Air connectivity: Why it matters and how to support growth

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Global air travel has changed considerably over the past decade. Thanks to major improvements in technology, air travel is more efficient, making distances between countries seem shorter than ever. Meanwhile, the continued growth of low cost carriers (LCCs) and their increased penetration into emerging markets has made air travel more accessible, while the rapid expansion of Middle East hub carriers has changed intercontinental travel patterns. As a result, air connectivity has also changed.

But what is air connectivity, exactly? The International Civil Aviation Organization (ICAO) defines it as an indicator of a network’s concentration and its ability to move passengers from their origin to their destination seamlessly.

Air connectivity is key to unlocking a country’s economic growth potential, in part because it enables the country to attract business investment and human capital. An increase in air connectivity also spurs tourism, which is vital to many countries’ economic prosperity.

By understanding how air connectivity is measured, how it has changed, how it relates to economic growth, and what drives it, key aviation stakeholders (i.e. States, Airports and Airlines), can make strategic decisions on how to enable and unlock the air connectivity potential of a country.

How is air connectivity measured?

Air connectivity is measured using a variety of measures at various levels of granularity. These measures – including total passenger movements, airfares, the number of direct destinations, and travel time – can serve as standalone proxies or may be combined to create a measure capturing different features of the air-transport market. (See Figure 1.)
Travellers have different priorities, depending on the purpose of their journey. That means different measures can be used to assess air connectivity for each passenger segment. For instance:

- **Business travellers** tend to be time sensitive and relatively indifferent to fare levels. Frequent and flexible service that enables passengers to quickly change flights to a more convenient time, coupled with easy surface accessibility, matter most to this segment. Thus air connectivity for them could be measured by frequency of service, convenience of schedule, travel time, number of direct routes available and proximity to the city centre.

- **Leisure travellers** care more about fares, with cost-effectiveness often the most important factor in decisions about whether to travel and where, especially for short breaks. An unacceptably high fare could cause them to change their mind about their destination. Measurements of air connectivity for this segment should therefore include fares.

Note: VFR is a subset of leisure travel. However, this segment differs from leisure in that passengers don’t have a choice of destinations and appear to be less sensitive to price (price, however, may determine how frequently they travel).
• **Visiting friends and relatives** passengers are travelling primarily to see loved ones. In some markets, this category of travel is substantial. Passengers travelling for this purpose tend to consider fares a major factor in determining how frequently they travel. However, unlike leisure passengers, they don’t have the option of changing their travel destinations if fares are too high.

The importance of air connectivity has led to the development of a number of indices in aviation economics literature. (See Table 1.) Each measure aims to capture a range of factors influencing connectivity. At the same time, aviation stakeholders looking to understand the integration of country (or city) within the global air network can tailor their choice of air connectivity indices to suit their needs by identifying the criteria most important to the country (or city) they’re interested in and by developing an integrated index which takes multiple variables into account.

### Table 1: Air connectivity indices in aviation economics literature

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
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<tbody>
<tr>
<td>York Aviation Business Connectivity Index</td>
<td>Captures economic importance of destinations, measures value of connectivity to businesses</td>
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<tr>
<td>Netscan Connectivity Index</td>
<td>Captures seat capacity, accounts for both direct and indirect connections and for transfer time as well as potential delay time when connecting</td>
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<tr>
<td>IATA Connectivity Index</td>
<td>Captures the importance of destinations based on the size of the final destination airport</td>
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<tr>
<td>World Bank Air Connectivity Index</td>
<td>Weights value of a route based on the number of onward connections available reflecting benefits of hubs</td>
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<tr>
<td>World Economic Forum Connectivity Index</td>
<td>Presents data on scheduled available seat kilometres per week in 2012 for a sample of 144 countries</td>
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*Source: Various*
How has air connectivity changed?

Over the past 10 years, the aviation industry has experienced the effects of various shocks (such as terrorist attacks, natural disasters and pandemics), a weak economy and rising fuel prices. The industry has shown its resilience by adapting itself to satisfy the needs of an ever evolving market.

