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An assessment of Turkish Airlines: Geographical location, fleet mix & international network

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Abstract

Istanbul-based Turkish Airlines (THY) is a major global carrier serving more international destinations than any other airline in the world, mostly from its new airport hub (IST). This paper aims to unpack and better understand this achievement by focusing on the airline's geographical location, fleet mix and international network scope. Although a range of other key metrics and/or factors could also generate valuable insights about THY, these three are particularly salient when it comes to explaining the number of international destinations it serves. Geopolitics would be a strong contender for inclusion here as well, although core competitors in the Gulf region and elsewhere share similar international relations, therefore, minimising the key insights available in this regard. The paper adopts a single case study approach whereby a deeper level assessment is made of the airline, including how these three core focal areas contribute to its global reach. Located at the point where Europe and Asia meet, Türkiye is home to over 80 million people, and has a significant domestic air market along with a thriving tourism industry. Operating a sizeable mixed fleet of narrow-body and wide-body aircraft, THY is able to capitalise on its home-base proximity to Europe, and its strong links further afield to North America and elsewhere, to create an extensive global network. Future potential growth exists into currently unserved air markets such as Australia (and the Southwest Pacific more widely), along with the expansion of its existing network in terms of capacity and frequency levels.

Keywords: Turkish Airlines; geographical location; fleet mix; network scope

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1. Introduction

Turkish Airlines (THY) is the flag carrier of Türkiye and is based out of its main hub at the new Istanbul Airport (IST). Turkish Airlines promotes itself as having "the world's biggest network" comprised of 340 destinations across 129 countries (THY, 2022a). The carrier's combined metrics of wide-body fleet, as defined in Ellis & Leib (2021), international destinations served and continents flown to, place it behind only Emirates Airline when benchmarked against other major global carriers. Although, if only international destinations are considered, Turkish Airlines would hold first place by quite some distance; 220 in 2019 versus British Airways (BA) next with 177, and Lufthansa in third place with 176 – Emirates Airline manages sixth position with 140 (Ellis & Leib, 2021). Turkish Airlines is a member of Star Alliance, the largest airline alliance in the world which extends the existing network of THY with codeshares, in addition to various bilateral codeshare agreements with non-alliance partners.

In terms of its geographical location, Türkiye is situated between East and West with a relatively large population and land area when compared to the rest of the world. In that perspective, Istanbul, as the hub of THY, is both an inbound and a transfer market internationally and regionally. In addition, geographical and demographic attributes present a big potential for the domestic market. Over the last two decades until the recent pandemic, the domestic air market has expanded with more than 24 new airports, while international traffic has boomed with more than 4.5-fold increase in international passenger numbers. Recently, Turkish Airlines moved to one of the biggest airports in the world, to support an ambitious global network expansion strategy. For any airline, geographical location is the first environmental factor that can shape their strategy and fleet mix. For THY, the geographical location presents various potential strategies. The aim of this paper is to assess how THY structures its fleet and global network strategy given the unique geographical location as well as exploring the implications of operating from the new hub. In this context, the advantages and disadvantages of the strategy that THY is following fleet utilization and network scope are revealed based on the location of its hub airport when considered other strategies and competitors.

2. Unpacking the case of Turkish Airlines

Single airline case studies are common in air transport research, with examples including Azul Airlines in Brazil (Oliveira & Oliveira, 2022), Emirates in the United Arab Emirates (UAE) (O'Connell, 2011), British Airways in the United Kingdom (UK) (Grundy & Moxon, 2013), and Singapore Airlines in Singapore (Heracleous & Wirtz 2009). Likewise, individual air market case studies have focused on national contexts such as PR China (Zhang, Yang, Wang & Zhang 2014) and Australia (Mohammadian, Abareshi, Abbasi, & Goh, 2019) and elsewhere. Single aviation jurisdictions like Taiwan (Lu, 2017) are also evident, and so are wider regions like Northeast Asia (Zhang & Zhang, 2021) and Europe (Ellis, 2020).

Turkish Airlines has received some scholarly attention in recent years; for instance, investigations into the development and progress of its business model (Adiloğlu-Yalçınkaya, & Besler, 2021), an assessment of delays across its network (Aydemir, Seymour, Buyukdagli & Guloglu, 2017), and explorations and analyses of its transformation over the first decade or so of the twenty-first century (Dursun, O'Connell, Lei & Warnock-Smith, 2014). This relatively limited amount of academic research broadly mirrors other major airlines based in emerging air markets, in particular the three major Gulf carriers, and is in contrast to the mature and long-established air markets in Europe and North America where data availability is not such a challenge (Aquilina-Spagnol, Ellis & Pagliari, 2020).

