

Research Office Legislative Council Secretariat

Information Note

Policy measures to enhance airport competitiveness in selected places

IN01/17-18

1. Introduction

1.1 Hong Kong International Airport ("HKIA") has been playing a vital role in the local economy, with the aviation-related business generating HK\$94 billion of value-added and employing 148 000 persons in 2012, equivalent to about 4.6% of GDP and 4.1% of total employment respectively.¹ Since its relocation to Chek Lap Kok in 1998, HKIA had been ranked as the best civilian airport in the world for a total of eight times up to 2011, while its global ranking as busiest international airport in terms of the number of international passengers had also ascended from the 5th to the 3rd position over the same period.² Yet the competitiveness of HKIA appears to have receded noticeably in the more recent years, in face of challenges such as (a) intensified competition especially from airports in the Middle East and the Mainland; (b) capacity constraint under the existing two-runway system; (c) emerging popularity of low-cost carriers and high speed rail; and (d) airspace congestion in the Pearl River Delta ("PRD") region. As such, HKIA has slipped consecutively to the 5th position in terms of the global ranking of "best civilian airport" in 2017.³ Its overall passenger volume also moderated to 3% growth in 2016, along with a steady decline in the proportion of transit/transfer ("TT") passengers.⁴

1.2 At the request of Hon YIU Si-wing, the Research Office has conducted a research study on measures taken to strengthen airport competitiveness in

¹ This is the sum of direct, indirect and induced contribution generated from the aviation-related business in Hong Kong, according to an updated consultancy study commissioned by the Airport Authority Hong Kong ("AAHK") in 2015. See Airport Authority Hong Kong (2017b).

² This note focuses on analysis of international airports and international passenger volume, excluding domestic airports and domestic passenger volume.

³ According to votes cast by 13.8 million global air passengers, Singapore Changi Airport is ranked the best airport in the world in 2017, followed by Haneda International Airport in Tokyo, Incheon International Airport in South Korea, Munich Airport in Germany and HKIA. As to the busiest airport in terms of international air passenger volume, Dubai International Airport, London Heathrow Airport and HKIA took the top three positions in 2016. See Skytrax (2017) and ACI (2017a).

⁴ Transit passengers continue their journey on the same aircrafts at the stop-over airports, while transfer passengers arrive and depart on different aircrafts at the stop-over airports.

selected places.⁵ Airports in Dubai and Singapore are selected for further study because they are close competitors of HKIA. Moreover, Singapore Changi Airport has been ranked as the best airport in the world for five straight years since 2013, while Dubai International Airport ("DXB") has become the busiest international airport in the world for three straight years since 2014.

1.3 This information note begins with a review of key developments in global aviation in recent years, followed by a quick analysis on the competitiveness of HKIA. It then discusses the salient features of policy measures taken in Dubai and Singapore to boost their airport competitiveness in recent years, with a summary table in the **Appendix**.

2. Recent developments in global aviation

2.1 Over the last decade, *the growth engine in global aviation demand has shifted towards Asia-Pacific region, especially the Mainland*. During 2006-2016, the volume of global air passengers has increased at a trend rate of 6%, slower than the 10% trend growth in Asia. To a considerable extent, buoyant aviation demand in Asia was attributable to the double-digit trend growth of 12% in the Mainland, spurred by rising affluence and hefty investment in airport infrastructure there.⁶ As the number of airports in the Mainland has increased by more than 50% from 142 to 218 during 2006-2016, it generated heavy air traffic flows both domestically and internationally. It is expected that the *Asian region will entrench its growth driver position in the next two decades*, as half of global investment in airport infrastructure estimated at US\$1.1 trillion (HK\$8.5 trillion) is directed to Asia right now.⁷ More specifically for the Mainland, it is expected to overtake the United States to become the largest air passenger market in the world in 2024 (Figure 1).

⁵ The request was made under a pilot scheme of a new initiative to strengthen research support to individual Members in the Sixth Legislative Council. This note will focus on airport competitiveness of international air passengers only, as airfreight itself merits another independent study.

⁶ Also contributed was increased popularity of intra-regional travel in Southeast Asia, along with enlarged spectrum of middle class in the region and growing popularity of low-cost carriers. See PwC (2013).

⁷ Globally, US\$1,100 billion (HK\$8,538 billion) is earmarked to build new airports or upgrade the existing airports by building new runways, terminal buildings and terminal extensions in 2017. For the Asian region, the respective investment is US\$525 billion (HK\$4,075 billion). As a result of this robust infrastructural investment, the share of Asia-Pacific region in global aviation demand is forecast to pick up visibly further, from 36% in 2016 to 43% in 2035, while the corresponding share of the Mainland will leap further from 13% to 18% over the same period. It was forecast that four out of the top five fastest-growing air passenger markets in the next two decades would be Asian countries, including the Mainland, India, Indonesia and Vietnam. See CAPA (2017) and IATA (2016).



Figure 1 – Average annual growth rate of air passengers, 2006-2016

Data sources: ACI, Civil Aviation Department and Civil Aviation Administration of China.

2.2 With more new entrants, competition amongst airports to become *global or regional hubs has intensified*.⁸ Traditionally, hub airports in prime locations (e.g. London, Hong Kong and Singapore) could attract a large amount of passengers to transit or transfer for connecting flights to their final destinations. As these TT passengers usually account for 30%-50% of passenger flows in these hubs, it helps considerably enlarge the customer base of the hub airports for creation of new air routes. However, new hub airports located in the Middle East (e.g. Dubai, Qatar and Istanbul) and Asia (e.g. Seoul, Beijing and Shanghai) have emerged in importance over the past decade, competing some of these TT passengers away from traditional hubs.⁹ Furthermore, there is an increasing number of direct flights from new airports located in second-tier cities, upon a higher density of flight routes. It tends to divert some of air traffic from traditional hub airports as well.

