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Airports: from flying fields to 21st century aerocities

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Introduction

‘I started my travels – where else? – in the airport’
(Pico Iyer 2000: 41)

Since the dawn of commercial aviation at the beginning of the twentieth century, airports have played a crucial role in the development and maintenance of a new world order. At their most basic level, airports exist to facilitate international flow and mobility and are routinely classified and judged according to the number of direct flights they host and the volume of passengers, cargo, and aircraft they process. Each nation has (with the exception of Andorra, San Marino, Vatican City, Monaco, and Liechtenstein, the only countries in the world without an airport) developed a national airport system appropriate to its transportation needs and this has resulted in a global airport system of great complexity. There are currently around 49,000 active airports in the world, ranging in size from tiny airfields that serve some of the remotest regions on earth to mega aerotropoli that handle tens of millions of passengers every year. Yet, irrespective of their particular geographic characteristics, airports have become a common feature of our industrialised landscape and have left indelible imprints on our language, culture, and environment.

As the transition points between earth and sky, airports enable people, goods and information to travel around the world. They have brought nations closer together in time and space and have enabled business and personal relationships to be routinely conducted at a distance. They have inspired novelists, artists, architects, politicians, musicians, philosophers, and film and documentary makers and been the setting for some of the most important moments in recent geopolitical history. Yet they have also provoked controversy and become increasingly criticised for their congestion and delays, their deleterious environmental impacts, and strict security. In a little over 100 years, the airport has been transformed from a place of excitement and opportunity into an increasingly maligned aspect of modern culture (Hickman 2007).

In charting the development of airports, from their origins in the early twentieth century to the present day, this chapter draws on literature from across the social sciences to explore how the creation of a functionally highly differentiated global airport system has enabled and driven processes of globalization in ways that have sometimes been unexpected. Attention is paid both to the development of mega-airport hubs and to the smaller regional or secondary facilities that play an important, but hitherto largely unappreciated, role in the creation of highly dynamic geographies of international trade and mobility. The chapter concludes by speculating on future airport scenarios, including the impact of rescheduling flights away from key hubs into less congested airports located in the hinterland of major world cities and the possibility that airports may ultimately become relics of a bygone age of mass aeromobility.

From the airfield to the airport

The origins of the airport as a distinct form of public space can be traced back to 1904, when pioneering aviators Wilbur and Orville Wright established a permanent flying ground on Huffman Prairie, a 34-hectare cow pasture at Simms Station, near Dayton, Ohio (Mackersey, 2003). Unlike the fixed infrastructure demanded by modern airports, the requirements for early 'flying fields' were relatively modest. Ideally, they needed to be located on open areas of flat, preferably windswept, land, away from tall buildings and other obstructions to enable pilots to take off and land safely. Depending on one's location, these sites were variously described as 'air stations' (the aeronautical equivalent of railway stations), 'air fields', 'flying grounds', or 'aerodromes' (an adaptation of the Greek word *dromos*, meaning speed).

Throughout the late-1900s and early-1910s, flying exerted an ever-stronger grip on the public imagination. The excitement that accompanied Louis Bleriot's successful flight across the English Channel and the first international air meeting at Reims, France, in 1909, resulted in vast crowds regularly gathering at municipal parks, racecourses, and playing fields on the outskirts of major towns and cities to watch pioneering aviators perform daring stunts and feats of aerial speed and endurance. Almost from their inception, these events became fashionable spaces of spectacle and spectatorship and were promoted as places for a curious and potentially 'air-minded' population to visit (Wohl 1996; Adey 2006). London's first aerodrome, at Hendon, on the northern fringes of the city, opened in 1909 and rapidly evolved into a 'successful and well-organised place for amusement for the entertainment of the public' complete with a spacious grandstand, sightseeing enclosures, an open-air café, tea tents, and pavilions (Claxton 1914: 253).

After the outbreak of war in 1914, many airfields were requisitioned for military use and public grandstands were replaced by prefabricated maintenance facilities. When civil flying resumed in Europe 1919, many demobbed pilots purchased surplus ex-military aircraft and organised themselves into airline companies to begin operating on a commercial basis. The rapid inauguration of regular passenger and airmail services between major towns and cities in Europe and North America during the early 1920s gave renewed impetus to the development of airfields and the provision of a modern landing ground became an issue of municipal pride and prestige that demonstrated 'a city "belongs" in the global net of cities' (Bouman 1996: 193). Significantly, this desire to have an airport exists to this day, with many communities, including the islanders of St Helena in the Atlantic Ocean, believing an airport will integrate them more fully into the global economy (Smith, 2009).

