

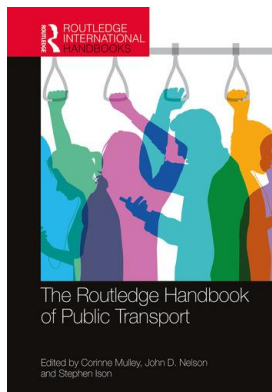
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### Air passenger services

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## AIR PASSENGER SERVICES

*Lucy Budd and Stephen Ison*

### **Introduction**

Air passenger services concern the branch of commercial air transport activity which involves the aerial conveyance of people in exchange for revenue. With the exception of sightseeing flights that are undertaken for recreation and pleasure, by far the majority of commercial air passenger services are a derived demand in that people fly because air travel is the quickest and, in some cases, cheapest and safest way to travel between where they are and where they need to be. The motivation to undertake air travel could be a professional obligation to conduct a business-related activity or to pursue a potential employment opportunity or a personal desire to go on vacation or visit family and friends overseas. Over the last 100 years, rapid advances in aircraft design and technology have progressively improved in-flight safety standards and reduced airline operating costs, while changes in the global regulatory regime of aviation have increased competition and changed the nature of air passenger service provision. As a result, passenger travel by air has swiftly evolved from being an elite and elitist mode of transportation that was accessible only to society's most affluent and politically influential members into a mass mode of mobility used by over 4.5 million tourists, migrants, business travellers, families and students on an annual basis.

This chapter considers the global heterogeneity of publicly available air passenger services, defined as aircraft which are available for use by fare-paying members of the public. This definition purposefully excludes private business aviation flights which are operated by aircraft not available for public hire as well as military flights and specialist charters. The chapter explores both the derived demand nature of passenger air services and the supply side, in terms of airlines, airports and airspace. Issues of air service provision and social in/equity, the geographical distribution of flights and developments in airline business models which have stimulated unprecedented growth in demand for flights in many world regions will be discussed. It concludes by considering future constraints and challenges to growth, including growing environmental awareness and changing patterns of consumer behaviour.

### **Demand for air passenger services**

The demand for air passenger services arises from a need for people to travel quickly, safely and relatively cheaply between geographically distant locations. In a little over a century since

the first scheduled passenger flight across Tampa Bay in Florida in 1914, air travel has developed into the dominant mode of rapid long-distance (and particularly international) passenger mobility. In common with most other forms of non-recreational surface transport, air transport is a derived demand in that the demand for aerial transport arises from a human need to be somewhere else and not from any particular desire to fly. Although many of the earliest innovations in aircraft design were primarily intended for military application, pioneering aviators and aeronautical engineers quickly appreciated that one of the easiest and quickest ways to generate additional revenue to fund further development was by making aircraft available for public use and charging a fee for the aerial conveyance of passengers, their luggage and cargo. However, the capital-intensive nature of these early services meant that many private independent airlines operated at a loss, and, in an effort to ensure continuity of operations and the development of a coherent network of air services, small independent carriers were subject to compulsory purchase and mergers to create a single state-owned airline company. In the United Kingdom, the state-owned Imperial Airways, which commenced scheduled operations in 1924, was formed from four independent operators.

From the late 1920s onwards, when state-owned European airlines began developing long-haul air routes from European capitals to the furthest reaches of their country's respective empires, the demand for air services was often derived from a political desire to demonstrate the capacity, capability and competence of the nation to operate such services as well as the need to rapidly convey military and diplomatic personnel overseas to suppress any potential threats to imperial rule (see McCormack, 1989; Pirie, 2004). Despite many decades of independence, the colonial legacy can still be observed in the primacy of Air France in services from Europe to Francophone West Africa and the Indian Ocean; KLM to the Far East and Indonesia; Iberia to South America and British Airways to North America, parts of the Caribbean and India.