⁸ Hub airports refer to those airports which are used by a number of airlines for connecting flights to other destinations, and TT passengers change flight there to final destination. With these TT passengers, hub airports have enlarged customer base, facilitating creation of more new routes which could not have been in place with local population only. For global airlines, the existence of hub airports enable them to achieve cost-saving by serving fewer direct flights which may not be financially viable due to limited local demand. See Cook and Goodwin (2008).

⁹ According to a study, 60% of passengers taking long-haul flights beyond 5 000 km (broadly similar to an eight-hour flight between Hong Kong and Dubai) are connecting passengers. See Johannes Gutenberg-University Mainz (2016).

2.3 To a considerable extent, *increased availability of direct flights is* precipitated by growing popularity of low-cost carriers, which in turn has posed a new challenge to full-service carriers and airport operators. Originated in the United States in the 1980s and rapidly developing in Europe in the 1990s and Southeast Asia in the 2000s, low-cost carriers are best suited for intra-regional air travel within flight duration of less than five hours.¹⁰ More specifically for Southeast Asia, the share of air passenger market captured by low-cost carriers has almost doubled from 32% in 2007 to 56% in 2016, higher than that of Western Europe (40%) and North America (32%).¹¹ By virtue of its low ticket price and direct flights to less convenient locations, low-cost carriers have crowded out some of passenger demand from fullservice carriers. For airport operators, although low-cost carriers can meet market demand and bring in more customers, business receipts brought by low-cost carriers to airport operators tend to be lower than full-service carriers due to lower landing/parking fees of narrow-body aircrafts largely used by low-cost carriers, especially when the airports concerned are facing immediate capacity constraints.¹²

2.4 In recent years, *rapid development of high speed rail in Asia has become a new challenger to the aviation industry, especially in the Mainland*. According to a study, high speed rail services for short journeys of around 300 km (lasting for about one hour) could completely crowd out aircraft services. Yet this "substitution effect" is inversely correlated with the journey distance, with the impact conceived to be almost muted when the rail distance goes beyond 1 000 km (about four-hour journey).¹³ In the Mainland, the total length of the high speed rail network has already reached 22 000 km in 2016,

¹⁰ Low-cost carriers are characterized by (a) point-to-point direct flights; (b) use of narrow-body aircrafts with fewer seats; (c) more frequent return flights and high aircraft utilization; and (d) simple operations in airport and fast turnaround time. Without frill services and in-flight entertainment, low-cost carriers provide basic service with the lowest cost. See JLS Consulting (2012), CAPA (2015) and Reuters (2017).

¹¹ Northeast Asia was one of the few exceptions, with a market share captured by low-cost carriers of only 11% in 2016. Slower development of low-cost carriers in Northeast Asia can be partly attributable to the stronger market position of the flag carriers there. Moreover, flying slots and traffic rights in Northeast Asia are more restrictive than Southeast Asia. See CAPA (2016a) and (2016b).

¹² Narrow-body aircrafts usually have only one aisle to divide normal passenger seating into two groups, with a capacity of less than 200 passengers for short-haul flights. By contrast, internal cabin of wide-body aircrafts is large enough to divide passengers into three groups by two aisles, with a much larger seating capacity for much longer flights. More recently, some low-cost carriers began to use wide-body aircrafts as well, in view of the slot-constrained airfields and higher passenger demand. See ICAO (2004).

¹³ In Taiwan, the launch of high speed rail in 2007 led to a 93% decline in the number of flights between Taipei and Kaohsiung in 2009. In Japan, the 500-km Shinkansen between Tokyo and Osaka took up 85% of the corridor's traffic in 2007. In South Korea, the share of domestic flight in the transport between Seoul and Busan fell from 42% to 17% during 2003-2008 after the launch of high speed rail. See D'Alfonso (2014), Nippon Communications Foundation (2014), PwC (2011), Taipei International Airport (2009) and Xia and Zhang (2017).

delivering 1.18 billion passenger trips.¹⁴ In spite of the robust growth in high speed rail, the volume of air passengers continued to grow at a buoyant trend rate of 12% during the past decade, suggesting that the "substitution effect" caused by high speed rail was not as great as earlier expected.

3. Recent aviation developments in Hong Kong

3.1 Leveraging on its geographical position as a gateway to the Mainland and its extensive aviation network, Hong Kong is one of the global aviation hubs. Within flying time of just five hours, one can reach almost half of the population in the world, predominantly in Asia. In 2016, HKIA was connected to 220 destinations across the globe (some 50 of which were located in the Mainland) provided by more than 100 airlines.

3.2 Under the existing two-runway system, HKIA can handle at most 68 aircraft movements per hour to meet the safety standards set out by the Civil Aviation Department. This hourly upper limit is similar to major airports in the world.¹⁵ As a result of this capacity constraint, trend growth in aircraft movements at HKIA has slowed from 5.5% during 1998-2015 to only 1.4% in 2016. Likewise, trend growth of air passenger volume has also moderated from 5.5% during 1998-2015 to 2.9% in 2016. Both aircraft movements and air passenger volume hit the record high levels in 2016, at 411 566 and 70.5 million respectively (**Figure 2**).

¹⁴ High speed rail services in Mainland commenced in 2004. By 2020, the high speed rail network will cover 80% of major cities, comprising 16 high speed rail corridors, with eight running north-south and eight travelling east-west respectively. See International Railway Journal (2015) and Xinhua News (2016).

¹⁵ The peak hours of air traffic at HKIA is between 8:00 am and 12:00 midnight. According to the Government, the maximum number of hourly aircraft movements under two-runway system during the peak hours is 68 at Narita (Tokyo), 68 at Suvarnabhumi (Bangkok), 62 at Changi (Singapore) and 62 at Dubai. See Transport and Housing Bureau (2015) and Airport Authority Hong Kong (2011).