3. Corner of Europe and edge of Istanbul

Türkiye spans both Europe and Asia, and provides literally a bridge (or more accurately bridges) between two continents. This geographical location, especially that related to Türkiye's largest city and corresponding airport Istanbul (IST), reflect a position on the south eastern edge of Europe, the south western corner of Central Asia and the north eastern tip of the Middle East. The new airport is just over 50 kilometres from the centre of Istanbul.

3.1. Proximity advantages & long-haul challenges

Istanbul's proximity to Western Europe provides a wide range of opportunities and geographical location advantages to operate a large fleet of narrow-body aircraft across an extensive European network. Rather than an hour-glass shaped international network of predominately long-haul to long-haul services linking east/west traffic flows (and vice versa) like the three major Gulf carriers, Turkish Airlines instead has much of its network short-haul to long-haul (and reverse). This international network structure is primarily a function of its geographical location. Nevertheless, Turkish Airlines like the three major Gulf carriers is able to build a global network based on the bilateral system, whereby country-to-country air service agreements (ASAs) underpin its network structure (Douglas, 2019).

While it is recognised that Istanbul's geographical location – and Türkiye more generally – provides advantages to the national carrier, markets such as the Southwest Pacific/Oceania including key cities in Australia and New Zealand, have proved beyond its reach to date, a little too distant to warrant non-stop (or even one-stop) services on THY's own aircraft. Even so, ultralong-haul services by other carriers including Qantas, Emirates and Qatar Airways demonstrates the technical feasibility of such routes.

Another impact of the country's geography involves its population size with just over 85 million citizens. While this presents an opportunity to serve the large domestic market within Türkiye, the allocation of resources between international hub traffic and domestic traffic defines the overall network strategy of THY. Logothetis and Miyoshi (2018) summarise this conundrum as "contrary to the UAE and Dubai, Turkey has a huge domestic market, and Istanbul is a big outbound market. As a result, Turkish has followed a 'hybrid' network strategy, split between the ambition to serve these markets and also to increase the share of its transfer passengers" (p. 222). As of 2021, 28% of passengers are inbound/outbound international passengers, 27% of passengers are international connecting passengers, and 45% is domestic passengers. In 2008, THY started operating AnadoluJet as a lower-cost alternative for domestic routes in Turkiye with hubs in Ankara Esenboga Airtport (ESB) and Istanbul Sabiha Gokcen Airport (SAW). This helped to relieve the pressure of diverting resources to the domestic market for THY, and the relative number of international connecting passenger increased in consequence.

3.2. A grand new home

For many years Istanbul Ataturk airport served Turkish Airlines as a network hub. However, limited options to increase capacity due to its geographic location prompted the Turkish Government to consider options for a new greenfield airport. It had become apparent that Ataturk airport could no longer, given its size and surrounding physical constraints, fulfil the future network expansion ambitions and customer service expectations of the national carrier. The Government eventually approved the construction of a new international gateway under a 25-year Build-Operate-Transfer (BOT) contract awarded to the consortium Istanbul Grand Airport (IGA or iGA) (Sengur, 2020). It was completed at a cost of $11bn in 2018. The transfer of operations from Ataturk to the new airport, some 54 kilometres northwest of Istanbul city centre, was completed by the summer of 2019, including also the transfer of its IATA code IST.

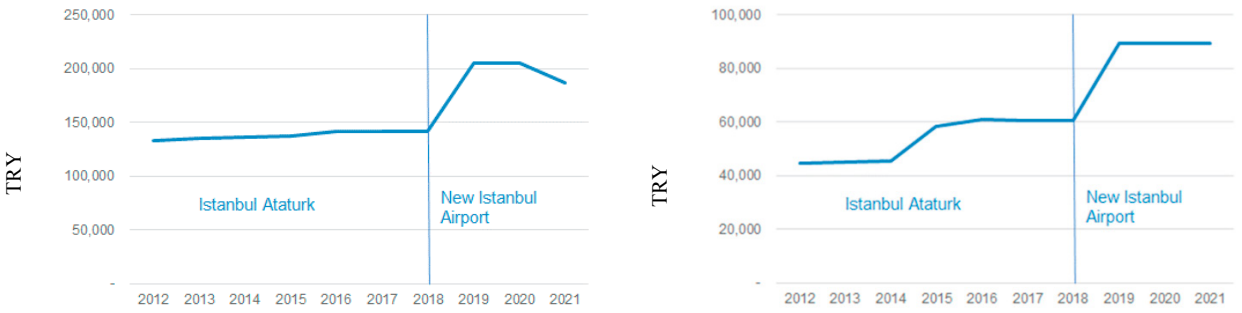
The new airport is important to Turkish Airlines, accounting for 40% of the airline's total network available seat kilometres (ASK) in 2021. A large proportion of costs that relate to the carrier's use of IST include the payment of fees relating to the use of infrastructure such as runway, taxiways, passenger terminal systems and facilities, otherwise known as aeronautical charges. It is not possible to obtain separate data on how much Turkish Airlines pays in aeronautical charges at IST, as the carrier only publishes an aggregation of the costs incurred at airports served across its entire domestic and international network. Table 1 below provides information on a range of metrics linked to Turkish Airlines expenses relating to airport aeronautical charges for each year in the period 2015-2021.

