

INVESTIGATION OF AIR TRAFFIC DENSITY IN ATATÜRK AIRPORT AND RECOMMENDATIONS

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ABSTRACT: It is known that air traffic demand has reached to distressful levels in Atatürk Airport of İstanbul and cramped conditions cause some serious problems concerning runways, terminals, park areas, and passenger entrances to facilities. It is possible to increase or improve the capacity of this airport by constructing a new runway with a minimum length of 3500 meters, and by introducing new terminals, park areas and passenger entrances to the facilities as a short term solution. In the medium term, the runway occupancy at Atatürk Airport should be shared with the airport of Kurtköy-İstanbul which is currently in the contracting phase. In the long term, new airports that will be constructed somewhere in the areas of Adapazarı and Çorlu must take over this occupancy. According to the available aircraft data, runways with a minimum length of 3500 m will be required in the airports that will be constructed besides Atatürk Airport in the near future.

KEYWORDS: Commercial Aircraft, Air Traffic, Atatürk Airport

ATATÜRK HAVAALANINDAKİ HAVA TRAFİĞİ YOĞUNLUĞUNUN İNCELENMESİ VE TAVSİYELER

ÖZET: İstanbul Atatürk Havalimanı'ndaki izdihamın gayet rahatsız edici dereceye eriştiği ve pist, terminal binaları, park sahaları ve tesislere yolcu giriş/çıkış mahallerindeki sıkışmaların ciddi sorunlara sebebiyet verdiği bilinmektedir. Kısa dönemde bu zorlukları aşmak ve bu havalimanının kapasitesini artırmak, uzunluğu en az 3500 metre olan yeni bir pist inşa etme ve tesislere yeni terminal binaları, park sahaları ve yolcu giriş/çıkış mahallerini ekleme suretiyle mümkün görülmektedir. Orta dönemde Atatürk Havalimanı pistlerinin iş yükünü ihale safhasında bulunan İstanbul Kurtköy'deki yeni havalimanı ile paylaşmak gerekli olacaktır. Uzun dönemde bu iş yükünü Adapazarı ve Çorlu civarında inşa edilecek yüksek kapasiteli yeni havalimanlarına aktarmak zorunlu olacaktır. Mevcut uçak teknik verilerine göre yakın gelecekte Atatürk Havalimanına ilave olarak inşa edilecek olan havalimanlarındaki pistlerin minimum uzunluğunun 3500 m olması gerekecektir.

ANAHTAR KELİMELELER: Ticari Uçaklar, Hava Trafik, Atatürk Havaalanı

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I. INTRODUCTION

In some major airports, runways, terminals, park areas, and passenger entrances to facilities are posing great problems because of cramped conditions. For example, primary airports of London, namely Heathrow and Gatwick [1], or Atatürk Airport in İstanbul are among these airports.

It is possible to partially increase or improve the capacities of these airports by introducing new runways, terminals, park areas and passenger entrances to the facilities. Governments are very well aware of the fact that efforts of extending runways or adding new runways to the airports particularly near the major residence areas are not tolerated at all as the public opinion can readily be controlled by ecologist movements. It is also possible to utilize new technologies to increase safety and reliability, such as the Intelligent Transportation Systems - ITS. These systems have been developed as a combined application of electronic, computer and electrical engineering in order to serve the current and future needs of people and public transportation. The term ITS covers the new and advanced branches of the technology such as traffic control, aircraft safety monitoring, emergency location transmitting, aircraft radar for prevention of the collisions [2].

Up to today, governments in Türkiye have been declaring that they support the long term objective which states commercial airports will be constructed in all provinces. In addition, according to protocol signed between Ministry of Transportation and Chief of General Staff, it is permitted that some air bases which belong to Air Force Command are also to be used for civil aviation purposes. In this manner, the need for additional airports can partially be met, and it will be possible to share the traffic density of Atatürk Airport which is in a very congested situation with the other airports in the vicinity of it. In Atatürk Airport of İstanbul, construction of a terminal on a build, operate and transfer - BOT basis as well as a World Trade Center was started in 1991. There will be four phases in the development of the terminal and a capacity of 24 million passengers and an area of 237,000 m² will have been put into operation at the end of the fourth phase.