	1998	2003	2008	2013	2016
Aircraft movements	163 223	187 507	301 138	372 080	411 566
Capacity of air passengers (million)	35	48	55	60	74
Volume of air passengers (million)	28.6	27.4	48.6	59.9	70.5
Derived capacity utilization rate (%)	81.7%	57.1%	88.4%	99.8%	95.3%

Figure 2 – Aircraft movements and air passengers of HKIA, 1998-2016

Data source: Airport Authority Hong Kong.

3.3 In the short-to-medium term, the position of HKIA as an international aviation hub is facing headwinds from several fronts, as summarized below:

- (a) **Capacity constraint up to 2024:** As the two-runway capacity is approaching its maximum of 68 aircraft movements per hour, there is a limited growth potential in air passengers in Hong Kong in the next seven years until completion of the construction work of the third runway by 2024.¹⁶ With this constraint, further growth in air passenger volume at HKIA may be achieved if more airlines switch to larger aircrafts with greater seating capacity. Yet choice of aircraft is largely a commercial decision with reference to the number of passengers of specific air routes.
- (b) Keen competition from emerging airports: Hong Kong cannot be immune to fierce competition from other airports. *First*, some long-haul passengers may choose to transit/transfer at other global hubs like Dubai and Seoul, instead of Hong Kong.

¹⁶ Although AAHK is studying ways to "marginally" enhance the capacity of the two runways during off-peak hours (early mornings and late nights), incremental growth is rather limited. Since March 2017, HKIA has added 20 extra flights per day, or some 7 000 flights annually. In the coming years, HKIA targets to add 50 extra flights per day in order to come up with a total of 1 200 flights per day, or an annual capacity of some 420 000 flights by 2020. See SCMP (2017).

Secondly, following the commencement of weekly scheduled direct flights between the Mainland and Taiwan in August 2009, the number of scheduled routes of Taoyuan Airport in Taiwan has increased by 54% from 81 to 125 during 2009-2016, with an upsurge in passenger volume by 96%. As some of Taiwanese passengers fly from their home airport instead, the share of Taiwan in overall passenger throughput of HKIA had fallen visibly from 16% to 13% over the same period.

Thirdly, HKIA used to be an important gateway for the Mainland travellers going to overseas destinations, but this intermediation role has diminished somewhat after progressive extension of the international network of major airports of the Mainland. For three major hub airports in Beijing, Shanghai and Guangzhou, they altogether offered 341 international routes in 2016, more than 220 in Hong Kong.¹⁷ Reportedly, 68% of HKIA's direct routes were also served by Guangzhou Baiyun International Airport in 2015, up from 59% in 2011.¹⁸ With this potential competition and despite more than six-fold increase in international air passengers in the Mainland since 2009, the share of Mainland in the overall passenger throughput of HKIA stayed unchanged at 20% during 2009-2016.¹⁹

As air passengers from other places have more choices in connecting flights or even direct flights from other airports, the derived share of TT passengers in the passenger throughput of HKIA has witnessed a noticeable and steady downtrend in recent years, from 38% in 2008 to 31% in 2016 (**Figure 3**).²⁰

¹⁷ In 2016, the number of international routes from Beijing Capital International Airport, Shanghai Pudong International Airport and Guangzhou Baiyun International Airport was 132, 124 and 85 respectively.

¹⁸ See Hang Seng Management College (2017).

¹⁹ According to a press report, less than 10% of tour groups in the Mainland preferred to fly from Hong Kong in the case of overlapping destinations.

²⁰ The share of TT passengers is derived on the basis of statistics from Census and Statistics Department and Civil Aviation Department. It is also noted that global ranking of hub connectivity of HKIA slipped from 15th in 2016 to 19th in 2017. See ACI (2016) and ACI (2017b).



Figure 3 – Derived share of TT passengers of HKIA, 1998-2016

Data source: Civil Aviation Department.

Passengers (million)

(c) Lagged development of low-cost carriers in Hong Kong: In parallel with a shift in market demand towards cheaper direct flights to short-haul destinations offered by low-cost carriers, the share of low-cost carriers in overall passenger throughput in Hong Kong picked up visibly over the past decade, from 1.3% in 2005 to 9.3% in 2015.²¹ That said, development of low-cost carriers in Hong Kong still lagged behind major hub airports in Asia. Taking Singapore as an example, low-cost carriers took up 31% of its air passengers in 2015 (Figure 4).²² It will then be a challenge for the Airport Authority Hong Kong ("AAHK") to accommodate growing market demand for low-cost carriers, in view of the capacity constraint and generally lower airport receipts from narrow-body aircrafts.

²¹ In December 2001, the first scheduled low-cost carrier flight was introduced in Hong Kong for the destination of Manila. During 2001-2014, the number of flights in Hong Kong operated by low-cost carriers surged from 168 to 38 561. Most of the low-cost carriers in Hong Kong are owned by foreign companies at present.

²² In 2015, the share of low-cost carriers in overall air passengers was 30.4% for Singapore Changi Airport, 18.1% for Tokyo Narita International Airport and 13.3% for Incheon International Airport. See Hang Seng Management College (2017).



Figure 4 – Market share of air passengers captured by low-cost carriers in Hong Kong and Singapore, 2007-2015

(d) **Substitution effect of high speed rail:** As Mainland took up 20% of passenger throughput of HKIA, there were concerns that the scheduled operation of the 26-km long Hong Kong Section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link ("XRL") in the third quarter of 2018 would divert air demand to the national network of high speed rail.

Yet these concerns appeared to be overstated, taking note of the following factors. *First*, empirical data show that high speed rail development has limited impact on aviation demand in the Mainland. While overall passenger throughput of high speed rail (1.18 billion) was 171% higher than domestic air passenger throughput (436 million) in 2016, domestic air traffic still increased at a rapid trend rate of 10% during 2010-2016. *Secondly*, the inconvenient location of some high speed rail stations in the Mainland might limit the diversion effect.²³ *Thirdly*, according to an assessment of AAHK, while short-haul passengers from the Mainland are deemed to be most affected by high speed rail, they account for just 3% of overall passenger throughput of HKIA. The conceived diversion effect could be absorbed by overall growth in passengers from other routes.²⁴ *Fourthly*, as XRL is expected to bring additional customers from

²³ It is deemed that "inconvenient station locations and their lack of connectivity limit the substitution of high speed rail for air travel". See Credit Suisse (2013).

