A Concentration Analysis in the Turkish Domestic Air Transportation Industry using with CRm and Herfindahl-Hirschman Indexes

Türkiye İç Hat Hava Taşımacılığı Üzerine Herfindahl-Hirshman Endeksi ve CRm Yoğunlaşma Oranı Analizi ile Piyasa Yoğunlaşmasının Tespit Edilmesi

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Abstract

Concentration means that economic activities are dominated or owned by a small number of firms in any market. Accordingly, there is a negative relationship between concentration ratio in the market and level of competition. In other words, as the concentration rate increases, level of competition decreases and vice-versa. The low market concentration ratio and imperfect competition are common occurences in the emerging countries such as Turkey. In this study, concentration ratio and level of competition of the top five airports in Turkey will be examined by years. In this context, the airlines' (using these top five airports) number of passengers and cargo volumes between 2012 and 2015 will be used to analyse. This study is significant as it is the first study to investigate airport market concentration and market structure in Turkey. In this context, the relationship between domestic air transportation concentration ratio and market structure will be demonstrated with using M-Firm Concentration Ratio (CRm) and Herfindahl-Hirschman Index (HHI) analysis methods. After the analyses, our results justified that market structure is far from competition. In addition, there are recommendations and determinations to what to do for ensuring competition and maintaining it truly in this study.

Keywords: Herfindahl-Hirshman Index, M-Firm Concentration Ratio, Airline Companies, Competition, Market Structure

Öz

Yoğunlaşma, herhangi bir piyasada ekonomik faaliyetlerin az sayıda firmanın domine edilmesi ya da sahiplenilmesi anlamında kullanılmaktadır. Buna göre piyasadaki yoğunlaşma oranı ile rekabet düzeyi arasında negatif yönlü bir ilişki söz konusudur. Diğer bir ifade ile piyasadaki yoğunlaşma oranı artıkça rekabet düzeyi azalır, yoğunlaşma oranı azaldıkça rekabet düzeyi artar. Türkiye gibi gelişmekte olan ülke piyasalarında piyasa yoğunlaşma oranın düşük olması ve eksik rekabet sık rastlanılan bir durumdur. Bu çalışma kapsamında Türkiye'deki faaliyet gösteren en büyük beş havalimanının piyasadaki yoğunlaşma oranı ve rekabet düzeyi incelenecektir. Bu kapsamda söz konusu havaalanlarını kullanan havayolu işletmelerinin 2012-2015 yılları arasında bu havaalanlarındaki yolcu sayıları ve kargo miktarları incelenecektir. Bu çalışma Tükiye'deki havalimanlarında pazar yoğunlaşması ve piyasa yapısını inceleyen ilk araştırma olması nedeniyle önemlidir. Türkiye'de havacılık piyasasında yoğunlaşma ve piyasa yapısı arasındaki ilişki M - Firma Yoğunlaşma Oranı ve Herfindahl-Hirschman Endeksi Analiz yöntemleri kullanılarak iç hat hava taşımacılığındaki piyasa yapısının durumu ortaya konmaya çalışılacaktır. Yapılan analizler sonucunda piyasanın rekabetçi yapıdan uzak olduğu ortaya çıkarılmıştır. Buna ek olarak çalışmada rekabetin sağlanması ve sağlıklı bir şekilde işlemesine yönelik yapılması gerekenlerle ilgili tespit ve öneriler yer alacaktır.

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Introduction

Competition is defined as sharing limited sources for unlimited needs of people (Aktan & Y.Vural, 2004). Therefore, in the classic economy, competition is behaviour of companies for reducing prices to fight back excessive supply (McNulty, 1968).

While classic economists define competition as market process, Neo-Classic economists define it as market structure and then pure competition fact is at the top of agenda. According to Classic economists, output of process is two companies which turn against each others. However, Neo-Classic economists state that there are many sellers and buyers, flow of information is complete and there is no entry or exit barriers in the pure competition. Moreover, market is homogen and share of market can be divided (Özkan, 2007).

If all conditions which Neo Classic thought are provided, pure competition can be realized. Pure competition is not possible in the real world (Aktan & Y.Vural, 2004). If all conditions mentioned above are not realised, markets are defined as imperfect competition. These markets; monopol, duopol and oligopol. Table 1 shows features of these markets (Grant, 2008).

Table 1: Market Structures

	Perfect Competition	**Oligopol**	**Duopol**	**Monopol**
Concentration	Many companies	A few companies	Two companies	One company
Entry and Exit Barriers	No barrier	Significant entry barriers		High entry barriers
Product Diversification	Homogen Product/Service	Potential for product diversification		
Accessibility to Information	No barrier to flow of information	Access to information is limited		

Source: Robert M.Grant, Contemporary Strategy Analysis (UK: Backwell Publishing, Sixth Edition. 2008)

Imperfect competition can be observed in developed countries, such as Turkey. In imperfect markets, thera are entry and exit barriers, players in the market can differentiate their products and access to informatin is limited wholly or partially (Silva, 2007; Batmaz & Özcan, 2008).

Concentration determines market structure and is related to the number of buyers and sellers in the market and size distribution (Süslü & Baydur, 1999). Market concentration is related to the situation that limited number of companies have economic resources and activities. In imperfect markets, market concentration is common (Durukan & Hamurcu, 2009).

To measure market power, concentration indexes which provides helpful and practical indicators are utilised. These indexes give important information about market concentration and competition level (Pehlivanoğlu & Tekçe, 2013). For this purpose, as part of Structure-Conduct-Performance (SCP) approach, Herfindhal-Hirschman Index and M-firm Concentration Ratio analyses are widely utilised (Polat, 2007; Pehlivanoğlu and Tekçe, 2013).

