

---

# ***Airport infrastructure in Asia***

## ***Coping with the demand surge***

Edward Clayton

### ***Executive summary***

Asia's rapid growth in the commercial aviation sector in recent decades has positioned the region as the largest and fastest growing in the world. The growth in Asia is expected to remain resilient, forecast to continue as the world's highest growth region well beyond 2020<sup>1</sup>. However, aviation infrastructure is not keeping pace with this growth. Many of the Asian hubs are already operating above their planned capacity, resulting in a rapid escalation of delays since 2010. Current plans for constructing mega-hub airports are not effective from a cost perspective and will fail to keep up with demand. Instead, governments should plan larger numbers of medium-sized airports to keep costs manageable, gain maximum operational efficiency, and build a wider aviation network, allowing Asian commercial aviation to continue in its role as a key enabler of economic growth.

Airport operators and governments in Asia are competing to build the world's biggest airport, with capacities well in excess of 100 million passengers per annum. However, our experience is

that owing to exponentially increasing complexity, airports suffer from significant diseconomies of scale above around 50 million passengers per annum, both for the airport operator (Capex and Opex) and for the airlines and passengers using them (time to move around the airport). At the same time, the network benefits of these very large airports do not increase as fast as their size. Therefore, Asian airport planners and operators will need to acquire capabilities in multi-airport systems – or radically change how airports operate to overcome the inherent scale diseconomies of mega-hubs.

### ***Asia as a high-growth region***

In recent decades, Asia has emerged as the leading region in aviation traffic, currently accounting for 30% of the world's revenue passenger kilometres, up from 24% in 2004. As the world's fastest growing region, Asia should see its growth remain resilient at over 6% per annum over the next two decades<sup>1</sup>. In contrast, established regions such as Europe and North America are expected to experience relatively slower growth, with opportunities scarce due to market maturity, environmental concerns, and increasing availability of substitutes such as high-speed rail.

---

**The growth in Asia is expected to remain resilient, forecast to continue as the world's highest growth region well beyond 2020.**

---

<sup>1</sup> IATA

Asia's surge in demand for airport infrastructure is explained by three factors: liberalisation of the Asian markets, growth in wealth and size of the Asian middle class, and a lack of alternative modes of transport.

Since the 1980s, the opening of formerly closed countries in Asia to global trade has massively stimulated the movement of both goods and people in the region. Free trade agreements (FTAs) have driven the convergence and integration of economies within Asia, stimulating intra-regional trade. Concurrently, Asian countries have liberalised visa requirements and air travel agreements. For example, the ongoing programme of ASEAN air services liberalisation has already resulted in significant increases in flights between capital cities, and should enable the opening up of many secondary airports to intra-ASEAN flights in 2015.

In combination, the liberalisation of Asian economies and travel restrictions has opened travel opportunities to new population segments, many of which were previously unable to travel by air.