²⁴ It is expected that high speed rail destinations like Shantou, Changsha, Nanning, Xiamen, Wuhan, Nanchang and Fuzhou will be most affected by XRL. See Airport Authority Hong Kong (2011).

the Mainland for HKIA through the national network of high speed rail, this induced effect is expected to be benign for the aviation industry in Hong Kong.

(e) **Delay in air traffic due to airspace congestion:** Within a small airspace of just 150-sq km in the PRD Region, there are five major airports located in Hong Kong, Macao, Guangzhou, Shenzhen and Zhuhai. Coupled with the fact that only 20% of airspace is allocated for civilian use in the Mainland, arrival and departure flights in Hong Kong are vulnerable to delays due to air traffic control.

Contrary to public perception, airspace congestion itself is not a major constraint on aircraft movements in Hong Kong (which is more related to the runway capacity as discussed above), but it does cause delays which have adverse implications for the competitiveness of HKIA.²⁵ According to a global ranking of airport punctuality conducted in August 2017, only 55% of flights could depart from Hong Kong on time, lying at the bottom of 43 global hub airports included in the comparison (**Figure 5**).²⁶ Serious flight delays in turn could discourage passengers from getting connecting flights in Hong Kong.





²⁵ See Transport and Housing Bureau (2016).

²⁶ Haneda International Airport in Tokyo achieved a rate of punctuality at 85% in August 2017, the best in Asia and the second highest amongst 43 airports included in the worldwide comparison. For other major airports in Asia, the punctuality rate was 80% for Narita International Airport in Tokyo and 79% for Singapore Changi Airport. See FlightStats (2017).

3.4 Both AAHK and the Government have been taking measures to address the above headwinds and to strengthen the competitiveness of HKIA. These measures include:

(a) Construction of the third runway: The three-runway system valued at HK\$141.5 billion is scheduled to come into operation in 2024, with almost half of the construction cost debt-financed.²⁷ By then, the maximum capacity of aircraft movements handled by HKIA can be boosted from 68 to 102 per hour, and the annual limit on the air passenger volume from 74 million to 102 million, relieving the capacity pressure in the long run.²⁸

Nonetheless, as the three-runway system is only a long-term solution, HKIA still needs to address the capacity issue during the construction period up to 2024. Moreover, the three-runway system may not help enhance the competitiveness of HKIA much in the longer term, as other hub airports are engaged in even more aggressive expansion. For instance, the passenger capacity of 102 million of HKIA after the completion of the three-runway system in 2030 will still be far below that of 360 million in Dubai and 135 million in Singapore (**Figure 6**).

Figure 6 – Handling capacity of international passengers of major international airports in 2016 and 2030

	2016	2030
Dubai	90 million	360 million ⁽¹⁾
London (Heathrow)	90 million	100 million ⁽²⁾
Hong Kong	74 million	102 million
Singapore (Changi)	66 million	135 million

Notes: (1) The figures took into account both Dubai International Airport and Al Maktoum International Airport, which is expected to operate in full by 2025.

(2) While figures for Heathrow Airport include both domestic and international passengers, international passengers account for a large trunk (94%) of its overall passenger throughput.

Data sources: Civil Aviation Department, Dubai Airports, Heathrow Airport and Changi Airport.

AAHK plans to finance the three-runway system project through three means. They include (a) retaining AAHK's operating surplus amounting to some HK\$47 billion in 10 years up to 2025 which otherwise should be disbursed to the government as dividend; (b) charging travellers an airport construction fee at HK\$26 billion; and (c) borrowing/raising funds up to an estimated HK\$69 billion from the market. See Airport Authority Hong Kong (2017a).

²⁸ See Airport Authority Hong Kong (2011).

(b) Attracting Mainland passengers through sea/land linkage: At present, HKIA offers cross-boundary ferry services for nine ports mostly located in PRD through SkyPier and coach services for 110 Mainland cities.²⁹ This multi-modal transport linkage is quite effective in bringing in Mainland passengers for HKIA. In 2016-2017, the number of air passengers using such crossboundary sea/land transfer services amounted to 4.6 million, equivalent to 21% of all transfer passengers. These compared with the respective figures of 3.3 million and 19% in 2008-2009 (Figure 7).

Figure 7 – Number of passengers using cross-boundary sea/land crossing, 2008-2009 to 2016-2017



Data sources: Airport Authority Hong Kong and Civil Aviation Department.

The catchment area of HKIA in the Mainland, particularly in PRD, can be expected to widen further in the near future, upon completion of the Hong Kong-Zhuhai-Macao Bridge by end-2017. According to the Government, the Bridge can trim travelling time

²⁹ Upstream check-in service is available at eight ferry ports and six land points in PRD where passengers can check in for Hong Kong flights with participating airlines. Upon arriving at HKIA, passengers are not required to go through check-in formalities again. In 2014-2015, AAHK reduced the minimum connection time of the SkyPier service by 10 minutes by shortening the baggage and security process.

between HKIA and Zhuhai from four hours to just 30 minutes. Coupled with scheduled completion of XRL in the third quarter of 2018, more passengers from the western PRD may come to HKIA for international travel.

In anticipation of the additional flow of Mainland passengers arising from these infrastructural projects and to quicken the immigration clearance, AAHK is planning to build a multi-modal customs centre on an artificial island and a sealed 360-metre bridge next to SkyPier, with a total construction cost of HK\$3 billion.³⁰ The new facilities are scheduled to come into operation by 2022, saving travelling time by some 20 minutes, and bringing in additional 1.8 million air passengers from the Mainland each year. This may help boost the competitiveness of HKIA in the PRD region, relative to the airports in Guangzhou and Shenzhen.