For this research, as part of application area, Turkish aviation domestic market was chosen. There are two main reasons for choosing this application area. Firstly, we did not find

any research related to this topic in Turkey. Secondly, after 2003, domestic deregulation was a milestone for Turkish Civil Aviation (Battal, Yılmaz, & Ateş, 2006) and to reveal the effect of increased competition on domestic markets (Gerede & Orhan, 2015).

In this context, the following research questions are answered:

- What is the level of market structure in Turkish domestic air transport?
- What is the level of market structure in Turkish domestic air cargo transport?

In the first part of this research, general structure of Turkey's aviation industry will be mentioned. All data in this research was obtained from General Directorate of State Airports Operations statistical annuals. Second part deals with the relationship between concentration and market structurer. The last part, in accordance with M-Firm concentration ratio and Herfindhal-Hirschmann index, examines Turkish domestic passenger and cargo transport and reveal market structures.

Turkey's Air Transport Industry

Air transport industry generated 819,4 billion dollars in gross domestic product of 2013 in Turkey (TÜİK,2014). Direct effect of aviation industry is 5,8 billion dollars, indirect effect is 4,3 billion dollars and induced effect is 2,01 billion dollars (ATAG, 2014). The total effect of aviation industry is responsible for 1,5% of gross domestic product.

In 1978, the United States of America deregulated its domestic markets. After 5 years, in 1983, thanks to No.2920 of Civil Aviation Law, private airlines were given permission to carry out domestic operations in Turkey (Battal, Yılmaz, & Ateş, 2006; Oktal & Gerede, 2002). Before this deregulation, only Turkish Airlines (the flag carrier) was flying in the domestic routes. After the deregulation, new airlines were established and the number of airlines increased. However, reasons such as technical inadequacy, lack of qualified employees and infrastructure problems led some airlines to go bankrupt and stop operations (Korul & Küçükonal, 2003). Moreover, this law did not deregulate domestic markets completely. 9/11 attacks and economic crises (IATA, 2011) affected aviation industry in the whole world adversely (Battal, Yılmaz, & Ateş, 2006). The government in Turkey modified No.2920 to reduce negative impacts and gave airlines the chance to determine their fares freely (TBMM, 2001). In 2003, deregulation has started in the domestic markets and private airlines started domestic operations (Battal, Yılmaz, & Ateş, 2006; Gerede & Orhan, 2015). All these developments expanded airline market and passenger numbers, cargo and commercial airplane traffic incresed significantly year by year. In the beginning of deregulation, passenger number stood at 9,1 millions. After only one year, passenger number reached to 85 millions (UBAK, 2014). In Turkey, the number of all airplanes in 2003 was only 162. In the December of 2015, this number reached to 489. In the same period, seat capacity incresed from 27.599 to 90.259 and cargo capacity grew from 302.737 kg to 1.759.600 kg (ATIG, 2015; UBAK, 2014; SHGM, 2015).

Summary of Statistical Data Related To Turkey's Air Transport

In this part, to explain present situation of Turkey's air transport better, the data of General Directorate of State Airports Authority between 2012 and 2015 were scanned and taking account of commercial airplane, passenger and cargo traffic, top 10 airports were tabularised. Related tables can be found in annexes. Annex A gives the data related to commercial airplane traffic, Annex B shows passenger traffic data and cargo traffic data can be found in Annex C.

According to Appendix A, since end of 2015, commercial airplane traffic increased by 9,5% year-on-year. If we look at the increase for domestic and international routes seperately,

percental increase shows parallelism with Turkey-wide. In terms of top 10 airports, Istanbul Ataturk Airport is responsible for 36% of total commercial traffic (IATA: IST, ICAO: LTBA[1]). IST/LTBA is followed by Istanbul Sabiha Gokcen, Antalya, Ankara Esenboga airports respectively.

Appendix B shows top 10 airports in terms of passenger traffic in 2012 and 2015. In the end of 2015, Turkey-wide passenger traffic reached to 165,7 millions and increased by 10,9% year-on-year. Domestic and international routes reveal differences in numbers. While increase in domestic routes was 12,2%, international routes saw 9,6% increase. Total increase in traffic reached to more than 16 millions. In terms of top 10 airports, Ataturk Airport accounts for 34% of total traffic and this percentage is close to its commercial traffic percentage of 36%. Istanbul Ataturk Airports is followed by Antalya, Istanbul Sabiha Gokcen and Ankara Esenboga Airports respectively.

Appendix C demonstrates transported cargo quantity between the years 2012 and 2015. In the end of 2015, cargo quantity increased by 15,6% year-on-year and this increased was derived from increase in international routes. Ataturk Airport is responsible for 86% of cargo traffic. By contrast with passenger and commercial airplane traffic, Antalya Airport was ranked at the 6.

Market Level Competition

‘’Competition’’ is defined as a company that it is trying to succeed against by achieving goals of sale amount, profit and market share (Bas, 2005: 38). Polat (2007) defines market structure as a method that classifies markets according to competition. Market is classified as pure competition, monopol, monopolistic competition and oligopoly. Examining market structures at the present time reveals that monopolistic competition and oligopoly markets are more common, on the other hand, pure competition and monopol markets are rare (2007: 99).

Pehlivanoglu and Tekce (2013) define monopolistic competition and oligopoly markets in their study. In monopolistic competition, there are many companies in the market but their effects on price are not significant. On the other hand, in oligopoly markets, there are few companies but they have power to determine prices.