Table 1. Information on airport aeronautical charges paid by Turkish Airlines (Sources: THY, 2021, THY, 2019, THY, 2017 & THY, 2015)

Year	Aeronautical charges costs (US$m)	Aeronautical charges as % of total costs	Average aeronautical charges costs per landing (US$)
2015	408	4.17%	885.98
2016	410	4.42%	942.56
2017	448	4.61%	970.39
2018	469	4.40%	1,005.74
2019	514	4.93%	1,228.04
2020	623	4.34%	1,310.65
2021	315	5.40%	1,422.22

The effects of transferring operations to the new airport are quite noticeable across three very different metrics (Table 1). The total amount paid in airport charges expenses increases by 21% between 2018 and 2019. The ratio of charges expenses to total costs increased from 4.4% to 4.9% during the same period (i.e. by 12%). Average aeronautical charges costs per landing incurred by Turkish Airlines actually went up quite significantly between both financial years by a factor of 22%. While these metrics encompass network-wide operations, given the significance of the carrier's operations at IST, in terms of scale relative to other airports, it would be reasonable to speculate that the increases were mainly attributed to the effects of higher charges incurred at IST.

It is possible to expand this analysis to compare aeronautical charges incurred before and after the transfer of operations between airports. The turnaround cost approach allows for the accumulated costs (from different charges based on published tariff schedules) incurred in aeronautical charges for a selected aircraft operation (arrival followed by departure) with fixed assumptions relating to ground time, aircraft-type and passenger load factor. Figures 1a and 1b below show the turnaround costs over the period for two well represented aircraft types in the THY fleet, the 777-300ER and the 737-800.



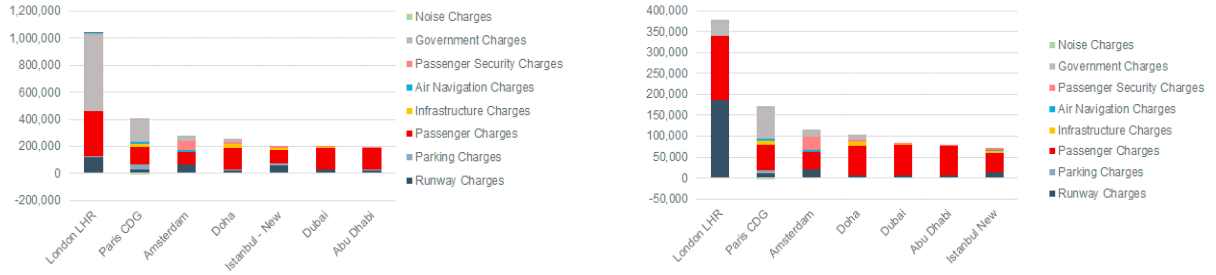
(a) Boeing 777-300ER* (b) Boeing 737-800**

Fig. 1. (a) Turnaround costs for Boeing 777-300ER at Istanbul Ataturk 2012-2018 and the New Istanbul Airport 2019-2021 in Turkish Lira (TRY). (b) Turnaround costs for Boeing 737-800 at Istanbul Ataturk 2012-2018 and the New Istanbul Airport 2019-2021 in Turkish Lira (Source: RDC Aviation database, 2022)

Turnaround assumptions based on International Long-haul service, 3 hours turnaround (ground) time, MTOW (Maximum Take-off Weight) of 352 tonnes, 80% load factor (279 passengers) Turnaround assumptions based on International short-haul service, 1 hour turnaround (ground) time, MTOW (Maximum Take-off Weight) of 78 tonnes, 80% load factor (129 passengers)*

Figures 1a and 1b both indicate that there was a marked increase in the total turnaround costs by 45% and 48% for the long-haul and short-haul operations respectively when comparing the last year at Ataturk with the first full year at IST. To what extent, therefore, does an increase in charges of this magnitude affect the cost competitiveness of the

national carrier? Given that the contribution of charges to total expenses was less than 10% in 2021, to what extent did the increase in charges incurred as a result of operating from the new airport affect the competitiveness of the airline relative to its principal peers? Aeronautical charges turnaround costs at IST are compared with a selection of comparably sized hubs with the same aircraft and operating assumptions as the historic analysis (Figures 2a and 2b).