By the late 1920s, the growing number of commercial flights and volume of airline passengers worldwide, combined with the increased size and weight of new purpose-built civilian aircraft, necessitated a fundamental redesign of airfield form and function. In order to entice potential passengers away from the relative comfort and safety of the railways, a number of 'air minded' individuals advocated the construction of a new type of facility to cater to the particular needs of discerning air travellers. Leading architects of the time, including Le Corbusier, Henard, and Sant'Elia, designed fanciful 'airports of the future' in which airports were constructed between or on top of another icon of early twentieth century modernity, the skyscraper (Voigt, 1996; Gordon, 2004; Pearman, 2004). However, operational and

safety concerns dictated that airports were not suited to downtown urban areas but a city's outskirts.

In order to facilitate the development of regular international air services, it was necessary to provide permanent customs and immigration facilities. The International Convention of Aerial Navigation of October 1919 stipulated that all civil aircraft engaged in international operations must, on leaving or entering a contracting state, depart from or land at a specified customs aerodrome. This regulation necessitated the construction of new and bigger buildings that served not only the operational needs of airlines and the personal requirements of travellers, but also had space in which passports and luggage could be examined. Permanent landing strips were established, paved aircraft parking areas laid, and grand passenger terminals, containing post offices, bookstalls, hotels, and restaurants were provided for the comfort and convenient of passengers (Dierikx and Bouwens, 1997). At Le Bourget airfield, near Paris, all commercial aviation activities were housed within a new passenger 'air station' that was considered to epitomise all that was exciting and progressive about modernity (Greif, 1979; Voigt, 2005). In order to distinguish international 'customs aerodromes' from smaller facilities, a new word, 'air-port', entered the English language and was increasingly used from the mid-1920s onwards (Voigt, 1996).

In the 25 years of architectural modernism that followed World War Two, few structures were more functionally modern than the airport. Though international regulations increasingly dictated the practices and procedures that should be followed at every airport (including the separation of arriving and departing passengers and the provision of secure 'airside' areas to separate flying passengers from non-travelling members of the public), terminal buildings became the centrepieces of modern design. Terminals, including Eero Saarinen's TWA building at Kennedy International Airport in New York (1956-1962), attempted to capture the wonder of flight and often featured soaring roofs and cantilevered facades. In order to expedite the timely and efficient flows of increasing numbers of passengers through these terminals, a new global airport logic - which provided continuity of progression from check-in to aircraft and from aircraft to baggage hall - was quickly established and copied around the world. English-language signs and (it was hoped) universally comprehensible pictograms began appearing in passenger terminals to identify the location of key airport facilities and guide passengers through the building.

The introduction of new wide-bodied long-haul passenger aircraft in the late 1960s and early 1970s, combined with the introduction of new 'tourist' or 'economy' class fares, stimulated unprecedented demand for air travel and made flying *the* normal mode of long-distance travel for a significant segment of the population (see Bowen, 2009). The introduction of Boeing's wide-bodied 747 'Jumbo Jet', Lockheed's Tristar, and McDonald Douglas's DC-10, which were wider and heavier and could seat over twice as many passengers as existing aircraft, required a fundamental redesign of many airports. Existing sites had to be reconfigured and expanded. On the airfield, runways and taxiways had to be widened, lengthened, and strengthened, while passenger terminals had to be expanded to accommodate hundreds of additional passengers and pieces of baggage. At the same time, a growth in the number of terrorist attacks against airports and aircraft necessitated the installation of ever-more stringent and time-consuming security checks. As the time taken to turn around large

aircraft and screen hundreds of passengers and bags grew, so too did the time passengers spent waiting in airports before their flight. In order to take advantage of this otherwise unproductive dwell time, airport operators began installing duty-free shops and other retail concessions in their terminals. Airport retailing had the dual purpose of helping to mitigate passenger boredom while raising valuable revenue for the airport operator. However, the development of a universally familiar airport environment led some commentators to suggest that the once distinctive local spaces of air travel had been subsumed by a global airport system that has a similar form and appearance regardless of physical location.

As a consequence, airports and other spaces associated with mobility, such as motorway service areas and railway stations, have often been described as being ‘placeless’ or ‘non-spaces’ of speed. Famously associated with the writings of Edward Relph (1976) and Marc Augé (1995), the idea that spaces of mobility are somehow ‘global’ spaces of flow, devoid of any local interest or cultural connection, gained widespread currency among some members of the academic community who used the theoretical concepts Relph and Augé advanced to criticise airports for their global ‘look-alike’ architecture and familiar retail landscapes. The spaces of the departure lounge and arrivals hall, in particular, are often described as being symptomatic sites where place has been sacrificed in the name of the mobility (see Kaplan 1994; Lloyd 2003; Wood 2003).