Concentration is defined as the degree to which the output in a market or an industry is accounted for by only a few firms. It differs according to market structure and competition level (Uysal and Ozturk, 2005: 274; Pehlivanoglu ve Tekce, 2013: 373). In other words, it is related to whether structure in the market is open to competition or not (Günlü, 2011: 102). Concentration analysis is utilised to measure competition between firms in a market and reveal unfair competition. The measurement of concentration level reveals market structure, market behaviour and market performance in a certain industry (Baş, 2005: 39).

There are many methods to measure concentration level in a market or an industry. Herfindahl-Hirschman and M-Firm concentration ratio are two of commonly used methods (Uysal and Ozturk, 2005: 275). The following part gives detailed information about mentioned concentration indexes.

Herfindahl-Hirschman Index (HHI)

This index is accepted as a good one because it takes account of firm numbers and their market shares (Kaynak and Ari, 2011: 48). Herfindahl-Hirschman Index is calculated by squaring the market share of each firm competing in a market and its formula is as follows (Uysal and Ozturk, 2005:276).

[1] IST: IATA’s (International Air Transportation Association) three digits airport code; LTBA: ICAO’s (International Civil Aviation Organization) four digits code

$(S_i)\ market\ shares\ of\ firms(\%)$

$HHI = \sum\ (S_i)^2$ i=1……n that is to say (1)

$HHI = s_1^2 + s_2^2 + s_3^2 + s_4^2 \ldots\ldots\ldots\ldots s_n^2$

Example; $HHI = (15)^2 + (15)^2 + (15)^2 + (15)^2\ (20)^2 + (20)^2$

= 225+225+225+225+400+400 =1700

While the highest H-H index value for a market can be 10.000 if there are many firms in the market, H-H index value can be near the zero. Generally, the value of 0-2.000 H-H index qualifies low concentration market, the value of 2.000-4.000 H-H index indicates medium concentration market and the value of 4.000-10.000 H-H index shows high concentration market. According to United States of America's "Merger Guideline", there is pure competition for HHI below 1000; there is monopolistic competition for HHI 1.000-1.800 and there is oligopoly competition for HHI above 1.800 (Polat, 2007, s. 100; Durukan & Hamurcu, 2009, s. 78; Pehlivanoğlu & Tekçe, 2013, s. 375).

M-Firm Concentration Ratio (CR_M)

This ratio is generally calculated for 4 or 8 firms. In the low concentration markets, competition level is high, in the high concentration markets, competition level is low. If concentration ratio reaches to 100%, this means that one firm dominates the market. M - Firm Concentration Ratio (CRM) is calculated as follows (Polat, 2007:100);

$CR_M = \frac{1}{X} \sum_{i=1}^{m} X_i$ (2)

CR_M : shows concentration ratio for "M" number of firms.

X_i : shows the value of ''x'' variable for "i" firm when firms are ranged according to this variable.

X: shows the total value of ''x'' variable for all firms in a market.

According to CR 4 concentration ratio, market structure is classified as follows (Hamurcu and Durukan, 2009: 77-78):

- 0-30 range: Concentration is low (there is competition),
- 31-50 range: Concentration is medium (reduced competition, almost oligopoly),
- 51-70 range: Concentration is high (competition is redeced and oligopoly market is formed),
- 71-100 range: Concentration is very high (monopoly market is formed).

Literature Review

There are many studies related to market concentration in the literature. In these studies, market concentration of various industries were analyzed by using Herfindahl-Hirschman Index (HHI) and M- Firm Concentration Ratio to evaluate concentration degree in the markets and market structures.

Polat (2007) determined Turkish cement market structure by using data of cement firms' revenues, costs and output. According to M-firm concentration analyses, market strucure verged between monopolistic competition and oligopoly market. In terms of Herfindahl-Hirschman Index, more competitive structure was found.

Kaynak and Ari (2011) investigated the concentration level of Turkish automotive industry. According to CR_4, native trap market had high concentration level. In terms of CR_8, imported trap market had high level of concentration. In the same study, according to Herfindahl-Hirschman Index, native trap market showed monopolistic competition characteristics. On the other hand, imported trap market had low level of concentration.

Haan and Poghosyan examined whether bank earnings volatility depended on bank size and the degree of concentration in the banking sector using quarterly data for non-investment banks in the United States for the period 2004Q1-2009Q4. They found that bank earnings volatility decreased with market concentration. They also found that larger banks located in concentrated markets experienced higher volatility during the recent financial crisis (Haan and Poghosyan, 2012).

Pehlivanoglu and Tekce (2013) examined electric energy market between the years 1993 and 2011 by analysing net sales profit of firms. Analyses results show that according to 〖CR〗_4, market has high concentration. According to Herfindahl - Hirschman Index, market has very high concentration.

Pulaj and Kume (2013) applied concentration ratio (CR4) method, HHI and Gini Coefficient to analyse the absolute concentration ratio and relative concentration ratio for construction industry market in Albania with 2003 to 2012 statistical data. The results revealed that the construction industry was a low concentrated industry because the industrial concentration ratios were below the threshold levels.

Ha and Seo compared cargo volumes and fleet capacity of top 4 transporters in Korean Ship Industry and their international counterparts between the years 1992 and 2004. Their findings showed that the concentration ratio was well below that of the global counterpart. Morover, the changes of CR4 between 1992 and 2004 indicated the Korean shipping market became more competitive and less concentrated. (Ha and Seo, 2013).

Nurwati (2014) investigated the relationship of market structure and performance for Indonesian Islamic Banks between the years 1999 and 2011. He found that there was a significant relation between market concentration and banks' equity conversion.