(a) Boeing 777-300ER (b) Boeing 737-800

Fig. 2. (a) Turnaround costs for Boeing 777-300ER at selected international hubs 2022 in Turkish Lira. (b) Turnaround costs for Boeing 737-800 at selected international hubs 2022 in Turkish Lira (Source: RDC Aviation database, 2022)

Despite incurring higher costs compared to when operations were based at Ataturk Airport, Turkish Airlines, at least in terms of aeronautical charges, appears to enjoy a significant airport cost advantage relative to three other significantly sized European hubs (London LHR, Paris CDG, Amsterdam). Indeed, turnaround costs at IST are very similar to those at Dubai (DXB) and Abu Dhabi (AUH), the hubs of Emirates and Etihad respectively. Furthermore, Turkish Airlines incurs aeronautical charges costs relating to the B777-300ER and B737-800 respectively that are 20% and 30% lower at IST relative to Doha (DOH), home base of Qatar Airways, and an airport that is also relatively new having opened in 2014.

Aeronautical charges at all Turkish airports are set by the state-owned airports and air traffic management authority, the General Directorate of State Airports Authority (DHMI). DHMI operates a two-tier aeronautical charging structure with one framework levied at its own managed airports and the other applied to those under PPP concession contracts including IST. Aeronautical charges in Turkey do not appear to be set with reference to the recovery of local airport operating and capital costs, an approach that is actually quite common internationally. For example, the respective civil aviation authorities of China PR and Malaysia set aeronautical charges within their jurisdictions independently of local airport costs. This contrasts with Western Europe where charges are set by airport operators with reference to airport costs.

This perhaps explains why carriers such as Emirates and Turkish are able to enjoy a substantial cost advantage over airlines such as British Airways and Air France. London LHR, Paris CDG and Amsterdam airports are subject to regulatory regimes where they are permitted to fully recover efficient costs through aeronautical charges. The low levels of charges at IST, in particular, indicates that aeronautical charges only recover a very small proportion of the airport's costs. Government taxes on airline tickets also plays a significant role in airline competitiveness. Per passenger taxes are especially high at London Heathrow (LHR) and non-existent at IST, DXB and AUH.

4. Fleet mix

Turkish Airlines operates a mixed fleet of narrow-body and wide-body aircraft by two manufacturers, Airbus and Boeing. As of June 2022, THY operates a total of 360 passenger aircraft with an average age of 8.7 years as shown in Table 2. This relatively young fleet includes 71% narrow-body aircraft, and 29% wide-body aircraft, with seat capacities of 44,000 and 33,000 respectively. As a full-service carrier, there are various configurations of each aircraft type in the fleet, notably older aircraft, though newer aircraft (24% of the fleet) do have common configurations.

Table 2. Fleet mix of Turkish Airlines as of June 2022 (Source: THY, 2022b)

	Total	Owned	Financial lease	Wet lease	Average age	Seat capacity	Range (km)
A319-100	6	1	5	-	11.1	792	6,850
A320-200	11	11	-	-	14.3	1,700	6,100
A321-200	66	28	34	4	9.9	12,100	5,600
A320NEO	33	-	25	8	2.1	6,000	7,400
Boeing 737-800	92	28	28	36	12.6	15,900	5,436
Boeing 737 MAX 8	26	-	20	6	1.8	4,100	6,570
Boeing 737 MAX 9	5	-	5	-	1.3	800	6,570
Boeing 737-900ER	15	-	15	-	9.1	2,400	5,925
Total/Average	254	68	132	54	9.0	43,792	
A330-200	13	5	-	8	14.4	3,500	13,400
A330-300	37	-	29	8	8.4	10,800	11,750
A350-900	8	-	8	-	1.0	2,600	15,700
Boeing 787-9	15	-	15	-	2.4	4,500	14,140
Boeing 777-300ER	33	5	22	6	8.6	11,700	12,000
Total/Average	106	10	74	22	7.8	33,100	

In terms capacity, almost 66% of ASKs are generated by wide-body aircraft mainly shared between Boeing 777-300ER and Airbus A330 variants. With narrow-body aircraft, 35% are generated by Boeing 737 variants and 65% are generated by Airbus A320 family aircraft (Figure 3).