Such accounts have, however, been criticised for glossing over the variegated socialities of air spaces. Merriman (2004: 152), in particular, argues that ‘frequent flyers, baggage handlers, flight crews, first-time flyers, first class passengers, refugees, air traffic controllers, police officers and the homeless are likely to have very different experiences of movements, dwelling, security, familiarity and belonging’ in airports. While Vidler (1998: 15) similarly contends that framing airports as ‘empty, sterile, non-spaces, determined more by mathematical calculation of times of arrival and departure than by any regard for the human subjects’ ignores the rich sociality of air travel, something Cresswell (2001) and Gottdiener (2001) have also been quick to recognise. The supposedly ‘placeless’ realm of the airport may, therefore, be variously experienced as exciting, stressful, overcrowded, disorganised, frightening, regimented, or boring, triggering a remarkably diversified range of inhabitation.

The rise of the ‘Airport City’: world airports and their cities

‘The world cities are the site of the great international airports: Heathrow, Kennedy, Orly, Schiphol, Sheremetyevo’.

(Hall 1977:1)

Within academia and civil aviation discourse, the term “air city” or “airport city” first emerged in the mid-1940s to describe the growth of an international network of cities connected by air travel. Though a small general aviation facility called ‘Air City’ had been constructed near the town of Sturtevant, Wisconsin in the 1920s, it was only after the Second World War, when airports gained the ability to function largely independently of the city that they were originally designed to serve, that they began to be conceptualised as modern cities in their own right (Bouman 1996).

During the mid-1940s it became apparent that the then-leading global aviation nations, Britain and the United States, held radically different views on how post-war civil aviation should develop. While the majority of countries agreed that every state had complete and exclusive sovereignty over the airspace above its territory¹, many states were not prepared to grant other countries extensive access rights to their airspace, and US proposals for ‘open skies’ across the Atlantic and unrestricted competition, while supported by some countries, were flatly rejected by Britain and other European nations who advocated a system of strict bilateral regulation (Cheng, 1962). Given that aircraft had no automatic right to ‘innocent passage’ through sovereign airspace, individual access agreements and airport landing rights had to be negotiated. The exchange or denial of these bilateral agreements had significant implications for the development of the global airline and airport network (Glassner 1996). In the 1960s, for example, aircraft belonging to the Israeli national carrier, El Al, were prohibited from overflying or landing in Iraq or Syria while other nations were prohibited from overflying what were deemed to be ‘unfriendly’ countries. The denial of overflying and landing rights has thus been used as a geopolitical tool by countries that have either sought to protect their own national carrier from competition or prevent certain countries from accessing their airports and airspace.

While strict bilateral and multilateral air service agreements largely dictated the structure of the evolving airline network throughout the 1940s, 50s, and 60s, regulatory changes within the global airline industry, beginning with the deregulation of the US domestic aviation market in 1978 and subsequent liberalisation elsewhere, again transformed the patterns of world air services. Deregulation enabled new airlines to enter the marketplace and encouraged competition. In order to protect their market share on lucrative inter-city routes, incumbent US carriers rationalised their route structures and consolidated their traffic at a few key ‘hubs’ (see Graham, 1995; Button 2002). The creation of hub-and-spoke networks (or ‘hubbing’) conferred significant operational advantages for the carriers concerned, but was not always popular with travellers.

The consolidation of flights and passengers at a limited number of major hubs has led to a new phenomenon in which major airports often fulfil many of the roles traditionally performed by the cities they were designed to serve. Large airports have their own security forces, medical units, business centres, hotels, resident press corps, beauty salons, gardens, places of worship and entertainment, and transient homeless populations (Kaplan, 1994). They usually have their own independent systems of power generation and waste disposal, and employ tens of thousands of workers in a bewilderingly diverse range of occupations. Furthermore, at the self-styled ‘AirportCity’ of Amsterdam Schiphol, it is possible for passengers and the public to shop, eat, sleep, worship, view famous works of art, and have a massage, all without leaving the central terminal area. Munich airport boasts a vast conference and hotel complex adjacent to the main terminals, Frankfurt airport contains 222 retail units, while Terminal Five at Heathrow reportedly contains more retail space than central London’s Bond Street. Vancouver International Airport’s terminal features indoor rivers, parks, and aquaria for the enjoyment of passengers, while travellers using Singapore’s Changi Airport can wander through tranquil orchid and butterfly gardens.