(c) Zhuhai Jinwan Airport as supportive airport for HKIA: Zhuhai Jinwan Airport is 55% owned by AAHK, with a maximum annual passenger capacity of 12 million, but only half of which is utilized right now. Zhuhai Jinwan Airport could become a supportive airport for Hong Kong. *First*, the Zhuhai-Hong Kong Airport Management Company considered utilizing the spare capacity of Zhuhai Jinwan Airport to handle some of Hong Kong's 1 100 daily commercial business jet flights in 2017.³¹ *Secondly*, aircrafts could switch to land at Zhuhai Jinwan Airport to offload passengers, instead of waiting for landing at HKIA. *Thirdly*, passengers could travel between Zhuhai and Hong Kong by sea/land cross-boundary transport and helicopters. This would bring convenience to Mainland passengers flying to Zhuhai Jinwan Airport from other airports in the Mainland, for their onward international travel from HKIA.

³⁰ Passengers boarding coaches from Zhuhai/Macao would pass through the Mainland immigration and customs onto sealed buses that would transport air passengers directly into the expanded SkyPier through the new bridge. The coaches could park next to SkyPier, while the passengers could then board the underground train of AAHK to the restricted area of the airport for departure. In other words, they need not go through immigration and customs checks of Hong Kong at all.

³¹ At present, there are no more than 70 parking slots for business jets at HKIA, with even fewer landing slots. As these business jets carry only a limited amount of passengers, their cost-effectiveness is generally lower than the aircraft operated by airlines. See Government Information Bureau of Macao (2017).

(d) Improving airspace coordination in PRD: In 2004, the aviation authorities of Hong Kong, Macao and the Mainland formed a Tripartite Working Group to formulate measures to harmonize airspace and air traffic management arrangements in the PRD region.³² In 2007, the Tripartite Working Group drew up a plan aiming to optimize the utilization of the PRD airspace on the one hand, and to ensure their flight procedures were mutually compatible on the other.³³ Major measures implemented over the past decade included (i) setting up additional handover points between Hong Kong and Guangzhou and new air routes to cater for flights overflying Hong Kong to Guangzhou, Shenzhen, Macao, and the eastern part of the Mainland; (ii) adjusting Zhuhai's airspace structure; and (iii) establishing peripheral flight paths in the PRD region.

In July 2017, the civil aviation authorities of the three places signed a Memorandum of Co-operation to further improve air traffic management in PRD. On top of setting up mechanisms for regular exchanges and day-to-day coordination, they agreed to use advanced technology to simulate airspace operations in the three places for more reliable analysis on air traffic management.

(e) **Providing a level-playing field for low-cost carriers:** It has been the established policy of the Government to "provide a level-playing field for all carriers to operate services to and from Hong Kong, be they local or foreign, or full-service or low-cost".³⁴ To cater for the special operation needs of low-cost carriers, AAHK had made certain facility adjustments at HKIA in recent years. They included (i) direct taxi-in and taxi-out parking stands allowing short turnaround time of aircrafts; and (ii) parking stands designed for narrow-body aircrafts with a lower parking charge. Under open competition and even without special supportive measures, the market share of low-

³² The Tripartite Working Group was established by the Civil Aviation Administration of China, the Civil Aviation Department of Hong Kong and the Civil Aviation Authority of Macao, aiming to ensure flight safety in the PRD airspace while supporting air traffic growth.

³³ The Tripartite Working Group drew up the "Pearl River Delta Region Air Traffic Management Planning and Implementation Plan (Version 2.0)" in 2007 to consider the whole PRD airspace as an entity in the planning and harmonisation work, ensuring a healthy and orderly development of all the airports in the PRD region.

³⁴ See Transport and Housing Bureau (2013).

cost carriers in Hong Kong has surged from 1.3% in 2005 to 9.3% in 2015.

(f) **Targeted measures to attract TT passengers:** In September 2017, the Hong Kong Tourism Board announced some measures to attract TT passengers to visit tourist attractions within the same day of their stay in Hong Kong. These measures include (i) waiving the air departure tax of these visitors; (ii) partnering with local airlines and travel agencies to launch the "Hong Kong Transit Programme", providing discounts for visiting certain attractions such as Hong Kong Disneyland and Ngong Ping 360; and (iii) offering free transport (Airport Express) for these passengers.

3.5 Notwithstanding the above measures, the runway capacity issue is still expected to be a key constraint on HKIA in the next few years. There are suggestions that AAHK may need to prioritize the use of scarce resources at HKIA in the short-to-medium term, such as (a) according higher priority to those air routes using more wide-body aircrafts for better cost-effectiveness;³⁵ (b) focussing more on higher value-added international routes with in which HKIA has distinct competitiveness; and (c) leaving some of those Mainland routes to secondary locations with lower economic viability to other airports in PRD.³⁶

4. Policy measures to enhance airport competitiveness in Dubai

4.1 The rapid rise of DXB as a global aviation hub in just two decades has profoundly changed the competitive landscape of airports. After the opening of its second terminal in 1998, DXB was only the 30th busiest airport in the world in 2000. Yet Dubai government embarked on further expansion of DXB

³⁵ In short, wide-body aircrafts provide more seats to maximize the capacity for each valuable slot for departing and landing. Apart from higher landing and parking income for AAHK, wide-body aircrafts can bring in more visitors and generate more economic contribution for Hong Kong. See Bauhinia Foundation Research Centre (2016) and Hong Kong Business (2016).