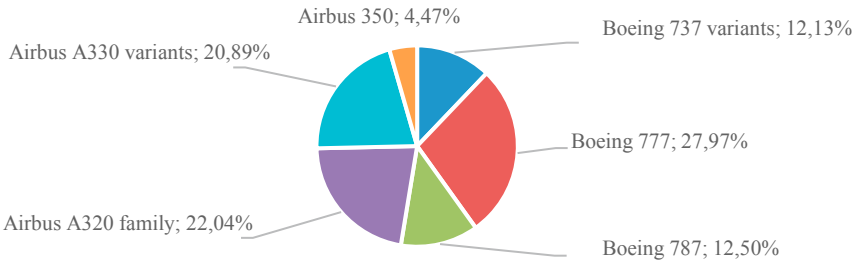


Fig. 3. Share of ASK per aircraft type (Source: OAG, 2022)

The allocation of narrow-body and wide-body aircraft to different regions is presented in Figure 4. When the destination of each aircraft type is considered, it can be observed that many destinations in domestic, European, African, and Middle Eastern regions can be served by narrow-body aircraft.

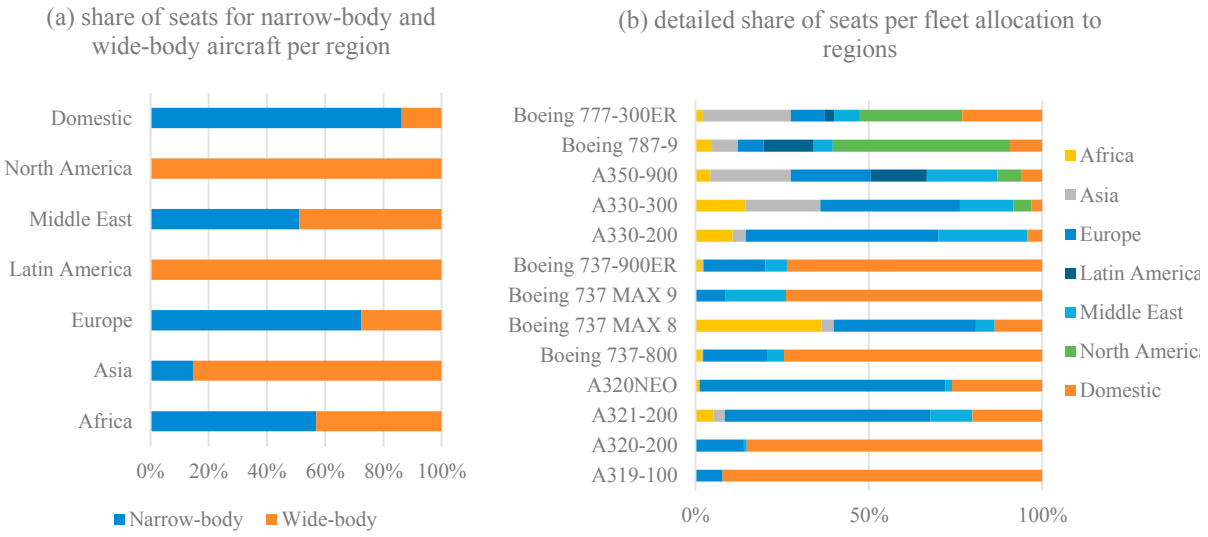


Fig. 4. Fleet allocation to regions based on number of seats offered (Source: Author based on data from OAG, 2022)

5. Network scope

As noted, Turkish Airlines serves the most international destinations of any airline in the world. The geographical location of Istanbul Airport, the main hub of THY, presents an advantage for connecting traffic. As of June 2022, the number of international destinations THY serves include 209 airports in 111 countries from the new Istanbul Airport (IST) (OAG, 2022). Out of 209 airports, 41% of destinations are based in Europe, followed by Africa and Asia with 21% and 17% respectively excluding domestic destinations in Turkey (Figure 5).