By the late 1940s, the global pattern of international air routes that had emerged was a curious collection of services that reflected not only the political and, increasingly, the commercial demands of an emerging modern world order but also the limitations of contemporary aircraft design and technology. The limited range of the first generation of piston and propeller aircraft necessitated that multiple refuelling and rest stops were built into the schedules, and the first generation of aircraft capable of trans-oceanic flight were reliant on the provision of refuelling facilities at strategically important airfields, including Anchorage (Alaska), Gander (Canada) and Shannon (Republic of Ireland). Although the continued evolution of aircraft has meant these locations can now be overflowed with ease, the contemporary patterns of demand for air services continues to reflect the historical dominance of world cities as leading centres of trade and diplomatic power.

The city of London, for example, had developed into one of the most aerially interconnected cities on earth by the end of the 20th century. This was due, in part, to the city's geographical location between the Old and New Worlds but also owing to its function as a major international centre of trade and commerce and hence the location of choice for international firms and regulatory agencies who required a presence in Anglophone Europe. By the beginning of the 21st century, demand for air travel was additionally being driven by a growing middle-class urban population, while regulatory reform in key markets (beginning in the United States in the late 1970s before spreading to Europe and other key markets from the 1990s onwards) made the global market of air transport services more competitive and stimulated innovation in airline business models and service offerings.

The rise of the low-cost (or no-frills) carrier, which occurred in the United States from the 1980s and Europe and other world markets from the mid-1990s onwards, saw a new type of airline take advantage of the new regulatory environment. These carriers only provided the

minimum necessary for safe and cheap flight, revolutionised air travel and transformed it from an expensive mode of transport that was only available to society's most affluent and privileged members into a mode of mobility that was increasingly accessible to a growing proportion of the world's population. The attraction of low(er) airfares stimulated unprecedented demand for air travel, much of it from previously underutilised regional and secondary airports that had hitherto handled only modest levels of air traffic (see also Chapter 6). These airports enticed low-cost airlines to operate from them with the promise of cheaper and uncongested facilities as well as offers of support with marketing and promoting the new flights. Clearly, the success in attracting passengers is dependent in no small measure on the availability and relative price of competing modes. For example, the decision to undertake a relatively short journey in the United Kingdom by air is impacted by the time taken and the cost of rail travel. The advent of HS2 is most likely to make some internal flights less desirable.

The relaxation of regulatory controls governing freedom of market entry and exit and the removal of government intervention with respect to fares, capacity and route selection led to rapid expansion in the airline sector and a period of unprecedentedly low airfares as multiple new operators entered the market and sought to undercut the ticket prices charged by rivals. As a consequence of intense competition and the relentless downward pressure on prices, the rapid emergence of new operators was soon followed by a period of consolidation as many of the new entrant operators either ceased trading and exited the market as a consequence of bankruptcy or were purchased and merged with larger competitors. The dominant low-cost operators that remained, including Southwest and Spirit in the United States, easyJet and Ryanair in Europe, Gol and Sky in South America, IndiGo and SpiceJet in India and JetStar and Air Asia in Australasia and the Far East, were able to stimulate and sustain demand for lower-fare point-to-point travel between a wide range of often secondary or regional airports and appeal to a wide and price-sensitive customer base. Secondary airports were, in some cases, able to offer marketing support and other financial incentives to airline operators such as an inducement to them to operate new routes. These incentives typically ranged from discounts on passenger handling fees to waived landing charges for certain types of aircraft.

In addition to meeting a latent demand for cheaper air travel, the new low-cost airlines sought to stimulate additional demand for their services and grow their market share through extensive marketing activities. Developments in mobile telecommunications and the internet from the mid-1990s onwards offered a new medium of communication, and airlines were quick to develop marketing activities using these new digital channels (see also Chapter 25). Interestingly, even though the media and the messages contained within airline marketing copy have changed since the first airline advertisements appeared in the 1920s, the advertisements have continued to generate demand for air travel by suggesting either the pleasurable consumption experiences which can be obtained by flying (usually abroad) to exotic or exciting foreign destinations and travelling on a particular airline (Budd, 2012). In the regulated era, airline marketing copy typically featured stylised images of culturally familiar landmarks, such as Big Ben in London, Paris's Eiffel Tower, San Francisco's Golden Gate Bridge or Sydney's Opera House, or visual compositions which explicitly alluded to the local culture, climate and/or cuisine that could be accessed by air, and price and service rarely featured. Deregulation permitted airlines to compete on price and service for the first time, and a second distinct group of airline advertisements emerged. These provided tangible cues to the airline's service offering by describing and/or depicting the facilities in the business class lounge, the dimensions of the aircraft seat, the extensive training undertaken by engineers and flight crew and the attentive nature of the cabin crew. The most recent promotional activities involve passengers and potential customers co-creating content and actively participating in the creation of brand knowledge. There