³⁶ In 2016, 50 of 220 destinations of HKIA were located in the Mainland, with a share of 23%. Reportedly, some of these Mainland destinations registered low market demand and some even suffered loss. There were views that Hong Kong could proactively develop new or niche overseas markets to provide more choices for passengers of Hong Kong and the PRD region. See Bauhinia Foundation Research Centre (2016).

in the next decade, such as constructing the third terminal.³⁷ After the completion of major works, DXB overtook HKIA and Paris Charles de Gaulle Airport to become the 2nd busiest international airport in 2012. With cumulative eight-fold increase in international passenger volume during 1998-2016, DXB has also overtaken London Heathrow Airport ("LHR") to become the busiest international airport for three consecutive years since 2014. DXB is connected to 240 destinations across the globe provided by 90 airlines. The number of international passengers at DXB surged to hit 83.1 million in 2016, with a capacity utilization rate of 92% (Figure 8).³⁸

Figure 8 – Key milestone developments of Dubai International Airport, 1998-2016



Data sources: Dubai Airports, Heathrow Airport and Civil Aviation Department.

4.2 Geography underpins the success story of DXB. *First*, located in the Middle East, DXB is an ideal stop-over hub for long-haul connecting flights especially between Asia and Europe. Within an eight-hour flight, DXB can reach destinations covering two-thirds of global population. As a "super-

³⁷ DXB has three terminals, which were open in 1998, 2000 and 2008 respectively.

³⁸ In 2016, the annual passenger capacity of DXB was 90 million passengers. See Dubai Airports (2017).

connector", many global airlines choose DXB for transferring their air passengers. According to the most recent statistics available, as many as 70% of the air passengers of DXB are for TT purpose in 2012, more than doubled that of 30% in Hong Kong. *Secondly*, given the limited railway network in most of the places in the Middle East (e.g. Kuwait, Oman and Qatar), air transport has become an important transport means for Dubai. *Thirdly*, the flag carrier of Dubai provides quality services at competitive prices, attracting a large number of TT passengers from other places.

4.3 On top of strategic location advantages, the Dubai government also made a significant contribution to the rapid rise of DXB as the global aviation centre. Here are the major policy measures taken to enhance the airport competitiveness in Dubai:

(a) Heavy investment in airport infrastructure: the Dubai Government has long adopted a proactive approach to expand its airport facilities to meet future demand, as it considered that "supply should come before demand" in terms of airport capacity.³⁹ Reflecting this, when the number of air passengers at DXB was only 22 million in 2004, the Dubai government commenced the construction of Terminal 3 to expand the capacity for 60 million passengers. It also planned in 2004 to expand its second airport, Al Maktoum International Airport ("DWC"), in anticipation of complete saturation of DXB by around 2018. Upon completion of the whole expansion project in 2025, DWC will replace DXB as the primary airport in Dubai. DWC will also become the largest airport in the world, with a capacity up to 240 million passengers annually in 2025, more than double the respective capacity for HKIA even after the completion of the three-runway system.

More specifically on the entire airport expansion project in Dubai, the total cost is estimated at US\$32 billion (HK\$248 billion). Reportedly, the project will be financed by (i) government equity; (ii) loans;⁴⁰ and (iii) passenger service fees,⁴¹ but detailed breakdowns are not publicly available.

³⁹ See Airport Business (2007).

⁴⁰ The first stage of loan amounting to US\$3.1 billion (HK\$24 billion) has been secured, about half of which from conventional loan and another half from Islamic finance. See Emirates News Agency (2017).

⁴¹ Since July 2016, air passengers flying out of Dubai had to pay a fee of US\$9.5 (HK\$73.6).

(b) **Open skies policy to attract connecting passengers from other places:** With a small territorial size of only 4 114 sq km and local population of just 2.8 million in Dubai, it is of utmost importance for DXB to attract a huge number of TT passengers from other places to sustain its airport operation. The Dubai government has thus adopted a highly liberalized aviation policy, welcoming any foreign airline to operate at DXB. As at 2012, the United Arab Emirates has signed 158 bilateral air services agreements with other places, 79 of which were open skies agreements.⁴²

With these open skies agreements and abundant spare capacity available at DXB, global airlines have established many new routes to new destinations, as reflected in a doubling in total flight destinations of DXB from 130 in 2010 to 240 in 2016. This has thus created huge connecting opportunities for overseas passengers, which in turn can attract more overseas TT visitors.

(c) **Promoting tourist attractions complementing the hub function of airport:** As discussed above, long-haul passengers have many choices regarding stop-over hubs. As such, the Dubai Government has created some tourist attractions, including the indoor skiing resort, Dubai Aquarium & Underwater Zoo (one of the largest in the world), desert safari, and mega sports events. These attractions help generate stop-over travel demand.

More specifically for TT passengers, DXB also provides dedicated attractions. For example, special snooze cube⁴³ are available in case TT passengers wish take a nap for a few hours. Furthermore, passengers can access to a swimming pool equipped with gym, sauna and shower facilities for a small fee. This has considerably boosted the attractiveness of DXB as a connecting hub, both for same-day travellers and those staying in Dubai for a couple of days before onward travel to final destinations.

⁴² Unlike bilateral air services agreements, open skies agreements go one step further by including more liberalized provisions to foster free market competition. In short, open skies agreements set no restriction on number of airlines, flights, capacity, frequencies, and types of aircraft to operate between the contracting places. Airlines could then provide their aviation services based entirely on market demand conditions.

⁴³ Unlike standard hotel rooms, snooze cubes are micro-hotel rooms inside the passenger terminal. Each snooze cube has a bed, touchscreen TV offering music and movies, WiFi access and separate storage space for hanging clothes and keeping luggage.

- (d) Speeding up transfer procedures and immigration clearance: Time required for going through transfer or immigration clearance is an important consideration of passengers. DXB adopted two types of technology to save time for passengers. First, some 530 motion sensors were installed at crucial passenger processing areas in DXB in 2016 to track the length of queue and the number of staff being deployed. The real-time information was transmitted to some 5 000 operational staff of the airport, airlines and immigration control authorities so that relevant parties can quickly deploy resources to address bottlenecks. Secondly, holders of biometric passports from 32 pre-approved countries could use the automated machines to go through immigration process within 20 seconds since 2015. In the first quarter of 2017, waiting time of passengers fell by 10% on average, with the processing time of some 84% of transfer passengers completed within five minutes.⁴⁴
- (e) Incentives for deploying wide-body aircrafts for cost-effective utilization of capacity: As wide-body aircrafts can carry more passengers than other aircrafts, there are incentives for airlines to use wide-body aircrafts in Dubai. For instance, wide-body aircrafts are entitled to free parking time up to three hours in DXB, twice the respective free parking time for narrow-body aircrafts.