Trish and Herring (2015) examined the relationship between employer-sponsored fully-insured health insurance premiums and the level of concentration in local insurer and hospital markets using the nationally-representative 2006-2011 KFF/HRET Employer Health Benefits Survey in the USA. They found that premiums were higher for plans sold in markets with higher levels of concentration relevant to insurer transactions with employers, lower for plans in markets with higher levels of insurer concentration relevant to insurer bargaining with hospitals, and higher for plans in markets with higher levels of hospital market concentration.

An Emprical Study On Turkish Domestic Air Transport Market

For this research, 2012-2015 data of domestic airlines (Turkish Airlines, Pegasus Airlines, Onur Air, AtlasGlobal Airlines, Borajet Airlines and Sun Express Airlines) which dominate Turkish domestic market were utilized. Within this scope, domestic passenger and domestic cargo data of 5 airports (Istanbul Ataturk Airport, Istanbul Sabiha Gokcen Airport, Ankara Esenboga Airport, Izmir Adnan Menderes Airport and Antalya Airport) which dominates airport markets were used. Herfindahl - Hirschman Index and Concentration Ratio values will be examined seperately.

Airlines' Market Shares At Airports In Terms of Passenger and Cargo

In this chapter, airlines' passenger numbers, cargo volume and market shares are analyzed in the biggest five airports in Turkey in terms of passenger and cargo taffic.

Airlines' market shares at Istanbul Ataturk airport

Table 2 and Table 3 presents data related to Istanbul Ataturk Airport. While Table 2 gives passenger traffic and market shares between 2012 and 2015, Table 3 presents cargo traffic and market shares.

Table 2: Airlines' Passenger Numbers Market Shares at Istanbul Ataturk Airport

	2012		2013		2014		2015	
Airline	**Passenger Numbers**	**Market Share %**	**Passenger Numbers**	**Market Share %**	**Passenger Numbers**	**Market Share %**	**Passenger Numbers**	**Market Share %**
Turkish Airlines	10.322.520	0,676	11.487.011	0,667	12.939.134	0,698	13.820.377	0,7148
Pegasus Airlines	510.064	0,033	549.798	0,032	570.669	0,031	585.974	0,0303
Onur Air	2.638.534	0,173	3.098.786	0,180	3.022.855	0,163	3.087.338	0,1596
Atlas Global	1.796.955	0,118	2.081.639	0,121	2.009.422	0,108	1.839.894	0,0951
Others	2907	0,000	1438	0,000	215	0,000	290	~ 0,010
Total	15.270.980	1,000	17.218.672	1,000	18.542.295	1,000	19.333.873	1,000

Table 2 presents passenger traffic data between 2012 and 2015 at Istanbul Ataturk Airport. According to the table, Turkish Airlines' market shares increased year by year. While its market share was at 67,6% in 2012 it increased to 71,48% in 2015. Other airlines' market shares decreased significantly.

Table 3: Airlines' Cargo Market Shares at Istanbul Ataturk Airport

	2012		2013		2014		2015	
Airline	**Cargo (ton)**	**Market Share %**	**Cargo (ton)**	**Market Share %**	**Cargo (ton)**	**Market Share %**	**Cargo (ton)**	**Market Share %**
Turkish Airlines	N/A	N/A	45803	0,960	47.999	0,971	42.111	0,9139
Pegasus Airlines	N/A	N/A	155	0,003	108	0,002	65	0,0014
Onur Air	N/A	N/A	1063	0,022	605	0,012	172	0,0037
Atlas Global	N/A	N/A	672	0,014	584	0,012	1.596	0,0346
Others	N/A	N/A	1	0,000	136	0,003	2.132	0,0462
Total	N/A	N/A	47694	1,000	49432	1,000	46.075	1,0000

Table 3 gives market share and cargo volume carried by airlines at Istanbul Ataturk Airport. Because the year 2012 data was not available it was showed as N/A. According to the table, Turkish Airlines' market share was too high and did not drop below 90% over the years.

Airlines' market shares at Istanbul Sabiha Gokcen airport

The data related to Istanbul Sabiha Gokcen Airport is given on Table 4 and Table 5. While Table 4 presents passenger traffic and market share between 2012 and 2015, Table 5 gives cargo traffic and market share.

Table 4: Airlines' Passenger Numbers data at Istanbul Sabiha Gokcen Airport

	2012		2013		2014		2015	
Airline	**Passenger Numbers**	**Market Share %**	**Passenger Numbers**	**Market Share %**	**Passenger Numbers**	**Market Share %**	**Passenger Numbers**	**Market Share %**
Turkish Airlines	1.635.485	0,168	3.110.356	0,261	4.410.692	0,295	6.343.622	0,3424
Pegasus Airlines	6.388.787	0,655	7.944.716	0,666	9.611.593	0,643	11.200.269	0,6045
Onur Air	0	0	0	0	0	0	253	~0,0050
Atlas Global	82.518	0,008	269.508	0,023	303.738	0,020	116.261	0,0062
Sun Express	1.585.396	0,162	544837	0,045	447.450	0,030	443.534	0,0239
Borajet	62.317	0,006	57511	0,004	181.270	0,012	420.510	0,0226

Others	4.350	0,000	1.143	0,001	828	0,000	1200	~0,0050
Total	9758853	1,000	11.928.074	1,000	14.955.571	1,000	18.525.649	1,0000

Table 4 shows passenger traffic data at Istanbul Sabiha Gokcen Airport between 2012 and 2015. Accordingly, Pegasus Airlines' market share in 2012 was at 65% and decreased to 60% in 2015. In the same period, Turkish Airlines' market share doubled.