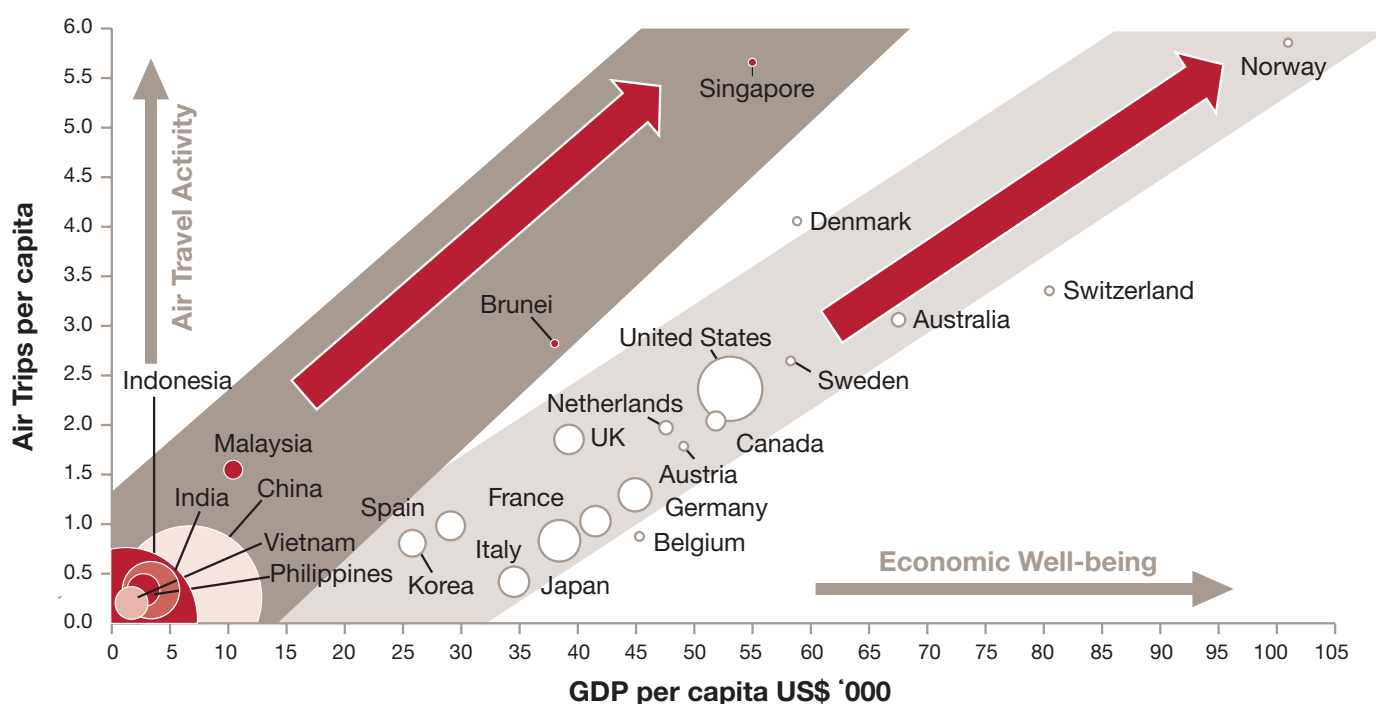
Asia already has the largest share of the world's urban population in its cities; this is unleashing a massive wave of new travel. The reasons are simple: people migrate to centres where they can earn higher wages; they can then travel owing due to the availability of airport infrastructure in proximity to such cities. They also have the motivation to do so, in many cases for visits to their home towns but also for tourism. Asia is rapidly becoming a higher income region, and is already home to 41% of the world's middle class. This percentage is predicted to rise to 68% of the world's middle class in 2033, owing to an

expected four-fold increase in absolute numbers of Asia's current middle-class population.

Empirical evidence shows that the propensity to travel increases with the economic well-being of the country. (See Figure 1.) However, upon further inspection, the trend points toward an even more compelling case for the growth of air travel in Asia. At similar levels of economic well-being, Asians take more trips than the Europeans and North Americans who adopted mass air transport far earlier than Asians.

One reason for this is the lack of alternative modes of transport. Unlike in Europe and North America, where large contiguous landmasses allow intercity highways and railways, large parts of Asia can be reached only by air. Geographical barriers include mountainous

**Figure 1: Air-travel activity versus economic well-being**



Note: Air Trips per capita is calculated as number of departing passengers divided by total population.

Source: The World Bank, Strategy & analysis

regions, the island nature of much of Southeast Asia (the Philippines, Indonesia, Malaysia, Brunei, and Singapore), and sheer distances between major Asian cities. Although high-speed rail is now well developed in parts of North Asia, for much of the continent, air travel will remain the best option from a cost and time perspective for the foreseeable future.

To fully respond to this demand, Asia's current aircraft fleet has to grow rapidly. This equates to an estimated 13,000 new aircraft deliveries in the next 20 years, more than doubling the size of the current fleet. So, the question remains: How can a region set to lead the world in terms of aviation traffic and size of fleet accommodate its growth?