4.4 Looking ahead, the capacity-led model is likely to give further competitive strengths to the airports in Dubai. As the two airports at DWC combined can handle a capacity of as many as 360 million passengers by 2025, coupled with tailor-made facilities for TT passengers, Dubai may be able to entrench its market leadership position in the coming years.

⁴⁴ In Hong Kong, the Immigration Department of Hong Kong adopted similar face recognition technology in self-service departure for visitors to Hong Kong ("Smart Departure") at HKIA on 10 October 2017. Photos of visitors taken at arrival clearance counters Hong Kong will be used to authenticate their identities when they leave Hong Kong. The entire departure clearance procedure could then be shortened to just 20 seconds. See GovHK (2017).

5. Policy measures to enhance airport competitiveness in Singapore

5.1 With a small territorial size of 720 sq km and local population of just 5.6 million, the home market is considered too small for the Singapore Changi Airport. With an annual handling capacity of 66 million passengers, Changi Airport relies heavily on TT passengers to sustain its viable operation. It is estimated that TT passengers accounted for about 30% in its overall throughput in 2016. There are more than 100 airlines flying to more than 200 destinations in around 90 countries from Changi Airport right now.

5.2 Notwithstanding its strategic location in Southeast Asia, the competitiveness of Changi Airport is increasingly challenged by emerging hubs like DXB in the Middle East over the past decade, particularly for connecting flights between the Asia-pacific region and Europe. Moreover, robust growth of direct flights offered by low-cost carriers in Southeast Asia also diverted some of the air traffic away from Changi Airport. As such, trend growth of air passengers at Changi Airport has slowed from 9.6% during 2009-2013 to 3.0% in 2013-2016. Unlike Hong Kong, it appears that deployment of cross-boundary sea/land crossing to attract customers from other places is rather limited at Changi Airport.⁴⁵

5.3 To address these challenges, both the Singaporean government and airport authority have taken the following policy measures to sustain its airport competitiveness in recent years:

(a) **Capacity expansion to meet passenger growth:** In anticipation of further growth in air traffic, the airport authority demolished the former Budget Terminal in September 2012 which had been in operation for only six years. This paved the way for construction of a new and larger Terminal 4, which is scheduled

⁴⁵ As some of air passengers at Changi Airport come from Malaysia, there are 12 return coach services every day between Changi Airport and Johor Bahru, the southernmost border city of Malaysia. There is also a fly-coach service provided by a private operator, in which 168 000 Malaysian passengers had used this service in 2016. Moreover, fly-cruise service has also been provided to those air passengers connecting to the cruise since 2015. Under this service, air passengers can transfer to cruise with check-in, bag-drop and obtaining cruise cabin access cards being processed at Changi Airport. It is expected to bring in around 170 000 passengers to Singapore in three years. Upon the operation of Jewel Changi Airport in 2019, it will introduce multi-modal transport lounges offering services for air passengers transferring to cruise (fly-cruise) and other connecting transports such as cross-boundary coaches (fly-coach).

to open in late October 2017.⁴⁶ Terminal 4 will serve both fullservice carriers and low-cost carriers, increasing the annual handling capacity by 24% from 66 million to 82 million passengers. Together with other construction works including the third runway and Terminal 5, the handling capacity of Changi Airport will increase further by 65% to 135 million passengers by the late 2020s.⁴⁷

More specifically on Terminal 4 and the third runway, it had a combined cost of some S\$2.4 billion (HK\$13.4 billion). It will be financed by (i) government equity through the Aviation Development Fund and the revenue of Changi Airport; (ii) debt; and (iii) passenger service charges.⁴⁸ Yet the respective cost for Terminal 5 is not available as the construction contract was open for tender only in March 2017.

(b) Encouraging the use of wide-body/mega aircraft: To foster more cost-effective utilization of the existing runway capacity to serve more passengers, a discount of 5% is offered to the landing fee of large aircrafts at Changi Airport. In addition, 50% landing fee rebate are provided for long-haul flights, which are usually used by wide-body aircrafts.

Moreover, the design of the new Terminal 5 scheduled for operation in the late 2020s will be flexible enough to accommodate new configuration of aircraft. It will incorporate long and linear piers without cul-de-sacs or sharp corners, facilitating easy reconfiguration in the future, especially for those mega aircrafts. Furthermore, it will be designed in such a way that more TT passengers can have direct access to the gates with shortest walking distances and minimal connection time.

⁴⁶ The new Terminal 4 will be highly automated with self-service process of check-in, bag-drop, departure immigration, security screening, body scan, and facial recognition to facilitate self-boarding processes. See Ministry of Transport of Singapore (2016).

⁴⁷ In addition to Terminal 4, new Terminal 5 and the third runway will be completed by the 2020s. Looking further ahead, the Singaporean government has kicked off the planning of further upgrade of Changi Airport after 2050, with architectural design scheduled for commencement in 2017-2018.

⁴⁸ Since April 2012, Changi has increased its service charges for outbound passengers (except TT passengers) by 43% to \$\$34 (HK\$196) to help pay for new capital works.