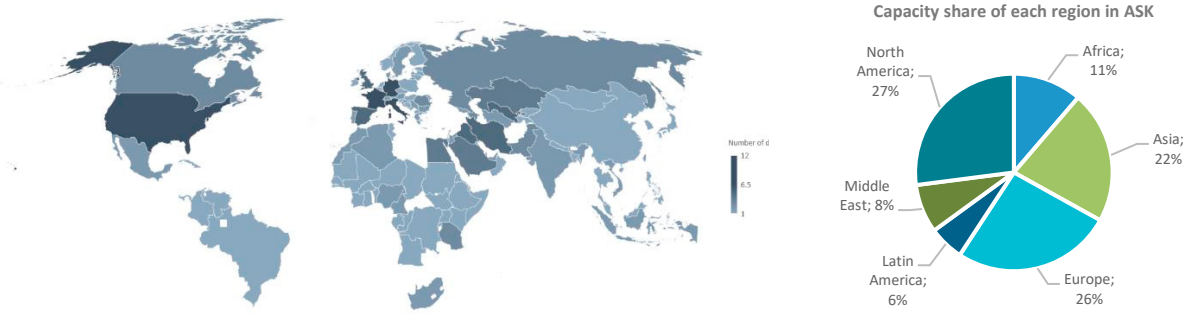


Fig. 5. Number of destinations per country and the capacity share of each region in ASK (Source: Author based on data from OAG, 2022)

In terms of capacity allocated to each region with regards to number of seats, with around 36% of the seats offered by THY in June 2022, Europe seems to be the focus, with the advantage of being able to utilise narrow-body aircraft to all destinations in the region. Within the dataset included, a narrow-body aircraft was utilised in 82% of all flights to/from Europe out of 10,851 flights in June 2022. Figure 6 presents the international routes to Europe, Asia, and Africa regions with narrow-body (a) and wide-aircraft (b). The utilisation of narrow-body aircraft provides shorter turnaround times and relatively higher flexibility in terms of scheduling, especially for destinations with higher seasonality or uncertainty, which could be essential for connecting passenger allocations and estimations. This helps to enhance and optimise the feed to IST for further connecting flights to other regions.

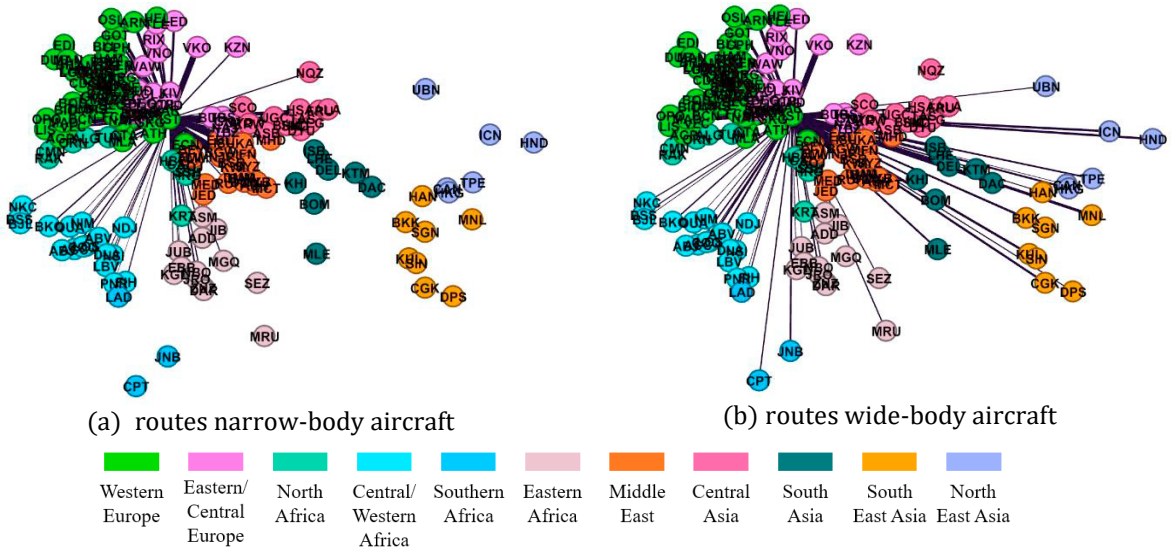


Fig. 6. Narrow-body (a) and wide-body (b) aircraft utilisations in European, African, and Asian regions (thickness and colour represents number of seats offered by respective type of aircraft). In a bigger picture context, as of June 2022, there were total of 154 destinations out of 209 airports globally (about 74%) served by a narrow-body aircraft accounting 52% of all seats and 66% of all flights offered by THY (Source: Author based on data from OAG, 2022).