Table 5: Airlines' Cargo Volumes data at Istanbul Sabiha Gokcen Airport

	2012		**2013**		**2014**		**2015**	
Airline	**Cargo (ton)**	**Market Share %**	**Cargo (ton)**	**Market Share %**	**Cargo (ton)**	**Market Share %**	**Cargo (ton)**	**Market Share %**
Turkish Airlines	N/A	N/A	674	0,190	1583	0,338	2.255	0,3659
Pegasus Airlines	N/A	N/A	2833	0,798	2976	0,635	3.553	0,5765
Onur Air	N/A	N/A	0	0,000	0	0	0	0
Atlas Global	N/A	N/A	0,62	0,000	0	0	1	0,0000
Others	N/A	N/A	41,38	0,012	127	0,027	352	0,0571
Total	N/A	N/A	3549	1,000	4686	1,000	6.162	1,0000

Table 5 presents market share and cargo volume carried by airlines at Istanbul Sabiha Gokcen Airport. Because the data related to 2012 was not available it was shown as N/A. According to the table, Pegasus Airlines' market share decreased significantly over the years. Accordingly, the 80% market share in 2012 decreased to 58%. As for Turkish Airlines, its market share increased from 19% in 2012 to 36% in 2015.

Airlines' market shares at Ankara Esenboga airport

Table 6 and Table 7 presents the data related to Ankara Esenboga Airport. While Table 6 gives passenger traffic and market share between the years 2012 and 2015, Table 7 presents market share and cargo traffic.

Table 6: Airlines' data at Ankara Esenboga Airport

	2012		**2013**		**2014**		**2015**	
Airline	**Passenger Numbers**	**Market Share %**	**Passenger Numbers**	**Market Share %**	**Passenger Numbers**	**Market Share %**	**Passenger Numbers**	**Market Share %**
Turkish Airlines	6315925	0,822	7.963.364	0,850	8141627	0,849	8.982.389	0,8504
Pegasus Airlines	1103765	0,144	1.271.261	0,136	1350452	0,141	1.487.220	0,1408
Onur Air	0	0	0	0,000	7314	0,001	N/A	N/A
Atlas Global	1112	0,000	369	0,000	0	0	1.654	0,0000
Borajet	255909	0,033	131.547	0,014	88737	0,009	89.674	0,0084
Others	2660	0,000	3.660	0,000	3220	0,000	1.346	0,0000
Total	7679371	1,000	9.369.832	1,000	9591350	1,000	10.562.282	1,0000

Table 6 shows passenger traffic data between the years 2012 and 2015 at Ankara Esenboga Airport. According to the table, Turkish Airlines' market share was significantly high. Its market share varied between 81% and 85%. Other airlines' market share did not change significantly. Therefore, it might be said that Turkish Airlines dominate this market.

Table 7: Airlines' data at Ankara Esenboga Airport

	2012		2013		2014		2015	
Airline	**Cargo (ton)**	**Market Share %**	**Cargo (ton)**	**Market Share %**	**Cargo (ton)**	**Market Share %**	**Cargo (ton)**	**Market Share %**
Turkish Airlines	N/A	N/A	13005	0,988	13613	0,988	11.940	0,981
Pegasus Airlines	N/A	N/A	159	0,012	165	0,012	226	0,019
Onur Air	N/A	N/A	0	0,000	0	0	0	0
Atlas Global	N/A	N/A	0	0,000	0	0	0	0
Others	N/A	N/A	0	0,000	0	0	1	0,000
Total	N/A	N/A	13164	1,000	13778	1,000	12.167	1,000

Table 7 presents market share and cargo volume carried by airlines at Ankara Esenboga Airport. According to the table, Turkish Airlines has a monopoly over the market.

Airlines' market shares at Izmir Adnan Menderes airport

Table 8 and Table 9 presents the data related to Izmir Adnan Menderes Airport. While Table 8 gives passenger traffic and market share between the years 2012 and 2015, Table 9 shows Cargo traffic and market share in the same period.

Table 8: Airlines' data at Izmir Adnan Menderes Airport

	2012		2013		2014		2015	
Airline	**Passenger Numbers**	**Market Share %**	**Passenger Numbers**	**Market Share %**	**Passenger Numbers**	**Market Share %**	**Passenger Numbers**	**Market Share %**
Turkish Airlines	2059069	0,296	2.596.599	0,335	2840528	0,339	3.295.949	0,3452
Pegasus Airlines	2296976	0,331	2.760.081	0,356	2930492	0,349	3.333.870	0,3492
Onur Air	445071	0,064	479.905	0,062	470195	0,056	559.740	0,0586
Atlas Global	723970	0,104	552.882	0,071	563732	0,067	527.830	0,0552
Sun Express	1416877	0,204	1.364.516	0,176	1565066	0,187	1.789.375	0,1874
Others	3081	0,000	376	0,000	20412	0,002	38.679	0,0040
Total	6945044	1,000	7.753.983	1,000	8390425	1,000	9.545.443	1,0000

Table 8 presents passenger traffic data between 2012 and 2015 at Izmir Adnan Menderes Airport. According to the table, in terms of passenger market, Turkish Airlines and Pegasus Airlines had almost the same market shares. Moreover, Sun Express' market share varied between 17% and 20%. These three airlines' total market share were at approximately 85%.