Air traffic growth, which was once led by North America and Europe, is now fronted by the Middle East, Asia-Pacific region and Latin America which have experienced strong growth over recent years. As reported by IATA\(^2\), in 2013 revenue passenger kilometres (RPKs)\(^3\) in North America and Europe have grown at a rate of 2.2% and 4.0% respectively. On the other hand, the Middle East, Asia-Pacific region and Latin America have shown growth rates of above 6% per annum, specifically 11.9%, 7.2% and 6.5%. Growth in Africa has also been remarkable with an increase of 5.1% in RPKs since 2012. Most of the growth can be attributed to economic growth as well as to regulatory changes which allow for greater market access.

If we consider the number of direct international routes as a proxy to measure connectivity at a regional level, we can see that a significant increase was observed by the Middle East and Asia, with Europe’s routes almost doubling since 2003 as a result of the increased penetration of low cost carriers and the subsequent increase in point to point services.

Assessing direct and connecting passengers further highlights the aggressive expansion of the Middle Eastern hubs, which experienced larger growth in passenger demand than any other region around the world. (See Figure 3.) At the same time, Europe saw strong growth in the number of direct passengers, driven mainly by the significant penetration of LCCs in that market and a subsequent increase in the number of point-to-point services. Asia, Latin America, and Africa have also shown considerable growth, as opposed to the more mature North American market, which has seen a moderate increase in the number of passenger movements.

Figure 2: Number of international routes by region: 2003 and 2013

Note: The chart only shows international scheduled routes. Central America is defined as Central America and the Caribbean.

Source: Milanamos, PwC analysis

\(^2\) IATA (06/2014), Fact Sheet: Industry Statistics

\(^3\) RPKs are a common industry measure of air traffic which is calculated by multiplying the number of revenue-paying passengers aboard the vehicle by the distance travelled
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How are air connectivity and economic growth linked?

Aviation generates significant benefits for the global economy. In 2012, it contributed US$2.4 trillion to the global GDP (3.4%). Direct benefits (i.e., employment and economic activity generated by the air transport industry) are estimated at about US$606 billion; indirect benefits (generated by employment and economic activity of suppliers of the air transport industry) at US$697 billion. Aviation also plays a key role in enabling the economic growth of countries which rely on major hubs such as Singapore and Dubai. In Dubai, for instance, aviation generates about 28% of the city’s GDP.

Therefore, we can see how improved air connectivity plays a large role in creating such economic value. Obviously, it benefits travellers by giving them access to a wider network as well as more frequent and better connected services. But it also can strengthen a country’s economy over the long haul, boosting productivity through its positive impact on businesses. For example:

- Increased connectivity reduces air travel times, giving businesses access to a wider marketplace.
- Increased connectivity makes it easier for managers and executives to oversee far-flung operations, which infuses efficiency into those operations.
- Better transport linkages enable investment and human capital to flow more freely across borders, improving returns on investment for some projects.

Note: The figure shows the travel patterns of passengers by region. It excludes domestic traffic. Latin America is defined as South America, Central America and the Caribbean.

Source: Sabre/PlanetOptim Milanamos, PwC analysis

Figure 3: Direct and connecting passenger traffic, 2003 and 2013

Note: the figure shows the travel patterns of passengers by region. It excludes domestic traffic. Latin America is defined as South America, Central America and the Caribbean.

Source: Sabre/PlanetOptim Milanamos, PwC analysis

ATAG (2014)

Note: other benefits generated by aviation include induced and tourism catalytic benefits which in 2012 made up for the remaining US$1,131 billion.
With such insights in mind, PwC conducted an econometric study for the UK Airports Commission. The study used seat capacity as a proxy for air connectivity to estimate the impact of improved connectivity on the UK’s economy. The study revealed that a 10% increase in seat capacity could improve:

- **Short-term GDP** by 1%.
- **Tourism** by 4% within the UK and 3% among UK tourists travelling abroad.
- **Trade** by 1.7% in terms of UK product imports and 3.3% in terms of UK product exports. UK service imports and exports would also improve by 6.6% and 2.5%, respectively.
- **FDI** by 4.7% in terms of increased UK FDI inflows and by 1.9% in terms of increased UK FDI outflows.