Efforts of constructing a new runway with a minimum length of 3500 m which will present an important advantage are under the way. Another possibility would be to extend the 06/24 runway. However, expropriation of the required surrounding lands and

settlement areas as well as a considerable difference in the height between the tip of the available runway and the point to which the runway is to be extended shows us that it will not be an easy task to work these matters out for runway 06/24.

II. TRAFFIC OF ATATÜRK AIRPORT

In 1995, almost 125 different types of aircraft were landing on the 24 airports of Türkiye. In that year, the total takeoff and landing number (airport traffic) of these 25 types of aircraft has amounted to 348,449. Some 159,630 takeoff and landings out of this number which constitute 45.8 % of the total correspond to the traffic of Atatürk Airport. As understood from this fact, close to the half of commercial aircraft traffic of Türkiye takes place at Atatürk Airport. Each of the takeoff and landing activity of the 25 different types of aircraft which performed 80.2 % of the total traffic load at Atatürk Airport in 1995 is shown in Figure 1. Total number of commercial aircraft traffic amounted to 159,630 in the same year. Out of these, the share of the first five types of aircraft which precede the other aircraft in air traffic reaches 60.1 % of the total [3].

1.	Boeing 737	30.1 %
2.	Airbus 310	10.3 %
3.	Boeing 727	8.5 %
4.	Tu 154	6.0 %
5.	Airbus 320	5.2 %

	Total	60.1 %

The availability of only two runways and a shortage of the airport area are at the top of limitations related to the development of Atatürk Airport. However, there are also some solutions beside these limitations. As the first solution, dealing with the features such as mistakes, deficiencies, etc related to the use of available

runways should take precedence over other items. Secondly, various methods of improving the infrastructure and the operations required for the efficient use of runways should be implemented. Thirdly, it is proposed that the military facilities in Atatürk Airport should be turned over to the commercial aviation authority.

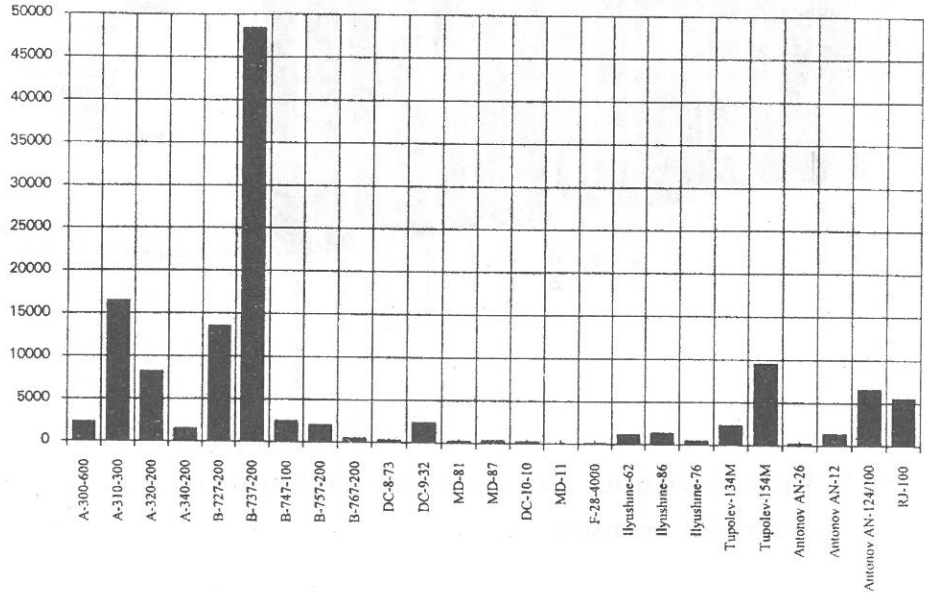


Figure 1. Distribution of a total number of 128,067 takeoff and landings performed by 25 different types of aircraft at Atatürk Airport in 1995.