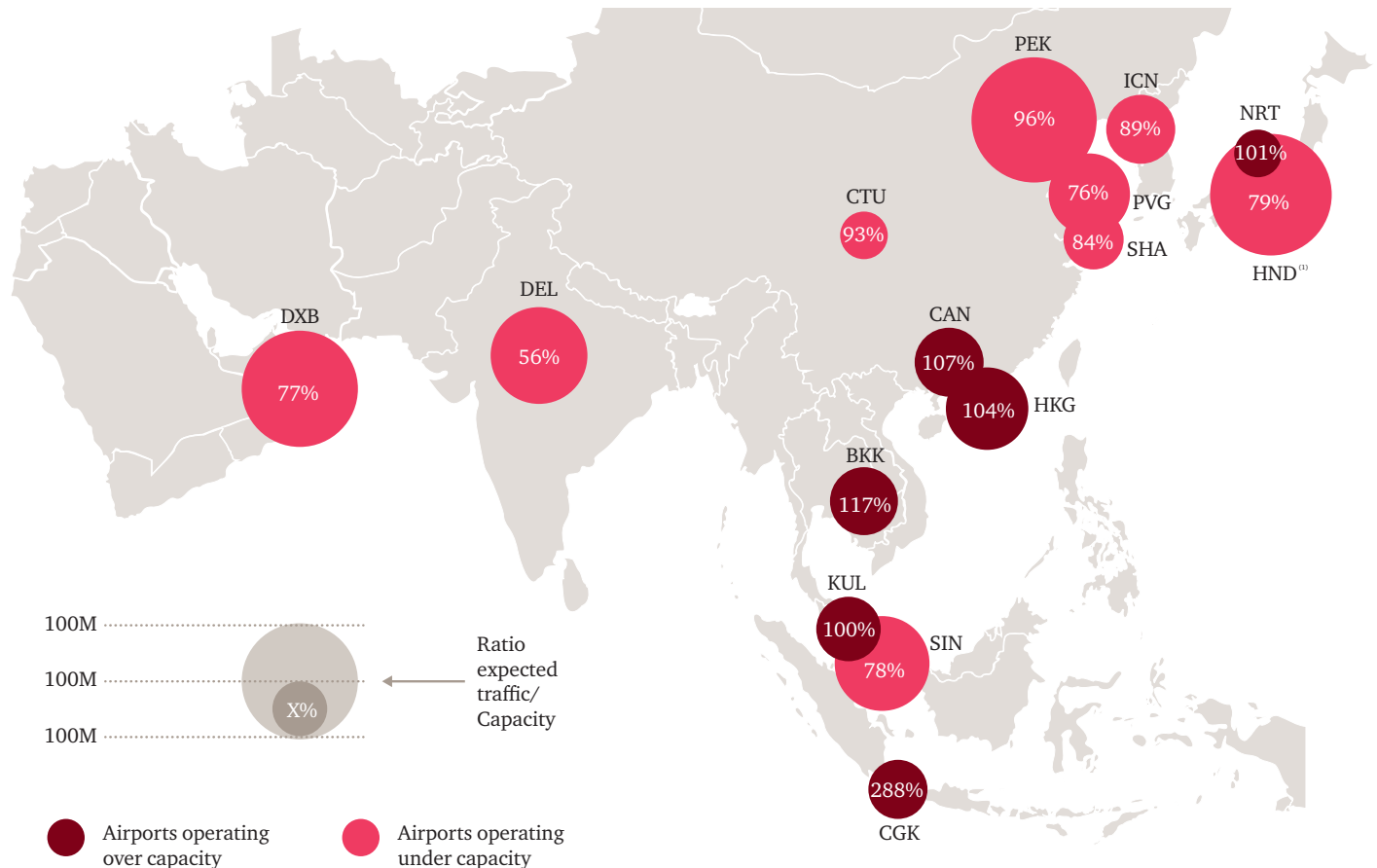
## Asia's current aircraft fleet has to grow rapidly.

### Current observations in Asia

Development of Asia's airport infrastructure has lagged behind travel growth. Traffic at most major Asian hubs is already exceeding planned capacity whilst even secondary hubs are starting to experience capacity strains. (See Figure 2.) Since the large surge in Asian airport developments in the 1990s, infrastructure has rarely been built ahead of demand. This is a cause for concern, owing to Asia's predicted high rate of growth and given that runway and terminal projects typically require 5-10 years from need recognition to implementation.

As a consequence, congestion-related delays are rapidly increasing at most Asian hubs. Passengers experience increasingly common flight delays, long queues for take-off, and circling of aircraft in stacks prior to landing. Availability of suitable landing and take-off slots is suddenly becoming scarce, leaving airports unable to cope with any further growth, and leaving airlines with nowhere to operate their newly delivered aircraft. Therefore, it is not surprising that in 2013, only 57% of departures from Asian airports were on time. This number is considerably lower than for airports in North America and Europe, which boast 79% and 73% of departures on time, respectively.

Figure 2: Passenger capacity of Asian hubs in 2012



Source: IATA PaxIS, Strategy& analysis

Specifically, in 2013, less than one third of the flights from China's three largest airports departed on time. And even Changi International Airport and Incheon International Airport, both award-winning and highly rated, were not able to match North America's average percentage of on-time departures.