**What drives air connectivity?**

Four main factors enable air connectivity: geography, airport infrastructure, airline models, and a country’s regulatory and economic frameworks. These enablers all play an important role in ensuring that a country can cement or expand its global air network to enhance air connectivity.

**Geography**

Air connectivity is especially important to countries with isolated air-travel markets (such as islands and large geographical areas) where passengers have few viable alternatives to air travel. However, a country's geographical location can enhance its ability to develop a well-connected network. Examples include Singapore, Hong Kong, Incheon, the Middle Eastern hubs of Dubai, Abu Dhabi, and Doha, as well as the emerging Turkish hub of Istanbul, all of which have exploited their favourable position in the global air-travel network to build strong hubs with far-reaching spokes.

If we look at Europe, Asia, and the Middle East, we can see how each of these regions has capitalised on its geographical location by capturing intra- and inter-regional flows:

- **Europe** – Within a four-hour radius, the EU’s main hubs can draw mainly from European and possibly North African destinations. On longer haul routings, the EU is a convenient intermediate point for (especially) East Coast7 North American traffic to Asia.

- **Asia** – Asian hubs such as Singapore and Hong Kong have traditionally enjoyed advantages with respect to traffic routes between Europe and Australasia and with respect to other points in Asia where traffic to and from Europe is less developed (such as Indonesia and Vietnam).

- **Middle East** – Within a four-hour radius of Middle Eastern locations lie the eastern parts of Europe and Africa as well as the highly populous markets of the Indian subcontinent. A range of destinations fall within the scope of a 12-hour flight from Dubai, including China, Southeast Asia, Australia, and the vast majority of the African continent. However, the majority of the Americas lie just outside this radius.

Middle Eastern countries have excelled at marrying a strong national carrier with a route network that supports it by leveraging on the advantage that comes from being located at the mid-point of major traffic flows. Inter-regional transfer traffic at Middle Eastern hubs has in fact grown 15% per year in the last decade – the largest such growth in the world. (See Figure 4.) The strategy adopted by Middle Eastern countries has catalysed development of hub services, which provide passengers with benefits such as more convenient travel itineraries, more frequent flights, and a wider range of destinations available within specific flight times.

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7 Although West Coast North America is also within the 12-hour radius of Europe, flights can reach much of Asia direct in the westerly direction.
Airport infrastructure

Airports provide the connectivity and access required for a modern economy, enabling businesses to capture overseas opportunities and facilitating the coming and going of tourists – all of which fuel economic growth.

Transport infrastructure acts as a facilitator of growth unlocking latent demand. Moreover, enhancement of transport infrastructure, combined with development of an extensive network, can decrease general travel costs for passengers and goods – thanks to lower fares, shorter travel times, and more seamless connections.

Analysis of what’s happening in emerging companies can shed light on the importance of airport infrastructure for improving air connectivity to foster economic growth. For instance, some countries – such as Indonesia, India, and Brazil – have registered brisk growth in recent years (driven by increases in population and economic wealth). But inadequacies in their current airport infrastructure are preventing them from fully capitalising on their growth. Such infrastructure lacks the required capacity, but boosting that capacity will require considerable capital expenditure.

Figure 4: Intercontinental transfer traffic

Note: The chart only shows interregional transfer passengers; it excludes direct passengers between regions as well as any passengers requiring more than one connection and passengers travelling within the region. Turkey has been classified as Middle East.

Source: Milanamos, PwC analysis
**Airline business models**

Airlines’ business models can directly affect air connectivity. Indeed, over the past decade, carriers have adopted new models to survive in the face of often unfavourable market conditions. Such models fall into three broad categories: low-cost carrier, network carrier, and hybrid. (See Figure 5.)

In the past, LCCs have targeted mainly the leisure passenger segment. The low-cost model has traditionally provided a ‘no-frills’ service that can create demand by offering very low fares as well as by serving destinations that were previously not served or only connected via a hub. The availability of low fares has opened the market to a wider group of consumers and has enhanced connectivity by establishing services to and from secondary airports.