As the fourth and last solution, in the medium term, the occupancy of runways which are currently being worked on within this study should be shared with the airport of Kurtköy-İstanbul which is in the contracting phase and in the long term, a significant portion of it should be transferred to the airports which will be constructed in the areas of Adapazarı and Çorlu.

RUNWAY LENGTH USAGE PERCENTAGE ACCORDING TO AIRCRAFT TYPE AND TRAFFIC
IN 1995

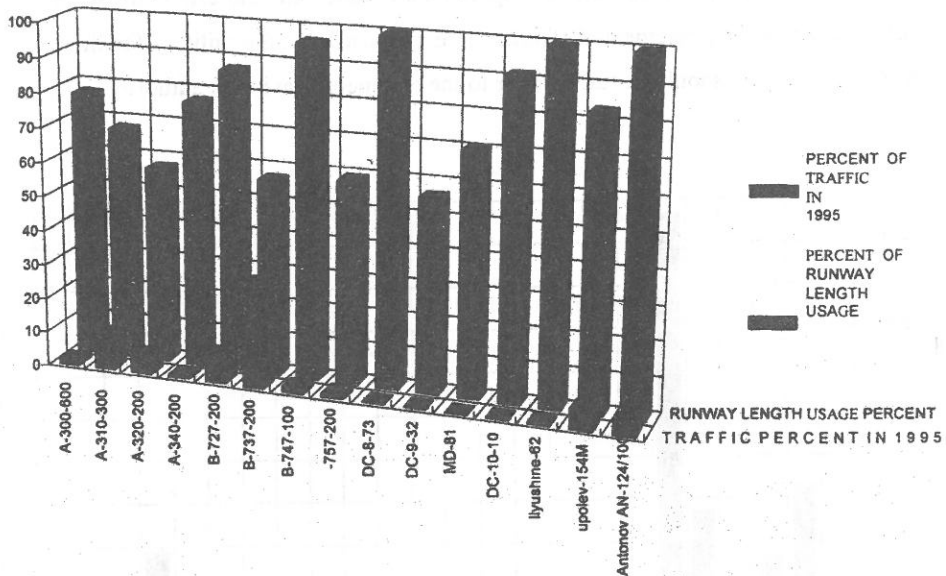


Figure 2. Percents of air traffic and usage of 3000 m runway for 15 types of aircraft which require long runways.

In 1995, 115,638 flights were performed at Atatürk Airport by the first 15 different types of aircraft which are able to land only at long runways. That number of flights constituted 72.4 % of the total commercial aircraft traffic in the same year. Runway length usage percent of these aircraft on the currently available runway of 3000 meters is presented in a bar-scale sense (Figure 2). In order to facilitate the usage, same data is given in Table 1 in the form of absolute numbers and also in Table 2 in the form of percentages.

Table 1. Air traffic and runway usage of the same aircraft [3-5]

MANUFACTURER	TYPE	AIR TRAFFIC IN 1995	RUNWAY USAGE (m)
Airbus Ind.	A-300	2265	2316
Airbus Ind.	A-310	16463	2031
Airbus Ind.	A-320	8283	1716
Airbus Ind.	A-340	1498	2316
Boeing	B-727	13600	2621
Boeing	B-737	48407	1707
Boeing	B-747	2515	2896
Boeing	B-757	2039	1768
McDonnell-Douglas	DC-8	304	3048
McDonnell-Douglas	DC-9	2402	1686
McDonnell-Douglas	MD-81	235	2110
McDonnell-Douglas	DC-10	253	2743
Russia	Ilyushine-62	1158	3301
Russia	Tupolev-154	9575	2499
Russia	Antonov AN-124	6641	3000

Having an air traffic percent of 72.4 % for aircraft which require long runways shows that runway length of Atatürk Airport came closer to a critical situation even today. As it can be detected from Figure 3 and Table 3; 5 types of the aircraft which require long runways constituted 60.3 % of total air traffic. These aircraft are B-727, Tupolev-154, A-310, A-320 and B-737. In particular, runway requirement of B-737 which constitutes 30.1 % of air traffic is 1707 meters. It is obvious that, aircraft of new technology should also be considered for future runway length requirements. By examining Table 3, it can be understood that runways with a minimum length of 3500 meters will be required in the airports of the future.