are a number of challenges of generating demand for air travel through marketing, and these challenges result from the fact that public transport (and air transport is no exception) exhibit a number of distinct characteristics. These are explored in the next section.

### ***Characteristics of air passenger services and their relationship to marketing***

Air passenger services have a number of distinct characteristics which result from the fact that all airlines essentially offer the same thing, namely safe aerial transport from A to B. However, the service that is provided, as well as the price and nature of the product, varies significantly from cramped low-cost 'no-frills' flying to high-fare luxurious premium cabins featuring private suites, personal butlers and Michelin-starred cuisine. The price, product and promotion of these services are important features of airline differentiation, marketing and brand positioning.

In common with other forms of public transport, four key characteristics of air passenger services can be identified:

- 1 They are intangible. All airline services are performances which involve complex interactions between numerous human and non-human actors. These performances cannot be stored in an inventory, handled or quality checked before purchase, as every flight is unique. The intangible nature of these services means that they are difficult to display and communicate. In response, airlines seek to emphasise tangible cues to their service and encourage word-of-mouth recommendation.
- 2 They are heterogeneous. This means that there is potential for significant variation in service performance between flights, even if those flights feature the same combination of crew, aircraft and in-flight service offered. Airlines have sought to impose an element of service control by obliging customer-facing staff to wear standard uniforms, adhere to strict standards of appearance and bodily presentation and deliver consistent and scripted service performances. This corporeal control also extends, to a certain extent, to passengers, with airlines detailing appropriate and acceptable forms of dress and behaviour in their terms and conditions of carriage. This includes wearing shoes and clothing which covers the torso and not wearing clothing featuring slogans likely to cause offence or clothes which are considered revealing or offensive. The list of potential sanctions and punishments for infringement typically includes the right of the airline to remove a passenger from a flight and lifetime travel bans.
- 3 They are simultaneously produced and consumed. Individual consumers, staff and other passengers are all involved in the production of a flight. This renders centralised control of production difficult, particularly when it is occurring simultaneously in numerous aircraft across multiple time zones. Airlines attempt to address this challenge through routinised staff training (which often focuses on the delivery of demanding emotional labour) and standardisation of all tangible elements of the service delivery. Emotional labour describes the delivery of routine (and often wholly scripted and artificial) customer service performances by passenger-facing staff who have to manage their own internal emotions (boredom, annoyance, frustration, stress) to deliver a happy, friendly and efficient external persona.
- 4 They cannot be stored in an inventory for later use. This means that it can be difficult to match demand for services with the supply of suitable seats. In response, airlines employ sophisticated revenue management techniques to extract the maximum amount of money from passengers through both their core airfare and ancillary products. Examples of ancillary

services that may attract an additional fee include checked baggage, in-flight refreshments, priority boarding and pre-assigned seating. These ancillary revenue sources have become an important revenue stream for all carriers, irrespective of their core business model.

Air transport and surface public transport exhibit a number of other similarities, too. Some forms of surface transport have introduced elements of low-cost airline pricing (for example, long-distance coach and rail operators) and check-in (for example, the Eurostar between London, Brussels, Amsterdam and Paris), while some railway stations are emulating airports through the provision of extensive retail concessions and passenger and baggage security screening. In addition, the Eurostar website is very similar to that of the airline operators in that it not only lists rail journeys but also offers hotel booking and/or train and hotel bookings. Aviation does, however, exhibit a number of points of difference. Although the European Thalys high-speed rail services require a reservation, most other rail operators accept walk-up fares. Although such products had been available on some domestic air services (for example, within France during the 1980s), current security regulations mean they are no longer available. As a result, unlike most rail journeys, airlines do not offer a facility to 'turn up and go', as seats have to be booked and paid for in advance and an approved form of identification given at point of booking and embarkation to satisfy national and international security requirements.