When we look more closely at the demand patterns, we see some major issues that have exacerbated the problem:

**1. Liberalisation and the growth of LCCs has led to smaller aircraft being deployed:** Historically, Asian airlines operated large aircraft with relatively low frequency between capital cities. Most of the growth in the past decade has been in narrow-body flights, reducing the ratio of passengers per runway slot.

## In 2013, only 57% of departures from Asian airports were on time.

**2. Rates of commercial aviation growth have been higher than forecast:** Despite various set backs such as SARS, the 2008 GFC, and political issues in some countries, aviation in Asia has grown faster than forecasters of the 1980s and 1990s expected.

However, looking beyond the demand for flights to the supply of infrastructure, we can see that Asia has developed its airports in a very different way from the rest of the world.

As a region, Asia has just 0.22 airports per million inhabitants; the least of any region in the world. (See Figure 3.) However, these airports serve an average of 1.75 million passengers, well above the mature aviation markets of North America and Europe.

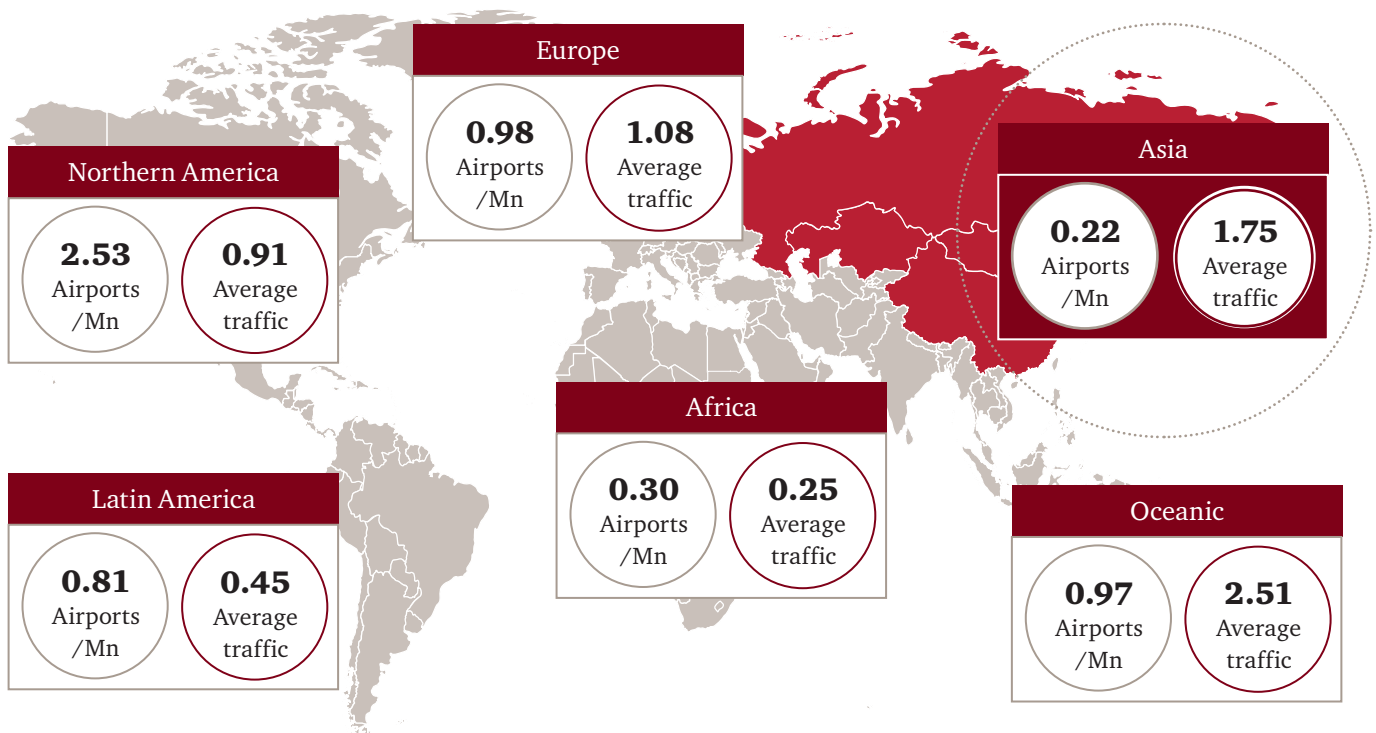
Bearing in mind that Asia's main hubs are already under capacity despite being among the largest in the world, it's clear that Asia has too few airports, and the inefficiencies of larger-sized airports is leading to increasingly frequent delays.