Having access to all European destinations within a 5-hour flight time, THY can potentially offer 3,655 unique connections between airports in Europe and Africa, and 2,975 unique connections between airports in Europe and Asia within about a 20-hour window. These two connections to/from Europe represent 51.1% of all seats offered by THY as of June 2022 (Table 3). These connections are utilised through a convenient peak hour allocation to maximise number of possible connections within a short-period of time. Figure 7 presents a snapshot of the banking structure of IST mostly feeding east bound (Africa, Asia, and Middle East) and west bound (Europe, North America, and Latin America) flights.

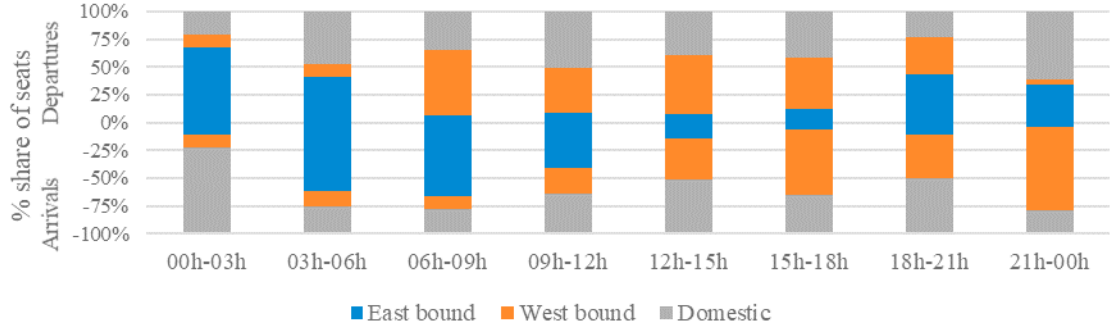


Fig. 7. Percentage share of number of seats offered per region from IST at different times over the first week of June 2022. The negative values represent the share in arrivals, while the positive values represent the departures (Source: Author based on data from OAG, 2022)

In comparison, a close competitor in region, Emirates, provides opportunities to connect 777 destinations between Europe and Africa, and 1221 unique connections between Europe and Asia. However, the comparison differs when capacity allocation is considered for these regions in terms of the number of seats. The share of the number of seats offered by Emirates for these regions represents 75% of all seats offered by the carrier as of June 2022. In terms of number of seats, Emirates provides more than twice the capacity of THY for Asian routes, while THY has almost

twice the seat capacity for European routes (Table 3). The focus of Emirates' strategy includes connecting hub traffic from their DXB hub. With the increased capacity, the new airport in Istanbul should provide the necessary infrastructure for THY expansion to capture and create more connecting traffic mainly between Europe and Asia, as well as Europe and Africa.

Table 3. Comparison of THY (excluding domestic market) and Emirates based on number of seats, total ASKs, number of flights, and total destinations per region for the month of June 2022 (Source: Author based on data from OAG, 2022).

	Total seats			Total ASK in millions			Total flights			Total destinations		
Region	**TK**	**EK**	**TK - EK**	**TK**	**EK**	**TK - EK**	**TK**	**EK**	**TK - EK**	**TK**	**EK**	**TK - EK**
Africa	411,177	515,532		1,583	2,411		2,054	1,332		43	21	
Asia	507,421	1,268,965		3,053	4,643		1,776	3,384		35	33	
Europe	2,114,214	1,324,851		3,672	6,476		10,851	3,041		85	37	
Latin America	76,680	30,960		806	378		240	60		7	1	
Middle East	583,101	511,692		1,118	615		2,658	1,352		24	14	
North America	413,076	302,950		3,793	3,624		1,270	722		15	12	
Southwest Pacific	-	176,040		-	2,029		-	360		-	4	

Turkish Airlines has gradually expanded their west-bound and east-bound flights over the last decade. Considering the peak time before COVID-19, between 2011 and 2019, there were 29 new destinations to Europe, 25 new destinations to Africa, 15 to Asia, six to North America, four to Middle East, and three to Latin America, all added to the network from Istanbul (Figure 8a). This represents a 128% increase in the capacity offered for international flights in terms of ASKs for the same period. In the same period, the capacity offered in the domestic market increased 58% (Figure 8b).