### ***The customers and consumers of air passenger services***

In addition to supplying a transport product, airlines need to be mindful that they are selling to two distinct groups of people – customers and consumers. The customers in this context are the decision-makers who decide how and when a person will travel. They include corporate travel providers and employers. The consumer is the person who actually flies. In some situations, for example, corporate business travel, these two groups are separate entities, whereas for personal leisure travel, the decision-maker (the customer) may well also be the traveller (the consumer). Generally speaking, in the case of business travel, customers (corporate travel providers and budget holders) are more concerned with cost and schedules, whereas consumers are more likely to be motivated by convenience, service attributes and the in-flight experience.

Of course, the reasons people fly vary considerably and, as such, passenger decision-making and related purchase behaviour are informed not only by cost but also attributes including past experience, flight frequency, anticipated service, personal status, convenience, word-of-mouth recommendations and available loyalty benefits. In recognition that customers and consumers are diverse in their motivations, behaviours and preferences, segmentation is used to identify groups of passengers who share common characteristics. The resulting passenger segments are used by airlines and airframe manufacturers to develop new products and services and ensure marketing copy is appropriately targeted. Three main approaches to segmentation are employed:

- 1 Situational segmentation relates to the context in which the passenger travels. This includes characteristics such as sales channels (online, telephone, reservation office), time and date of flight, time of booking, location and access of origin and destination airports, seat and ticket availability, ticket flexibility, loyalty benefits, airport service and in-flight services.
- 2 Socioeconomic and demographic segmentation considers the personal characteristics of individual passengers. Typical criteria may include age, gender, nationality, religion (important for informing meal choices), any mobility impairments or 'hidden' disabilities such as autism or dementia, relationship status, income, first language, occupation, education/

qualifications and whether a passenger is travelling alone or in a group (as well as the age of group members, their relationship to each other and the size of the group).

- 3 The third approach, psychographic segmentation, focuses on trip motivation and the values, attitudes and interests of the traveller. This may include considerations of the motivation to undertake the trip, the intended destination, routing, length of flight, time away from home, travel class, travel frequency, cultural background, airline preference, aircraft preference, seat preference and environmental considerations.

This practice results in the creation of passenger segments who share common characteristics and who can be grouped accordingly. Such groups may be defined as price-conscious 'bargain' travellers, mainstream travellers, VIP travellers, older travellers, children/infants, unaccompanied minors and travellers with additional needs. Each of these passenger segments exhibits different needs and priorities and displays different preferences regarding their choice of airline. In general, younger, more price-conscious 'bargain' travellers are more likely to travel with cheaper low-cost operators.

### ***Falling traffic and/or lack of demand***

Thus far, this chapter has explored the demand for air passenger services and showed how consumer demand for flight has stimulated the development of new airline business models and air routes. However, it would be misleading to suggest that the current narrative of air passenger services is one of untrammelled global growth. The airline industry has experienced many failures over the decades, and once-famous names in aviation history, including TWA, Pan Am and Eastern Air Lines from the United States, as well as Thomas Cook, British Midland and Monarch from the United Kingdom, are no longer trading. Although airlines fail for a variety of reasons, the changing nature of passenger demand and changes in the number of passengers wanting to travel to key destinations in an airline's network are often contributory factors. Falling passenger demand, of course, not only affects airlines but other companies involved in the aviation service delivery chain. Indeed, there are many examples of 'ghost' or 'zombie' airports worldwide which were either constructed or expanded in anticipation of traffic which never materialised. Many often once busy airports have closed due to lack of traffic or a rapid decline in demand. Examples include Montreal's Mirabel airport, which failed to attract sufficient traffic to sustain operations and closed in 2004, not 30 years after it first opened; Ciudad Real Airport in central Spain, which was built to alleviate congestion at Madrid airport but closed in 2012 after barely 3 years of operation and Plymouth Airport in the United Kingdom, which closed in 2011 after a sudden reduction in services. Other facilities, including 'London' Oxford, Cambridge, Gloucester and Coventry airports in the United Kingdom, have also not been able to sustain long-term regular scheduled passenger services but remain operational for private and business aviation operations.