¹ Including that above all land, territorial waters, colonies, dependencies and mandates.

Arguably, the only things cities possess which airports do not are resident populations and permanent residential areas.

For John Kasarda, the influence of the world's major airports is so profound that it is actively reshaping the geography of the airport hinterland. For him, the airport city has become the 'Aerotropolis', consisting of an airport city core and an outlying area of airport-related businesses that can stretch for fifteen miles (20km) or more beyond the airport boundary (Kasarda, 2001, 2008, 2009). The crux of Kasarda's thesis posits that major airports act as 'network magnets' that attract large international businesses, which then cluster along main transportation routes and reshape the airport hinterland creating a new economic geography of the airport periphery. While a number of commentators, including Charles *et al* (2007), have sought to critique the aerotropolis model by raising concerns about its long-term sustainability, many others have remarked upon the distinctive geography of car rental lots, access roads, hotels, and light industrial units that surround many major airports (Pascoe, 2001; de Botton 2009).

Classifying world airports

Many measures, including total passenger enplanements, the number of aircraft movements, the type of air traffic, or the volume of cargo uplifted have been used in an effort to classify airports and quantify their relative importance within a global airport hierarchy (Schaafsma, 2003; Derudder and Witlox, 2005a, 2005b; Zook and Brunn, 2006; Derudder et al., 2007a, 2007b; Guimera et al., 2005). Such rankings help to describe the ways in which individual airports are stitched into local, regional, national, and international space-economies, with "world cities" fully participating in the international economy through international air connections (Keeling, 1995). As a result, much of the existing world cities and globalization literature focuses on the passenger processing capabilities and/or network attributes of the top 20 or so biggest hubs of the estimated 840 airports worldwide that support regular international services. Despite a lack of consensus about what constitutes a 'hub' (Button, 2002), these sites tend to be the focus of sustained academic inquiry. However, while much attention has been paid to these major centres of global aeromobility, there are tens of thousands of smaller sites whose role in the global aviation system has often been overlooked.

Crucially, the hub-and-spoke networks of the post-deregulation era mean that even relatively small airports can be intimately connected into the global airline network via short-haul connections to major hubs elsewhere. For example, Birmingham International Airport (BHX), a regional facility in central England, has daily connections to Emirates's worldwide network via Dubai; Air France/KLM's network via Charles de Gaulle and Amsterdam; Lufthansa's international network via Frankfurt and Munich; Continental Airlines' network via New York; and SN Brussels Airlines via the Belgian capital. Hence, classifying BHX's worldwide connectivity using a metric that only counts direct flights and does not take into account transfer traffic is arguably misleading.

In terms of passenger numbers, Atlanta Airport in Georgia is the world's busiest international airport. Significantly, however, a large proportion of the 90 million

passengers it handled in 2008 were US domestic travellers. If domestic passengers are stripped away, the five busiest international airports in the world in 2008 were London/Heathrow (62 million international passengers), Paris/Charles de Gaulle (55 million international passengers), Amsterdam/Schiphol (48 million international passengers), Frankfurt (47 million international passengers) and Hong Kong (46 million international passengers). However, as Table 1 shows, the busiest international airports are not necessarily the best connected, with Heathrow serving fewer direct destinations than Paris, Amsterdam, and Frankfurt.

Table 1: The connectivity of the top five busiest international airports (2008/2009)

Rank (pax nos.)	Airport	Direct destinations served	Number of countries served	Number of airlines
1	London/Heathrow	180	90	90
2	Paris/Charles de Gaulle	294	106	66
3	Amsterdam/Schiphol (2007 figures)	267	87	98
4	Frankfurt	304	106	119
5	Hong Kong	180	46	85

Source: compiled from individual airport websites, 2009

If these individual attributes are ranked, Paris/Charles de Gaulle emerges at the top of the international airport hierarchy and Heathrow is relegated to third place (Table 2).

Table 2: International airport hierarchy based on connectivity rankings

Airport	Rank – intl. passengers	Rank – no. of direct destinations served	Rank – no. of countries served	Cumulative score
Paris/CDG	2	2	=1	5
Frankfurt	4	1	=1	6
London/LHR	1	=4	3	8
Amsterdam	3	3	4	10
Hong Kong	5	=4	5	14

The progressive worldwide liberalisation of the aviation sector has resulted in a new type of carrier entering the marketplace. These low cost airlines typically eschew the congestion, delays, and expense associated with operating from major airports and fly instead from smaller and cheaper facilities in the hinterland of major world cities. Hence, these carriers will use London/Stansted, Frankfurt/Hahn, and Stockholm/Skavsta in preference to Heathrow, Frankfurt-am-Main, and Arlanda. Despite the fact that these secondary airports are often located many miles away from the city they are intended to serve, passenger growth has often been rapid. As a consequence, two discrete networks of passenger aviation have emerged. One is a major international hub-and-spoke system that serves major city airports and the other is a low-cost point-to-point network that operates from smaller secondary airports.

