U.A.E		5	7	1.0019	354	0	0	13.3524
IST - MEL	TK	MH		KUL - Malaysia		5	7	1.0045	290	0	0	0.2145

Proposed O-D Market	IST - MEL	**QSI Score**	**Market Share**	**Forecast (Weekly)**	**Load Factor**
Operating Airline	Turkish Airlines	311.0249	59%	301.9306	87%
Aircraft Type	Boeing 777-300ER Passenger	Annual Passenger Demand	9660		
Aircraft Capacity	349	Market Stimulation Effect	2.75		
Weekly Frequency	1	Weekly Passenger Demand	185		

Appendix D - QSI analysis of the IST – SYD route (December, 2017)

Origin - Destination	Operating Airline (Leg 1)	Operating Airline (Leg 2)	Operating Airline (Leg 3)	Gateway Airport (1)	Gateway Airport (2)	Total Est. Pax	Weekly Frequency	Detour	Seats	Inline Connection	Direct Flight	QSI Score
IST - SYD	TK						1	1	349	1	1	311.0249
IST - SYD	AF	AF	MU	CDG - France	PVG - China	7	7	1.2946	143	0	0	0
IST - SYD	EK	EK	QF	DXB – U.A.E	PER - Australia	9	11	1.0245	271	0	0	23.9691
IST - SYD	EK	EK		DXB – U.A.E		126	11	1.0061	354	1	0	84.6592
IST - SYD	EY	EY		AUH – U.A.E		193	7	1.0079	188	1	0	23.6733
IST - SYD	TK	EY		AUH – U.A.E		4	7	1.0079	178	0	0	0
IST - SYD	KE	KE		ICN – South Korea		25	3	1.0882	218	1	0	7.4434
IST - SYD	TK	OZ		ICN – South Korea		11	11	1.0882	349	0	0	43.4783
IST - SYD	SQ	SQ		SIN - Singapore		272	4	1.0002	264	1	0	19.0416
IST - SYD	EK	QF		DXB – U.A.E		4	7	1.0061	354	0	0	13.5732
IST - SYD	QR	QR		DOH - Qatar		168	7	1.0100	412	1	0	70.2394
IST - SYD	TK	CA		PVG - China		8	7	1.0625	265	0	0	0
IST - SYD	TK	TG		BKK - Thailand		5	11	1.0040	349	0	0	39.0764
IST - SYD	TK	SQ		SIN - Singapore		3	7	1.0002	264	0	0	0
IST - SYD	TK	QF		CGK - Indonesia		3	5	1.0003	265	0	0	0

Proposed O-D Market	IST - SYD
Operating Airline	Turkish Airlines
Aircraft Type	Boeing 777-300ER Passenger
Aircraft Capacity	349
Weekly Frequency	1

QSI Score	**Market Share**	**Forecast (Weekly)**	**Load Factor**
311.0249	49%	235.8920	68%
Annual Passenger Demand	10056		
Market Stimulation Effect	2.5		
Weekly Passenger Demand	193		

Appendix E - Regression results of the IST – NRT route (June, 2017)

Origin - Destination	Operating Airline (Leg 1)	Operating Airline (Leg 2)	Gateway Airport (1)	Total Est. Pax	Total Est. Pax (Weekly)	Weekly Frequency	Detour	Seats	Inline Connection	Direct Flight
IST - NRT	**TK**			**1010**	**236**	**7**	**1.0000**	**289**	**1**	**1**
IST - NRT	TK	JL	CDG - France	5	1	7	1.3278	161	0	0
IST - NRT	TK	LO	WAW - Poland	7	2	5	1.1107	184	0	0
IST - NRT	TK	JL	FRA - Germany	4	1	7	1.2485	180	0	0
IST - NRT	EK	EK	DXB – U.A.E	70	16	7	1.2213	354	1	0
IST - NRT	QR	QR	DOH - Qatar	131	31	7	1.2264	259	1	0
IST - NRT	BA	BA	LHR – United Kingdom	5	1	7	1.3454	162	1	0
IST - NRT	OZ	UA	ICN – South Korea	34	8	4	1.0219	166	0	0
IST - NRT	KE	KE	ICN – South Korea	43	10	3	1.0219	218	1	0
IST - NRT	TK	NH	DUS - Germany	5	1	7	1.2636	180	0	0
IST - NRT	SQ	SQ	SIN - Singapore	19	4	5	1.5591	264	1	0
IST - NRT	EY	EY	AUH – U.A.E	92	21	7	1.2345	174	1	0
IST - NRT	KL	KL	AMS - Netherlands	16	4	7	1.2815	142	1	0
IST - NRT	TK	KE	ICN – South Korea	4	1	11	1.0219	276	0	0
IST - NRT	HY	HY	TAS - Uzbekistan	8	2	1	1.0450	247	1	0

Regression Statistics			*Coefficients*	*Standard Error*	*t Stat*	*P-value*
Multiple R	0.992745731	Intercept	8.38921489	23.01973	0.364436	0.723948198
R Square	0.985544085	Weekly Frequency Destination	0.990322979	1.187317	0.834085	0.425816688
Adjusted R Square	0.977513022	Detour	-14.26818572	18.08903	-0.78878	0.450520343
Standard Error	8.952797603	Seats Destination	0.019930886	0.045367	0.439329	0.670782059
Observations	15	Inline Connection	10.47445835	5.857127	1.788327	0.107354547
		Direct Flight	278.709351995	6.739163677	41.356667586	0.000000001

Appendix F - Regression results of the IST – NRT route (December, 2017)