Table 9: Airlines' data at Izmir Adnan Menderes Airport

	2012		2013		2014		2015	
Airline	**Cargo (ton)**	**Market Share %**	**Cargo (ton)**	**Market Share %**	**Cargo (ton)**	**Market Share %**	**Cargo (ton)**	**Market Share %**
Turkish Airlines	N/A	N/A	17493	0,885	19204	0,896	18.314	0,8374
Pegasus Airlines	N/A	N/A	1623	0,082	1700	0,079	2.213	0,1011
Onur Air	N/A	N/A	35	0,002	1	0,000	0	0
Atlas Global	N/A	N/A	541	0,027	411	0,019	1.249	0,0571
Others	N/A	N/A	77	0,004	113	0,005	93	0,000

Total	N/A	N/A	19769	1,000	21429	1,000	21.868	1,000

Table 9 presents market shares and cargo volume carried by airlines at Izmir Adnan Menderes Airport. According to the table, Turkish Airlines dominates the market. Its market share was 88% in 2013 and decreased to 83.7% in 2015.

Airlines' market shares at Antalya airport

Table 10 and Table 11 give data related to Antalya Airport. While Table 10 gives passenger traffic and market shares between 2012 and 2015; Table 11 presents cargo traffic and market shares.

Table 10: Airlines' data at Antalya Airport

	2012		2013		2014		2015	
Airline	**Passenger Numbers**	**Market Share %**	**Passenger Numbers**	**Market Share %**	**Passenger Numbers**	**Market Share %**	**Passenger Numbers**	**Market Share %**
Turkish Airlines	1771477	0,359	2083217	0,377	2204715	0,354	2.632.133	0,3811
Pegasus Airlines	972639	0,197	1323549	0,239	1575766	0,253	1.792.702	0,2595
Onur Air	581899	0,118	632028	0,117	557090	0,089	576.397	0,0834
Atlas Global	675547	0,137	648147	0,150	900015	0,144	661.663	0,0958
Sun Express	870870	0,176	831517	0,114	925505	0,148	1.162.354	0,1683
Others	68571	0,014	8027	0,001	67794	0,010	82015	0,0118
Total	4941003	1,000	5526485	1,000	6230885	1,000	6.906.364	1,000

Tablo 10 gives passenger traffic data between 2012 and 2015 at Antalya Airport. According to the table, in terms of passenger market, Turkish Airlines has the highest market share. Turkish Airlines' market share varies between 35% and 38%. Pegasus Airlines increased its 19.7% market share in 2012 to approximately 26% in 2015. Other airlines' market shares did not change significantly.

Table 11: Airlines' data at Antalya Airport

	2012		2013		2014		2015	
Airline	**Cargo (ton)**	**Market Share %**	**Cargo (ton)**	**Market Share %**	**Cargo (ton)**	**Market Share %**	**Cargo (ton)**	**Market Share %**
Turkish Airlines	N/A	N/A	17493	0,885	5.314	0,873	4706	0,8520
Pegasus Airlines	N/A	N/A	1623	0,082	465	0,076	403	0,0729
Onur Air	N/A	N/A	35	0,002	64	0,011	65	0,0117
Atlas Global	N/A	N/A	541	0,027	147	0,024	269	0,0487
Others	N/A	N/A	77	0,004	99	0,016	80	0,0144
Total	N/A	N/A	19769	1,000	6089	1,000	5.523	1,000

Table 11 indicates market share and cargo volume carried by airlines at Antalya Airport. According to the table, Turkish Airlines dominates the market. The relevant airline's market share varies between 85% and 88%.

Concentration Ratio for Turkish Domestic Passenger and Cargo Markets

CR4 domestic passenger and cargo market concentration ratios

Table 12: Domestic Passenger and Cargo Market Concentration Ratios according to CR_4

Airport		Value				Value Range	CR Market Definition
		2012	2013	2014	2015		
Istanbul Ataturk A.	**Passenger**	~1,00	0,999	~1,00	0,998	$CR_4 \geq 70$	Almost Monopol, High Intensive Market
	Cargo	NA	0,999	~1,00	0,965	$CR_4 \geq 70$	Almost Monopol, High Intensive Market
Ist. Sabiha Gokcen A.	**Passenger**	0,993	0,949	0,988	0,991	$CR_4 \geq 70$	Almost Monopol, High Intensive Market
	Cargo	NA	0,988	~1,00	0,999	$CR_4 \geq 70$	Almost Monopol, High Intensive Market
Ankara Esenboga A.	**Passenger**	0,999	0,986	~1,00	0,999	$CR_4 \geq 70$	Almost Monopol, High Intensive Market
	Cargo	NA	~1,00	~1,00	0,999	$CR_4 \geq 70$	Almost Monopol, High Intensive Market
Adnan Menderes A.	**Passenger**	0,935	0,824	0,931	0,940	$CR_4 \geq 70$	Almost Monopol, High Intensive Market
	Cargo	NA	0,996	~1,00	0,995	$CR_4 \geq 70$	Almost Monopol, High Intensive Market
Antalya A.	**Passenger**	0,869	0,884	0,900	0,904	$CR_4 \geq 70$	Almost Monopol, High Intensive Market
	Cargo	NA	0,999	0,989	0,988	$CR_4 \geq 70$	Almost Monopol, High Intensive Market

Table 12 indicates domestic passenger and cargo market concentration ratios according to CR4 between 2012 and 2015. If CR_4 concentration ratio is between 0 and 30, that means there is low level of concentration. This range is the proof of competition. The range of 31-50 indicates medium concentration level thus, competition is reducing and there is a situation which is near oligopoly. The range of 51-70 shows that there is high level of concentration thus, competition decreases extremly in other words, there is oligopoly market structure. Lastly, the range of 71-100 indicates there is very high level of concentration. This market structure shows monopolistic characteristics (Durukan and Hamurcu, 2009: 77-78). Data from table 12 reveals that all airports are near monopoly. Although CR_4 values differs across different airports, all airports' values are higher than critical value of 70. In other words, all airports have a high degree of concentration.