### Moving to a better travel world

#### Building mega-hubs

Several mega-hub projects have been announced and are set to come into service in the next decade. Such projects include the Al Maktoum International Airport, Beijing Daxing International Airport, Hong Kong International Airport's Three-Runway System, and

Figure 3: Airports per million inhabitants and average airport capacity in 2013



Note: The definition of 'Airports' refers to facilities with a paved runway of at least 5000ft (1,500 metres) in length and has scheduled passenger service on commercial airlines.

Source: The World Bank Group, OAG, Airbus, Strategy& analysis

Changi's East extension. When finished, each of these is planned to have a capacity of more than 100 million passengers per annum.

When we study growth trends amongst airports globally, we find that the largest airports have experienced slow rates of growth, appearing to hit a growth wall at the 80-100 million passenger level, while the second tier of large airports continues to grow rapidly in terms of passengers served. Given the current inability to manage large Asian hubs efficiently, and the evidence from other regions that airports typically do not grow indefinitely, constructing even larger airports may not be the best approach moving forward.

### **Optimizing airport size**

An alternative approach involves the construction of a larger number of optimally sized airports, sufficient as a whole to handle the growth in demand – despite being smaller than mega-hubs. The rationale behind this approach rests on three pillars:

- Delivering airport infrastructure that is cost-effective and efficient, potentially introducing competition for the provision of airport infrastructure
- Providing airport accessibility to a larger percentage of the population, as more airports inevitably means a larger population lives within easy surface-travel distance
- Improving the quality of travel and reducing congestion and delays, during normal service and by delivering redundancy in the event of unplanned incidents

This approach is not entirely new; more than 70 cities globally (including London, Paris, New York, Chicago, and Sao Paulo) are already being served by more than one airport, with just 15 such cities in Asia (such as Kuala Lumpur, Bangkok, and Manila). Regardless of the reasons for multi-airport cities,

## **Asia's main hubs are already under capacity despite being among the largest in the world.**

the benefits appear clear. Operating several smaller airports is very different from operating a mega-hub with capacities exceeding 100 million passengers per annum, both in magnitude of costs and ease of achieving operational efficiency.

### **Managing multiple airports**

The notion of having multiple airports serving a city, raises several concerns:

- In some cases (such as Singapore and Hong Kong), it is extremely hard to find space in the city for more than one airport. In these situations, airports in neighbouring territories can provide an alternative (for example, Johor Bahru for Singapore, and Shenzhen, Macao, and Zhuhai for Hong Kong).
- To avoid transfer passengers having to move between airports in a multi-airport city, airports should be planned so that a single airline or alliance can be accommodated in a single airport; transfers between non-alliance airlines are rare.
- Private airport operators may not wish to see a competing airport in the city. It is therefore essential that prior to privatisation, clear policies on multi-airport development are laid out so that the operator has certainty when making the privatisation investment.

### **Conclusion**

Our recommendation is that government policy makers and planners in Asia consider moving beyond simply considering the provision of capacity to meet demand, and instead think through the options for providing a cost-effective travel experience for passengers. Such options should take into account surface travel distance

to the airport, time spent navigating the airport (kerbside to aircraft), and operating efficiencies that airlines gain with shorter taxi distances from runway to gate as well as slots that are available to suit passenger and airline schedules. Our expectation is that airports with terminal capacities of 20-25 million passengers and runway capacity of around 50 million passengers (twin independent parallel runways) will give the optimal combination of scale economy whilst allowing the majority of passengers to travel on point-to-point flights. As such, governments should plan to construct more optimally sized airports with capacities of 20-50 million passengers per annum, rather than mega-hubs exceeding 100 million passengers. In this way, they will stand a better chance of meeting Asia's growing demand in a way that enhances air connectivity and improves the quality of travel.

**Note:** We have not addressed air cargo in this paper. Because of its nature, air cargo tolerates much longer journey times to airports, and therefore different scale issues arise.

*About the author: Edward Clayton is Managing Partner, Strategy& for Malaysia, Singapore and Brunei. He provides strategic advice to airports, airlines, aviation regulators as well as economic policy makers throughout Asia-Pacific.*

*Contact: Edward Clayton  
(Edward.Clayton@strategyand.pwc.com,  
+60 16 672 3420)*