Origin - Destination	Operating Airline (Leg 1)	Operating Airline (Leg 2)	Gateway Airport (1)	Total Est. Pax	Total Est. Pax (Weekly)	Weekly Frequency	Detour	Seats	Inline Connection	Direct Flight
IST - NRT	**TK**			**1311**	**296**	**7**	**1**	**289**	**1**	**1**
IST - NRT	EK	EK	DXB – U.A.E	101	23	7	1.2213	354	1	0
IST - NRT	EY	EY	AUH – U.A.E	56	13	7	1.2345	188	1	0
IST - NRT	TK	JL	FRA - Germany	7	2	7	1.2485	180	0	0
IST - NRT	KE	LJ	ICN – South Korea	18	4	3	1.0219	189	0	0
IST - NRT	TK	LO	WAW - Poland	4	1	5	1.1107	188	0	0
IST - NRT	TK	LX	ZRH - Switzerland	3	1	7	1.2623	178	0	0
IST - NRT	MS	MS	CAI - Egypt	3	1	1	1.2029	76	1	0
IST - NRT	OZ	OZ	ICN – South Korea	3	1	3	1.0219	275	1	0
IST - NRT	QR	QR	DOH - Qatar	51	12	7	1.2264	259	1	0
IST - NRT	SQ	SQ	SIN - Singapore	3	1	4	1.5591	264	1	0
IST - NRT	BA	BA	LHR – United Kingdom	5	1	6	1.3454	162	1	0
IST - NRT	TK	SQ	SIN - Singapore	3	1	7	1.5591	264	0	0

Regression Statistics	
Multiple R	0.998747760
R Square	0.997497088
Adjusted R Square	0.995709293
Standard Error	5.304071010
Observations	13

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	5.320607608	12.101252622	0.439674121	0.673427335
Weekly Frequency Destination	1.771803388	0.918562604	1.928886916	0.095077985
Detour	-16.385607841	9.970052295	-1.643482637	0.144283571
Seats Destination	0.032681400	0.025360170	1.288690100	0.238459227
Inline Connection	6.508099807	3.336755735	1.950427398	0.092109542
Direct Flight	278.709351995	6.739163677	41.356667586	0.000000001

Appendix G - QSI analysis of the IST – KIX route (December, 2017)

Origin - Destination	Operating Airline (Leg 1)	Operating Airline (Leg 2)	Operating Airline (Leg 3)	Gateway Airport (1)	Gateway Airport (2)	Total Est. Pax	Weekly Frequency	Detour	Seats	Inline Connection	Direct Flight	QSI Score
IST - KIX	**TK**						**2**	**1**	**349**	**1**	**1**	**289.1019**
IST - KIX	EK	EK		DXB – U.A.E		241	7	1.2085	354	1	0	15.9987
IST - KIX	EY	EY	KE	AUH – U.A.E	ICN – South Korea	3	7	1.2233	188	0	0	3.8228
IST - KIX	HY	HY	KE	TAS - Uzbekistan	ICN – South Korea	5	4	1.0346	246	0	0	3.4944
IST - KIX	KE	KE		ICN – South Korea		611	3	1.0043	218	1	0	7.8122
IST - KIX	LH	LH		FRA - Germany		17	5	1.2702	150	1	0	4.7761
IST - KIX	OZ	KE		ICN – South Korea		11	3	1.0043	275	0	0	3.1670
IST - KIX	OZ	RS		ICN – South Korea		138	3	1.0043	195	0	0	0.5525
IST - KIX	OZ	TW		ICN – South Korea		22	3	1.0043	189	0	0	0.3564
IST - KIX	OZ	OZ		ICN – South Korea		78	3	1.0043	275	1	0	9.6751
IST - KIX	T5	T5	CA	ASB - Turkmenistan	PEK - China	8	2	1.0561	177	0	0	-2.6556
IST - KIX	TK	OZ		ICN – South Korea		16	11	1.0043	290	0	0	17.8316
IST - KIX	TK	HX		HKG – Hong Kong		20	6	1.1970	174	0	0	2.0240
IST - KIX	W5	W5	CA	IKA - Iran	PEK - China	3	4	1.0788	177	0	0	0.5159

Proposed O-D Market	IST - KIX	**QSI Score**	**Market Share**	**Forecast (Weekly)**	**Load Factor**
Operating Airline	Turkish Airlines	288.2166	80%	499.2973	86%
Aircraft Type	A330-300	Annual Passenger Demand	14076		
Aircraft Capacity	289	Market Stimulation Effect	2.3		
Weekly Frequency	2	Weekly Passenger Demand	270		

Appendix H - Travel & Tourism competitiveness indexes of Turkey, Australia and Japan

4 Broad Factors of Competitiveness	Index Components – 14 Pillars	Turkey	Australia	Japan
Enabling Environment	Business Environment	63th	31st	20th
	Safety and Security	116th	22nd	26th
	Health and Hygiene	64th	32nd	17th
	Human Resource and Labour Market	94th	29th	20th
	ICT Readiness	72nd	18th	10th
T&T policy and enabling conditions	Prioritization of T&T	87th	32nd	18th
	International Openness	50th	2nd	10th
	Price Competitiveness	70th	128th	94th
	Environmental Sustainability	112nd	38th	45th
Infrastructure	Air Transport Infrastructure	14th	4th	18th
	Ground and Port Infrastructure	54th	53rd	10th
	Tourist Service Infrastructure	42nd	8th	29th
Natural and Cultural Resources	Natural Resources	70th	6th	26th
	Cultural Resources & Business Travel	16th	11th	4th

Source: World Economic Forum (2017)