Yet in addition to recognising the existence of different types of passenger airport, it is also important to acknowledge the role major cargo facilities, including Liege (Belgium), Memphis (USA), and East Midlands (UK), and dedicated business aviation airports such as London/Farnborough and Paris/Le Bourget (see Budd and Graham, 2009), play in the global airport system.

Failed airports

While a network of highly functionally differentiated airports developed to meet the needs of multiple air travel users during the 20th century, the structure of the global airport hierarchy is highly dynamic and individual airports are vulnerable to competition, evolving aeronautical technology, and changing international political relations (see Grubestic et al., 2005). Until the introduction of jet-powered commercial aircraft in 1952, much of the strategic importance of certain airports was due not only to the size and/or intrinsic business or tourist attractions of the area they served but also to the limited range of early aircraft. In the mid-1930s, Britain and other European Imperial powers established chains of landing grounds across the Middle East and Africa. These sites enabled aircraft to be refuelled and allowed pilots and passengers time to rest between sectors on long-distance journeys to the Far East and South Africa. However, the introduction of modern longer-range jet-powered aircraft meant that these small intermediate landing grounds could be overflown with ease. As a consequence, many were abandoned or served far less frequently and once busy international air junctions in Africa and the Middle East were relegated to the relative backwaters of commercial aviation. Similarly, the replacement of flying boats and piston-powered aircraft by jet airliners on transatlantic routes in the late 1950s meant that the once busy refuelling stations at Prestwick (Scotland), Shannon (on the west coast of Ireland), Gander (Newfoundland), and Goose Bay (Labrador), and the once-important staging posts of the Azores, Bermuda, Sondrestromfjord (Greenland) and Iceland are now overflown with ease and only used in the case of a technical problem or diversion. In the Pacific Ocean too, the once busy airports of Honolulu, Nadi (Fiji), Papeete (Tahiti), Canton Island, Midway, Guam, and Wake Island have lost their status as important trans-Pacific staging posts.

Other airports have become victims of changing aeronautical practice and/or global economic recession more recently. Montreal's Mirabel airport, for example, which opened in 1975, was designed to handle over 6.8m passengers a year. However, due to its location 45 miles north of Montreal, it was never a commercial success and fewer than 800,000 passengers a year were using the facility when it closed in 2003 (Clark 2003). In South Korea, several airports have been mothballed owing to challenging trading conditions, while Coventry and Sheffield City airports in the United Kingdom have closed owing to a lack of traffic and competition from neighbouring facilities. Liberalisation and the rise of low-cost flying have also meant that airlines are free to enter and leave the marketplace as economic conditions dictate. Many airports, which have often invested heavily to attract new services, have found these links withdrawn at short notice, while others have struggled to make a profit in the face of adverse economic conditions.

The future

In a little over a century, airports have evolved from rudimentary flying fields into 24-hour a day mobility machines that serve hundreds of thousands of flights and millions of passengers every year. The unprecedented growth in passenger demand during the

latter half of the twentieth century not only necessitated a rapid evolution in airport form and function but also resulted in many airports operating close to capacity. This, in turn, has led to congestion and delays and a growing sense of customer dissatisfaction with the airport experience. Anecdotal evidence suggests that the current economic downturn, combined with increased awareness of aviation's environmental impacts and growing concern about the risk of aviation terrorism, is starting to depress passenger demand. It has been suggested that many travellers are now actively avoiding congested hub airports and buying point-to-point tickets between smaller regional airports instead, choosing to holiday within their own country, and engaging in teleconferencing rather than business travel. Given current concerns about oil price volatility and 'peak oil', it could be argued that air travel may once again become a luxury obtainable only by the very rich. Under this scenario, commercial airports might become relics of a bygone age of mass aeromobility.

Conclusion

Geographers and social scientists have consistently identified air travel as being one of the key drivers of globalisation. Airports have enabled business and personal relationships to be conducted at a distance and they have transformed human cultures of movement. However, in addition to being places of excitement and opportunity, airports are also highly contested spaces and have been sites of political protest, opposition, and violence. Yet, despite controversy surrounding their development, airports are emblematic spaces of the modern world whose importance to, and influence on, human society are difficult to overstate.

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