In addition to airlines and airports ceasing to operate, numerous routes have been withdrawn from the airline network owing to a lack of demand resulting from changing patterns of consumer destination choice or the introduction of viable surface transport alternatives. In the regulated era, socially and politically important air services with low demand were maintained through direct government intervention, but following deregulation, airlines were free to withdraw from loss-making routes. In response, governments have felt the need to intervene in the market to maintain the provision of these services through direct public subsidies. In the European Union, this is achieved through the public service obligation (PSO) scheme. Similar programmes exist in the United States and Australia. These 'lifeline' services may be the only

year-round transport connection a remote community has with a major settlement, and so the provision of reliable and routine air connectivity is vital to the daily life and viability of these communities.

Although perhaps few would question the need for lifeline air services, growing public and consumer awareness of the environmental impacts of flying is also beginning to affect passenger transport choices. Already, high-speed rail is capturing market share from airlines. This has resulted in a reduction in flight frequency on certain high-demand routes (including Madrid-Barcelona) and airlines marketing joint air-rail services. The recent phenomenon of 'flight shaming', in which consumers question their need to fly and actively seek alternatives, is also stimulating new interest in long-distance and sleeper train services (particularly in Europe), which have a lower environmental impact than flying. The reduction in domestic passengers using Swedish airports in 2019 has been attributed, at least in part, to growing environmental awareness among consumers. Airlines are reacting to these concerns by positing themselves as socially and environmentally responsible corporate citizens. The Dutch national carrier KLM has taken out advertisements asking consumers on short-haul routes in Europe (including Amsterdam-Brussels) to take the train as opposed to the plane, while Ryanair, a company that reportedly ranks among Europe's largest emitters of CO<sub>2</sub>, produced a television commercial stressing its commitment to environmental responsibility.

However, the extent to which flight shaming and reduction in demand will impact passenger numbers in the longer term is unknown, and the fact remains that in many other world markets, demand for air passenger services continues to grow dramatically. This demand is met by a variety of different airline operators who seek to supply the products and transportation services these passengers demand. Consequently, it is to the issue of the supply of air passenger services, past, present and future, that this chapter now turns.

### **The supply of air passenger services**

Air passenger services are provided by approximately 1,400 different airlines that collectively operate a fleet of 14,000 commercial aircraft on 55,000 routes between 4,000 world airports (ATAG, 2019). These flights traverse the sovereign airspace of most of the world's nation-states. At the most basic level, airlines provide a transportation service, but, in an increasingly competitive and price-conscious market, they also now have to actively supply a positive customer experience to engender brand loyalty and encourage repeat purchasing behaviour. In order to consider the supply of air passenger services, the strategic assets and infrastructure of aviation are examined in turn, beginning with aircraft before considering airlines, airports and airspace.

#### ***Aircraft***

The vehicles which enable air travel to occur are fundamental to the supply of air passenger services. Over the last century, hundreds of different designs of commercial aircraft have been proposed and manufactured, with the design of the most successful ones coalescing around a cylindrical fuselage of varying dimensions and capacities, to which a pair of wings, tail plane, engine/s and vertical stabiliser are attached. Interestingly, the name of one of the world's largest manufacturers of commercial aircraft alludes to its public transport objectives. *Airbus* (our emphasis), based in Toulouse, France, manufactures a diverse product line of commercial jet aircraft, ranging in size from 100 to 850 seats, that has attracted over 19,000 orders from across the globe (Airbus, 2020).



One of the key issues for airlines is the supply of suitable airframes (as well as the related price of acquisition and cost of operation). The supply of airframes is dictated both by the manufacturing capacity on the final assembly lines of original equipment manufacturers (OEMs), including Airbus and Boeing, but also by the availability of suitable finance options. The majority of the world's commercial aircraft are leased, and major leasing companies are responsible for placing large orders and obtaining the most desirable delivery slots. Although there is a dynamic market in used second-hand airframes and engines, there is often a dearth of supply of the most popular airframes, which raises the price and may oblige airline operators to source suboptimal short-term alternatives.