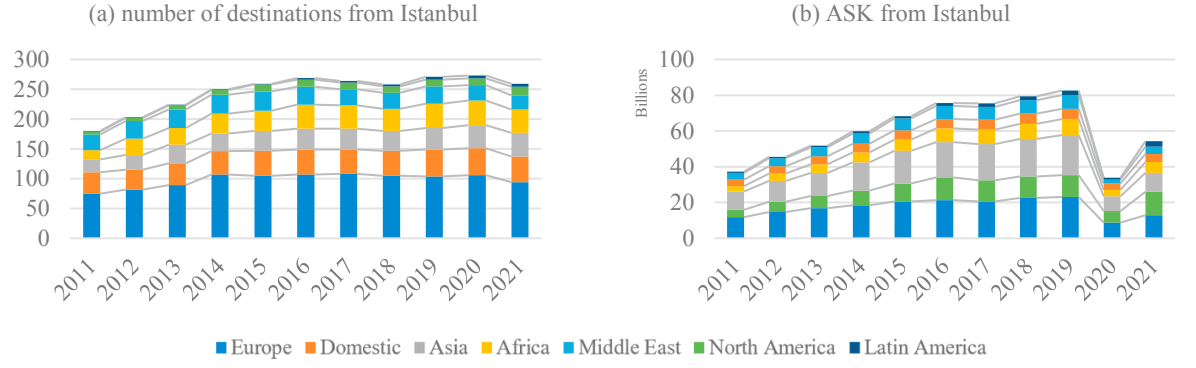
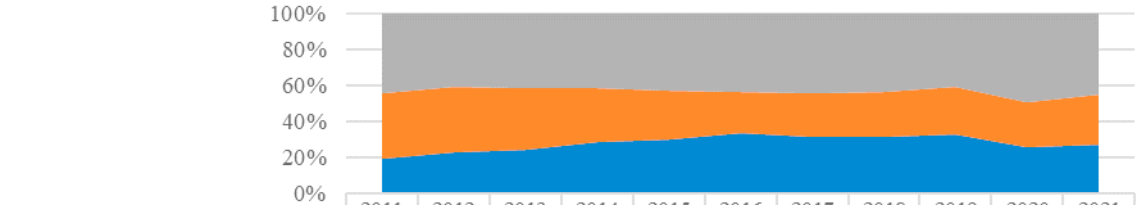


Fig. 8. Growth of network and capacity between 2011 and 2019 per region. In terms of network expansion, the biggest difference over the 10-year period is observed with new destinations in Asia region with 71% increase. In terms of capacity offered in ASKs, the fastest growing destinations are in Latin America with CAGR of 15%, followed by Africa and North America respectively. (Source: Author based on data from OAG, 2022)

The geographical location and fleet mix of Turkish Airlines fit very well with a strategy focused on connecting passengers. While the domestic market has further potential to develop with a population of over 85 million, connecting passenger traffic has been increasing steadily over the last decade (Figure 9). The number of international-to-international (int-to-int) connecting passengers increased threefold between 2011 and 2019. The share of int-to-int connecting passengers was almost half of all international flights, representing 55% of all scheduled Turkish Airlines flights in 2021. Similar to other airlines during the COVID-19 pandemic, the share of domestic short-haul flights increased, but the trend also indicates a recovery for international traffic. Even though the recovery of int-to-int connecting passenger is not as fast as the other markets, the strategy focus and its presence at the new Istanbul airport should help support future growth in the connecting passenger market volumes of THY.



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Dom pax (`000)	14,488	15,906	20,053	22,708	26,304	27,301	30,130	32,944	30,438	13,827	20,144
Int pax exc. connecting traffic ('000)	11,911	14,148	16,600	16,403	16,559	14,526	16,741	18,783	19,501	6,822	12,522
Connecting pax (int-to-int) (`000)	6,249	8,991	11,615	15,564	18,385	20,931	21,746	23,441	24,337	7,301	12,122

Fig. 9. Growing share of international-to-international connecting passengers in Turkish Airlines operations. (Source: THY, 2011 to 2021)

6. Concluding remarks

Turkish Airlines holds the laudable position of being the airline with the most international destinations in the world. This reality is underpinned by geographical location, its fleet mix and a network scope heavily reliant on European traffic, including feeder traffic for international-to-international transfers. The carrier also has a strong position in the substantial domestic air market. The extensive network reach, and the flexibility when serving one of the major markets for connecting passengers in Europe, provides the opportunity for THY to utilise one of the biggest airports in the world in Istanbul. When compared to Emirates, with its all wide-body fleet, THY's network extends to a wider coverage of destinations. Though Oceania, particularly Australia, remains out of reach to date, new ultralong-haul services by the likes of Qantas suggest that THY's growth and expansion has significant potential in future, along with clear scope to grow in North America and Latin America, and elsewhere. There appears no real imminent competitive threat from any other airline in the world which is likely to wrest away THY's proud status as the carrier with the greatest number of international destinations – a status aptly held by a country, and indeed an airport and a city, literally connecting two continents.

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