- (c) Dedicated promotion measures for TT passengers: As TT passengers take up some 30% of passenger throughput of Changi Airport, targeted facilities and services are in place to meet their special needs. *First*, Passenger Service Charge for TT passengers has been reduced by two-thirds from S\$9 (HK\$50.8) to S\$3 (HK\$16.9) since July 2015, aiming to boost the segments of TT and long-haul passengers. *Secondly*, to make their short stay comfortable, the airport authority offers free facilities such as (i) snooze lounges; (ii) computers with Internet connection; (iii) 24-hour free movie theatre, and (iv) video game zone, along with 24-hour restaurants. Connecting passengers may also visit three transit hotels inside the airport, either for a nap as short as a few hours or taking a shower at affordable charges without passing through the immigration clearance. *Thirdly*, a new terminal complex called Jewel acting more like a multi-purpose shopping and entertainment mall is scheduled for opening in the early 2019. With a 40-metre indoor waterfall and a largest indoor garden in Singapore, it could provide much entertainment to TT passengers staying at the airport. *Fourthly*, Free Singapore Tour is offered to TT passengers who have to wait at least 5.5 hours before boarding the connecting flight.
- (d) Lower airport fees: There is a wide range of rebates and reductions in airport fees at the Changi Airport. *First*, rebates of 50% parking fee and 15% aerobridge fee are also offered. *Secondly*, there has been a 20% rebate to airlines since May 2015 on both flight catering and ground handling franchise fees, with an aim to encourage airlines to enhance service such as by increasing staffing levels during peak periods.
- (e) Open the sky through air services agreements: The Singaporean government has concluded bilateral air services agreements with more than 130 places as at 2016, compared with 67 for Hong Kong.⁴⁹ Within this total, more than 60 are open skies

⁴⁹ In Hong Kong, the general principle of concluding bilateral air services agreements with other places is to achieve "reciprocal interests and benefits" and "careful and well-considered liberalisation", taking into account the overall benefits of the Hong Kong economy and the competitiveness of the home carriers. This partly explains the number of bilateral air services agreements is less than Singapore. Under the liberal aviation policy, Singapore not only signed the open skies agreements with ASEAN countries, it also actively leveraged on ASEAN to establish liberal air services arrangements with other places in the region such as concluding the ASEAN-China Air Transport Agreement in 2010. See Central Policy Unit (2010), Transport and Housing Bureau (2013) and Ministry of Transport of Singapore (2017).

agreements, including those with the Association of Southeast Asian Nations ("ASEAN"). ⁵⁰ The liberalized approach encourages open competition amongst airlines and creation of new routes to new destinations, enlarging the overall pie of the aviation market in Singapore.

5.4 Looking ahead, Changi Airport may face more challenges in the near future. For instance, the emerging adoption of ultra-long range aircrafts for flights lasting up to 19 hours may lead to more direct flights to long-haul destinations, dampening the hub position of Changi Airport, particularly for those flying between Southern and Northern Hemispheres. Moreover, the 350-km high speed rail service between Singapore and Kuala Lumpur scheduled for 2020 may divert some of aviation demand between the two places.

6. Concluding remarks

6.1 In the face of intensified competition and in anticipation of further sustained growth in air traffic in the longer term, all selected airports in Hong Kong, Dubai and Singapore have been upgrading their airport infrastructure in recent years. As a matter of fact, capacity expansion seems to be the most important means of competition in all three places. To meet the huge cost in capacity expansion at airports, the governments of all three selected places resort to similar financing means like (a) injecting government equity; (b) imposing passenger service charges; and (c) incurring market loans.

6.2 More specifically for Hong Kong, even after the completion of the three-runway system in 2024, the capacity of HKIA is still lower than airports at Dubai and Singapore by 2030. In face of this constraint, there may be a need to prioritize its air routes and to encourage usage of larger aircrafts at HKIA, based on the principle of cost-effectiveness and the overall benefits for Hong Kong. It is noted that some low-cost carriers have also tried to deploy

⁵⁰ The ASEAN Open Skies Policy aims to develop a unified and single aviation market among ASEAN member states. It came into effect in January 2015 while facing several hurdles of implementation such as reluctance from Indonesia and the Philippines. Ultimately, those impediments were overcome and the Policy achieved full ratification by all 10 ASEAN member states in May 2016. See Holman Fenwick Willan LLP (2016).

larger aircrafts to meet growing passenger demand and to overcome some slot-constrained airfields.

6.3 For airports in Dubai and Singapore, TT passengers account for 30%-70% of their passenger flows. Specific measures introduced to attract TT passengers include (a) speeding up immigration clearance with the use of facial recognition technology; (b) increasing application of automation to expedite logistic processes such as check-in and bag-drop; (c) providing tailor-made facilities such as snooze cube and shower facilities; and (d) providing entertainment options at both the airport terminals or downtown at a discount.

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Appendix

	Hong Kong	Dubai	Singapore				
(a) Annual passenger volume (million)							
1998	29	10	24				
2006	44	29	35				
2016	71	83	59				
2025 (forecast)	82	156 (incl. DXB and DWC)	108				
2030 (forecast)	97	189 (incl. DXB and DWC)	117				
(b) Capacity enhancement projects							
New airport facilities	3 rd runway	DXB and DWC expansion	Terminals 4 and 5 and 3 rd runway				
Change in capacity	From 74 million to 102 million	From 90 million to 360 million	From 66 million to 135 million				
• Cost	HK\$141.5 billion	HK\$248.4 billion	HK\$13.4 billion*				
Completion date	2024	2025	Late 2020s				
(c) Other key measures to boost airport competitiveness							
Fostering the use of wide-body aircrafts	 No specific policy. 	 Longer free parking time. 	 Landing fee discount and rebate. 				
Better service for TT passengers	 Incentives to attract TT passengers to visit tourist attractions in town. 	 Queue monitoring helps shorten TT process time. Paid facilities such as snooze cubes, swimming pool and fitness facilities. 	 Free: facilities for short stay. Paid: transit hotels. 				

Annual passenger volume and key competitive measures in selected airports

Note: (*) It reflects the construction cost of Terminal 4 and the 3rd runway only. The Singaporean government has not announced the cost estimate of Terminal 5.

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