The varying nature of passenger demand combined with the physical constraints of some of the world's airports has resulted in the creation of multiple types of aircraft, from rugged short-haul single-seat aircraft that can access some of the most remote regions on earth to ultra-long-haul B787 and A350s that can fly for 16–17 hours non-stop and A380 super jumbos seating over 800 people. The aircraft fleets employed by the world's airlines reflect both the supply of suitable airframes and the different demand characteristics and physical attributes of the routes in their network. For example, low-cost airlines tend to operate a single fleet of aircraft to reduce their costs and gain from economies of scale in training, maintenance and scheduling. Full-service operators, on the other hand, who may operate a mix of short and long-haul services with different demand characteristics, usually require a mixed fleet.

The seemingly insatiable demand for passenger air travel is imposing a growing burden on the environment. At the global level, aircraft emissions are a key contributor to global climate change, while at a local level, issues of aircraft noise and atmospheric pollution remain acute. The opportunities for rapid decarbonisation of the air transport sector remain limited. Electric aircraft remain many years away from commercial application, and biofuels and other sources of alternative energy are, at present, too expensive and too limited in production capacity to make inroads on the use of aviation kerosene. For the foreseeable future, the supply of commercial aircraft will remain based on those that require the combustion of fossil fuel.

### *Airlines*

The supply of air services in a deregulated market is dynamic. Over time, the airline market has evolved into several categories of operation: full-service network airlines which have developed a large global presence through alliances, interlining and codeshare agreements; low-cost airlines and carriers which have developed niche or specialist operations in particular markets.

Many airlines are now private entities, and, although freedom of entry and exit are not costless, airline operators nevertheless have greater freedom of market entry and exit. Deregulation has also led to consolidation in the sector as smaller and less profitable operators have ceased trading or been purchased and merged with other operators. Over time, this has reduced the number of operators and, on some routes, led to one carrier having a monopoly on services to the potential detriment of consumers, as the lack of competition exerts no downward pressure on price and provides no incentive for service innovation. The presence of just one operator on routes with low demand makes these routes vulnerable in the case of that airline failing. Such concerns were brought to the fore in the United Kingdom in early 2020 when concerns were raised about the long-term financial viability of the privately owned regional airline operator Flybe. The reported intervention (prior to its subsequent collapse) by the UK government to keep the airline flying and preserve aerial connectivity to/from and within UK regions demonstrated the importance of this privately operated public transport service.

Despite decades of deregulation lowering the price of airfares, the majority of air travel is still undertaken by society's highest-income groups. Thus, the 'public' that uses air transport is selected, and air travel arguably remains a form of transport that is outside the financial reach of millions of the world's population. In Great Britain, an oft-reported statistic is that the wealthiest 15% of the population take over 70% of the flights, while 57% of the population of Great Britain never fly at all (cited in Harrabin, 2019). The fact that enterprising business leaders in India reportedly purchased an old aircraft that people could pay to sit on to experience what it was like onboard an (admittedly permanently grounded) aircraft show that there is a long way to go before aviation is a mode of transport that is accessible to all the world's population.

### ***Airports***

Another factor which continues to shape the global air service market is the supply of airports, runways and landing slots. There are currently in excess of 4,000 airports worldwide that are capable of handling commercial scheduled flights. However, passenger demand is spatially uneven and concentrated on a few key routes and airports which act as central nodes or hubs in the worldwide air traffic network. One of the consequences of deregulation was that incumbent passenger airlines attempted to protect their market share on core routes from the competitive threat posed by new entrant low-cost operators by consolidating flights at so-called 'fortress hubs'. These locations came to be dominated by air traffic movements from one operator so as to effectively prevent the entry of new operators. Examples for these fortress hubs include Atlanta (dominated by Delta) and Dallas Fort Worth (a major hub for American Airlines). Outside the United States, the national flag carrier often enjoyed a near-monopoly (or at the very least held the majority of desirable slots). In this way, British Airways remains dominant at London Heathrow, Emirates is the principal operator at Dubai and Air France holds key slots at both Orly and Charles de Gaulle airports in Paris. The concentration of large numbers of passengers at a limited number of sites has meant that these 'mega airports' have developed beyond mere transportation nodes into entertainment, retail and commercial centres in their own right replete with business parks, hotels, international conference venues, art galleries, public gardens and restaurants. Munich airport has its own brewery, while Stockholm's Arlanda airport has a wedding licence.