Table 2. Percents of air traffic and runway usage for the same aircraft

AIRCRAFT TYPE	AIR TRAFFIC PERCENT	RUNWAY LENGTH USAGE PERCENT
A-300	1,4	77,2
A-310	10,3	67,7
A-320	5,2	57,2
A-340	0,9	77,2
B-727	8,5	87,1
B-737	30,1	56,9
B-747	1,6	96,5
B-757	1,3	58,9
DC-8	0,2	100
DC-9	0,2	56,2
MD-81	0,1	70,3
DC-10	0,2	91,4
Ilyushine-62	0,7	100
Tupolev-154	6,0	83,3
Antonov AN-124	4,2	100

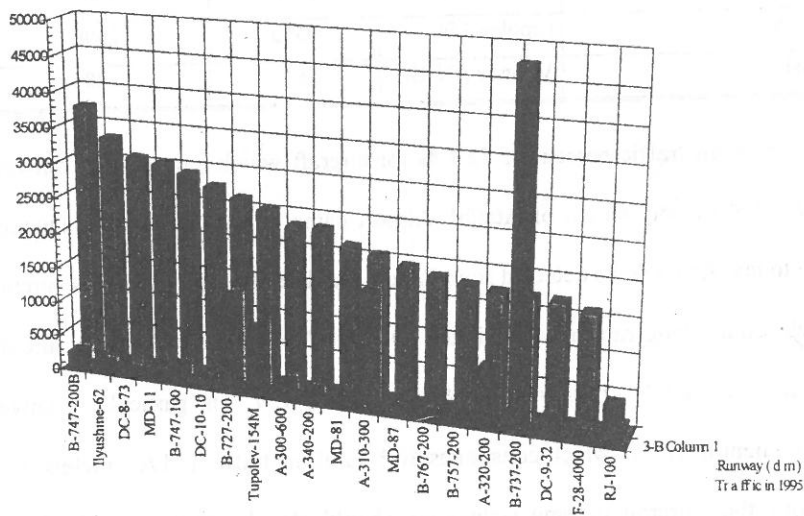
Running Distances of Aircraft (dm) and Traffic loads in 1995
(flight counts)

Figure 3. Runway usage (dm) and air traffic of 18 types of aircraft at Atatürk Airport.

Table 3. Air traffic and runway usage of aircraft which require long runways [3, 5]

AIRCRAFT TYPE	AIR TRAFFIC IN 1995	RUNWAY USAGE (dm)
Ilyushine-62	1168	33010
DC-8	304	30480
MD-11	31	29870
B-747	2515	28960
DC-10	253	27430
B-727	13600	26210
Tupolev-154	9575	24990
A-300	2265	23160
A-340	1498	23160
MD-81	235	21100
A-310	16463	20310
MD-87	337	19200
B-767	530	18290
B-757	2039	17680
A-320	8283	17160
B-737	48407	17070
DC-9	2402	16860
F-28	106	15850
RJ 100		11000
RJ 70		11000
C 47	566	9300
C 650	749	8840
C 340	664	2350
T 41	2073	1890
C 172 Skyhawk Fleet	2207	1710

III. CONCLUSION

Presently, there are no other really viable alternatives to Atatürk Airport in İstanbul, although it poses serious problems related to runways, terminals, park areas, and passenger entrances to facilities. Nonetheless, as a temporary solution, it seems possible to increase or improve the capacity of this airport by constructing a new runway 3500 m long, and by introducing new terminals, park areas and passenger entrances to the facilities. Within the scope of this paper, as a medium term solution, it is proposed to share the runway occupancy at Atatürk Airport with the airport of Kurtköy-İstanbul

which is in the contracting phase. As a long term solution, it will be imperative to transfer the major portion of the air traffic to the airports which will be constructed in the vicinities of Adapazari and Çorlu. After a technical scrutiny of the given aircraft data, it can be concluded that runways with a minimum length of 3500 m will be required in these future airports.

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