Although there are many studies which evaluate the airport situation of being natural monopoly (Gillen, 2011; Starkie, 2002; Gerber, 2002; Niemeier, 2002) this study aims to exhibit differences in concentration degrees across airports in Turkey. When viewed from this aspect, in terms of passenger numbers, Istanbul Ataturk Airport is close to monopoly. It is followed by Ankara Esenboga Airport. Izmir Adnan Menderes Airport is the most distant from being a monopoly. Although airport market concentration ratios varied by years, no variations from monopol structure is visible.

Examining cargo market concentration ratios reveals that CR_4 values are near 1. This indicates that cargo market is closer to monopoly. Cargo market concentration rate was close to 1 by years and monopol structure gained importance.

Domestic Passenger and Cargo Market Concentration Ratios According To HHI

Table 13: Domestic Passenger and Cargo Market Concentration Ratios in terms of HHI

Airport		HHI Value				HHI Value Range	HHI Market Definition
		2012	2013	2014	2015		
Istanbul Ataturk A.	**Passenger**	5066	4929	5086	5464	*4000 < HHI < 10000*	Almost Monopol, High Intensive Market
	Cargo	NA	9222	9411	8385	*4000 < HHI < 10000*	Almost Monopol, High Intensive Market

Istanbul Sabiha Gokcen A.	**Passenger**	4772	5122	4951	4838	*4000 < HHI < 10000*	Almost Monopol, High Intensive Market
	Cargo	NA	6729	5261	4695	*4000 < HHI < 10000*	Almost Monopol, High Intensive Market
Ankara Esenboga A.	**Passenger**	6929	7409	7422	7431	*4000 < HHI < 10000*	Almost Monopol, High Intensive Market
	Cargo	NA	9762	9802	9627	*4000 < HHI < 10000*	Almost Monopol, High Intensive Market
Izmir Adnan Menderes A.	**Passenger**	2525	2478	2827	2827	*2000< HHI < 4000*	Almost Oligopol, Medium Intensive Market
	Cargo	NA	7906	8169	7147	*4000 < HHI < 10000*	Almost Monopol, High Intensive Market
Antalya A.	**Passenger**	2361	2489	2353	2572	*2000< HHI < 4000*	Almost Oligopol, Medium Intensive Market
	Cargo	NA	8076	7642	7339	*4000 < HHI < 10000*	Almost Monopol, High Intensive Market

Table 13 shows Turkish domestic and cargo markets HHI values, value ranges and market definitions. Maximum value of HHI can be 10.000. If there are many firms in a market and their market shares are insignificant, HHI value is near zero. In other words, HHI value decreases when market is close to pure competition. Moreover, the value of HHI 0-2000 indicates low concentration markets, the value of HHI 2000-4000 shows medium concentration markets and the value of HHI 4000-10000 indicates high concentration markets (Su, 2003: 20-21).

According to HHI, domestic passenger market concentration indicates that almost all airports have monopoly market structures. Moreover, cargo markets in all airports have monopoly market structures. Izmir Adnan Menderes and Antalya airports in terms of passenger market are more competitive and have oligopoly market structures. By contrast with this, other markets do not show competitive structures and only a few companies have all the market. Turkish domestic passenger and cargo markets HHI values share smilarities with CR_4 values. In other words, both tests' results are close to each other and coherent.

Conclusion and Evaluation

To determine aviation market structure and examine this quantitively are crucial for both market players and decision makers. By this means, it might be possible to develop qualified politics and increase competition for ever-growing and ever-changing aviation industry.

In this study, Turkish domestic passenger and cargo markets were examined by years. In this regard, top five airports in terms of passenger and cargo transported were examined to determine which market structure they had. M-Firm Concentration Ratio (CR_M) and Herfindahl-Hirschman Index (HHI) were used to reveal market structure and examine market concentration. Moreover, in this study, airlines' market shares at airports were mentioned.

M-Firm Concentration Ratio (CR_M) analyses showed that all airports in terms of passenger and cargo data had the highest level of concentration ratios. This situation indicated that market is far away from competition.

In terms of CR_4 market concentration ratio, the nearest to monopoly in respect to passenger numbers is Istanbul Ataturk Airport. It is followed by Ankara Esenboga Airport with its 0,986 concentration ratio. When cargo market concentration ratios are examined, CR_4 value range is very high (almost 1). This indicates that cargo market shows monopolistic

characteristics. The highest CR_4 value range for cargo markets is Ankara Esenboga Airport. Concentration ratio here is very close to 1.

In terms of Turkish domestic passenger and cargo market HHI values, value ranges and market definitions, Ankara Esenboga Airport has the highest HHI value in domestic market. This situation shows that this market is far away from competition. On the other hand, Izmir Adnan Menderes Airport and Antalya Airport have the lowest market concentration ratios in domestic passenger market. Their HHI values are near 2500. This indicates that there is relatively competition in these airports. These airports can be evaluated as low concentration airports. Moreover, domestic cargo market HHI reveals that it has higher concentration market structure than passenger markets have. In other words, domestic cargo markets are more concentrated than passenger markets. The nearest to monopoly market structure is Ankara Esenboga Airport. It is followed by Istanbul Ataturk Airport, Izmir Adnan Menderes Airport, Antalya Airport and Istanbul Sabiha Gokcen Airport respectively.

The analysis of airports' market structure in Turkey reveals that they are distant from competition and close to monopoly. This situation inhibits development of aviation and people's accession to the aviation. Monopoly structure leads to high prices, poor quality and unprecedented to passengers. To make airports more competitive in Turkey, privileges to public airline should be avoided, the market should be reorganized and some subventions should be carried into effect. Thanks to these precautions, air transportation in Turkey will develop and society benefit and contribution will reach to significant levels.