Although these additional facilities generate much-needed non-aeronautical revenue for the airport operators, the key disadvantage of the fact that the majority of traffic wants to land and take off from a limited number of sites is that these airports suffer from congestion and must continually expand to meet growing demand. The supply of suitable airport capacity is becoming a growing challenge for many world cities and the proposed expansion of their airports a point of intense political debate and controversy. For example, the incremental expansion of London's Heathrow airport through the addition of Terminal 4 (opened 1986), Terminal 5 (opened in 2008) and the proposed third runway has been marked by years of political debate, planning inquires and public opposition, while elsewhere, new airports are rapidly planned and constructed. China alone is reportedly building 216 new airports by 2035 to meet growing passenger demand (Airport Technology, 2018), and a new airport serving Istanbul, which will have an ultimate annual capacity of 200 million passengers when complete in 2025, opened in 2019.

### ***Airspace***

The supply of airspace is also another important consideration. Unlike road and rail vehicles, aircraft do not follow a fixed track and are able to navigate through the sky at different speeds

and at different horizontal and vertical trajectories provided their pilots adhere to basic aeronautical regulations. Given that all aircraft have to land, and by far the majority have to land at an aerodrome with the hard runway that has been specially prepared for this purpose, the airspace around many of the world's airports is approaching its capacity to safely handle aircraft and allow them sufficient separation from one another to reduce the risk of mid-air collision to an acceptable level. In many cities, the supply of airspace is being constrained by the imposition of night noise curfews, limits on the numbers of air traffic movements and other operating restrictions that reduce the number of landing slots and hours of operation and which may lead to congestion at peak times. In the case of London Heathrow, the two runways are operating at over 98% capacity, and any disruption to the normal landing and takeoff rate results in considerable delays, inconvenience and expense.

At a national level, the supply of airspace for use by commercial flights is reduced by civil unrest and the threat to aircraft of surface-to-air missiles, while other countries have, historically, not allowed aircraft registered in one state to access the sky above their territory for political reasons. The use of airspace above private property and residential areas has long been controversial, and contemporary debates around the possible use of drones for urban passenger mobility and parcel delivery are likely to exacerbate this. In addition, advances in precision area navigation mean that aircraft can fly very precise trajectories over the ground, leading to an issue of whether noise should be concentrated on a few areas or dispersed.

## Conclusions

Although rarely included in considerations of public transport, commercial air transport performs a significant role in the global mobility of passengers and thus should be considered a form of public transport. Over time, the demand and supply of aviation services have fluctuated in response to changing economic conditions, the introduction of new aircraft technology and the development of contestable markets and regulatory environments. Historically, the supply of air transport services was not only shaped by demand (whether actual or political) but also by the aircraft technology that was available at the time. As aeronautical technology has evolved and commercial aircraft are able to fly progressively further, faster, longer and higher, once-important refuelling and rest stops have been bypassed and the supply of air services constantly reconfigured to meet the demands of an increasingly mobile world which, until recently, at least, prioritised and championed rapid international connectivity between major world cities.

The collapse in passenger demand resulting from the COVID-19 pandemic and restrictions on international travel in early spring 2020 sent a profound shock through the world economy. Globally, airlines have temporarily ceased flying, have grounded entire fleets of aircraft and have furloughed tens of thousands of staff. Social distancing and self-isolation measures, aimed at saving lives by reducing opportunities for viral transmission, have created fear and unease, and future research will need to examine not only the practical issues associated with resuming air passenger services but also the psychological impact among users relating to their willingness to use public transport in the future when the very vehicles, infrastructure and spaces of public transport (including aircraft) have been identified as an epidemiological risk.

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