Network carriers mainly operate radial networks centred on their main base or hubs. Their networks provide a wide range of destinations and frequent and flexible services that meet the needs of both business and leisure travellers. A hub-and-spoke model consolidates traffic through a hub and allows for lower-density routes to become viable that may not have been viable as a point to point service. This helps to provide a country (or city) with important links and increased frequency of services to the global air travel network.

Figure 5: Three airline business models
With the most recent global financial crisis, many business travellers have gravitated toward LCCs for short haul travel. To capture this new market, some airlines are transitioning to a hybrid model, providing reasonable fares combined with the flexible and frequent service business travellers want.

Countries that can rely on strong network carriers that use their hubs efficiently are more likely to achieve greater air connectivity than countries served only by LCCs. However, this likelihood also depends on what type of air connectivity is central to a nation’s economy; specifically, what their leisure and business travel markets want.

**Regulatory and economic framework**

Public policy and regulation can powerfully facilitate air connectivity – or hinder it by constraining development of a country’s air-transport network. Since the 1940s, international air services have been governed by a complex web of bilateral air services agreements (ASAs) between States. Such agreements determine the number of airlines that may compete in any given market, the routes that airlines may operate, capacity (in terms of frequency, and often the number of seats offered) that airlines may provide, and airfares. In recent years, some States have moved to liberalise ASAs; for example, through so-called ‘open skies’ agreements. Yet despite these open-access models, restrictions remain.

Most notably, when it comes to ownership and control of airlines, most ASAs allow governments to reject the designation of any airline that is not owned and controlled by the designating party. For the foreseeable future, the prospect of ‘normalisation’ of air transport, particularly with respect to consolidation or cross-border mergers of airlines, remains limited.

Governments trying to decide the degree to which they want to liberalise their ASAs would generally take a number of factors into account. For example, a country’s geographic features influences the extent to which liberalisation will boost air travel and connectivity. Geography also dictates the features of a country’s air-travel market; in particular, whether it is mainly domestic market, an international market, or a transit point for global traffic flows. The attractiveness of the country to tourists and businesses also matters, with population affecting the size of the potential market. For instance, geographically isolated countries may be more likely to see liberalisation as being in their economic interest, especially if they’re not attractive to tourists or they don’t have the population density needed to build a competitive air-transport network.

Size and geographic location may also influence a government’s attitude toward liberalisation of airline ownership provisions. Unfortunately, ownership decisions can’t be made unilaterally. Countries need agreement from ALL the bilateral partners who are most significant to their markets – or they risk having airlines with foreign ownership rejected. This is a problem of growing significance for governments seeking fresh capital investment in their airlines. As former flag carriers experience distress, the need to maintain air connectivity will raise new questions about the role of public- and private-sector investment in the industry.

**How can stakeholders facilitate connectivity growth?**

With the exception of external factors such as geography that are beyond one’s control, stakeholders have the ability to influence many of the factors that enable achievement of greater air connectivity. For instance:

Emerging countries can achieve greater air connectivity by:

- Focusing on the development of aviation infrastructure (such as airports) – attracting new investors and ensuring that enough capacity is created to accommodate demand.
- Airlines need to continue establishing and building up their networks to support the linkages a country has with the rest of the world.
- Developing regulatory and economic frameworks which reflect the characteristics and needs of the country, whilst at the same time, fostering air transport growth.

On the other hand, more mature economies will need to focus on sustaining air connectivity by:

- Maintaining the current aviation infrastructure (such as airports) and ensuring any need for additional aviation capacity is promptly addressed to avoid loss of air connectivity to other competing neighbouring countries.
- Airlines should continue to find new routes to enhance their network connectivity which is vital to the success of an airline. These opportunities may be found in emerging markets.
- Mature economies should examine their regulatory and economic frameworks to see that these are continuing to enable growth.

The importance of air connectivity to a country’s economic prosperity calls for stakeholders to work together towards ensuring that the right steps are taken to improve or maintain the global position of a country (or city) within the global air network.

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