The results of this research contribute to both determining market structure and guiding decision makers. In addition to that, being the first research on airport market concentration in Turkey increases original value of this study. In this research, only 4 years period was considered in determining market concentration, however, it is recommended that further research might consider more years and examine changes living in aviation markets. This is extremly important for monitoring the development of market structure.

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APPENDIX A: Top 10 Airports İn Terms Of Commercial Airplane Traffic

AIRPORTS	COMMERCIAL AIR TRAFFIC								
	END OF DECEMBER 2012			END OF DECEMBER 2013			END OF DECEMBER 2014		
	Domestic	International	Total	Domestic	International	Total	Domestic	International	To
Istanbul Ataturk	114.767	231.293	346.060	126.566	259.432	385.998	132.965	286.932	419.
Istanbul Sabiha Gökcen	70.051	41.864	111.915	83.335	51.130	134.465	105.467	65.826	171.
Antalya	33.447	117.684	151.131	38.022	120.825	158.847	42.176	122.584	164.
Ankara Esenboga	61.594	13.266	74.860	72.026	13.051	85.077	70.468	11.640	82.
Izmir Adnan Menderes	49.339	17.078	66.417	52.599	16.617	69.216	55.325	17.372	72.
Adana	22.960	4.995	27.955	26.963	4.387	31.350	28.739	5.915	34.
Mugla Milas-Bodrum	7.003	15.863	22.866	12.718	11.215	23.933	15.103	11.205	26.
Mugla Dalaman	12.301	11.477	23.778	6.816	17.450	24.266	7.372	18.323	25.
Trabzon	16.852	531	17.383	17.141	910	18.051	17.569	1.136	18.
Gaziantep	9.088	1.784	10.872	12.033	1.164	13.197	13.490	1.304	14.
TURKEY TOTAL	**483.441**	**463.456**	**946.897**	**554.166**	**505.225**	**1.059.391**	**606.063**	**553.774**	**1.159**

APPENDIX B: Top 10 Airports İn Terms Of Passenger Traffic

	PASSENGER TRAFFIC (Inbound-Outbound)								
Airports	**END OF DECEMBER 2012**			**END OF DECEMBER 2013**			**END OF DECEMBER 2014**		
	Domestic	**International**	**Total**	**Domestic**	**International**	**Total**	**Domestic**	**International**	**Total**
Istanbul Ataturk	15.279.655	29.812.307	45.091.962	17.218.672	34.079.118	51.297.790	18.542.295	38.152.871	56.695.166
Antalya	4.943.308	20.152.836	25.096.144	5.526.485	21.492.138	27.018.623	6.230.885	22.072.307	28.303.192
Istanbul Sabiha Gokcen	8.704.249	4.420.421	13.124.670	11.928.074	6.593.688	18.521.762	14.955.571	8.539.075	23.494.646
Ankara Esenboga	7.080.072	1.405.395	8.485.467	9.369.832	1.572.228	10.942.060	9.591.350	1.444.256	11.035.606
Izmir Adnan Menderes	6.125.076	2.398.457	8.523.533	7.753.983	2.479.157	10.233.140	8.390.425	2.580.238	10.970.663
Adana	2.651.873	589.094	3.240.967	3.754.227	561.551	4.315.778	4.057.291	630.203	4.687.494
Mugla Dalaman	696.644	3.035.730	3.372.374	851.704	3.203.926	4.055.630	1.012.396	3.297.084	4.309.480
Mugla Milas-Bodrum	1.396.493	1.991.842	3.388.335	1.738.027	1.890.293	3.628.320	2.011.444	1.835.103	3.846.547
Trabzon	2.190.503	89.514	2.280.017	2.528.990	91.897	2.620.887	2.668.349	109.187	2.777.536
Gaziantep	1.170.025	144.483	1.314.508	1.662.457	166.342	1.828.799	1.889.937	192.884	2.082.821
TURKEY TOTAL	**58.258.324**	**59.362.145**	**117.620.469**	**76.148.526**	**73.281.895**	**149.430.421**	**85.416.166**	**80.304.068**	**165.720.234**

Appendix C: Top 10 airports in terms of cargo traffic

AIRPORTS	CARGO TRAFFIC (Ton)								
	END OF DECEMBER 2012			END OF DECEMBER 2013			END OF DECEMBER 2014		
	Domestic	International	Total	Domestic	International	Total	Domestic	International	Total
Istanbul Ataturk	N/A	N/A	N/A	44.360	586.319	630.679	45.596	682.888	728.485
Istanbul Sabiha Gokcen	N/A	N/A	N/A	3.545	29.340	32.885	4.618	34.828	39.447
Izmir Adnan Menderes	N/A	N/A	N/A	19.152	2.087	21.239	20.702	2.341	23.043
Ankara Esenboga	N/A	N/A	N/A	12.047	2.514	14.561	12.230	6.687	18.918
Trabzon	N/A	N/A	N/A	2.290	8.627	10.918	2.190	7.677	9.867
Antalya	N/A	N/A	N/A	5.041	1.598	6.639	5.590	2.278	7.867
Adana	N/A	N/A	N/A	5.907	186	6.093	5.774	410	6.184
Gaziantep	N/A	N/A	N/A	1.931	4	1.936	1.983	1	1.984
Diyarbakir	N/A	N/A	N/A	1.097	0	1.097	1.044	0	1.044
Samsun Carsamba	N/A	N/A	N/A	635	65	700	706	8	714
TURKEY TOTAL	N/A	N/A	N/A	**100.097**	**631.865**	**731.961**	**104.941**	**737.300**	**842.241**