Asia-Pacific Economic Cooperation

# Develop Air Connectivity in the APEC Region

CHINESE TAIPEI

Tourism Working Group | October 2016

APEC Project: TWG 01 2014A

Produced by


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Asia-Pacific Economic Cooperation

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## Glossary

The following section presents a list of commonly used expressions and abbreviations found in the report.

**Connecting Potential** – Common rates of passengers connecting beyond/behind when traveling through a hub to/from a particular region.

**Induction/Stimulation** – Initial spike in passenger demand when new non-stop service is offered due to better accessibility, shorter travel time, lower cost, etc.

## List of Abbreviations

**PDEW** – Passenger daily each way (passenger demand in each direction between a select origin and destination).

**SDEW** – Seats daily each way (number of seats offered in each direction on a non-stop or one-stop flight segment).

**OD** – Origin and destination.

**Airport Codes:**

AAQ – Anapa, RUS

ACA – Acapulco, MEX

ADL – Adelaide, AUS

AER – Sochi, RUS

AGU – Aguascalientes, MEX

AKJ – Asahikawa, JPN

AKL – Auckland, NZ

ANF – Antofagasta, CHL

AOR – Alor Setar, MAS

AQP – Arequipa, CHL

ARH – Arkhangelsk, RUS

ASF – Astrakhan, RUS

ATL – Atlanta, US

AUS – Austin, US

AYP – Ayacucho, PE

BCD – Negros Occidental, PH

BDJ – Banjarmasin, INA

BHE – Blenheim, NZ

BJX – Silao, MEX

BKI – Kota Kinabalu, MAS

BKK – Bangkok, THA

BLI – Bellingham, US

BMV – Buon Ma Thuot, VN

BNA – Nashville, US

BNE – Brisbane, AUS

BOS – Boston, US

BPN – Balikpapan, INA

BUR – Burbank, US

BWN – Bandar Seri Begawan, BD

BXU – Butuan, PH

CAN – Guangzhou, PRC

CBO – Cotabato, PH

CCP – Concepción, CHL

CEB – Cebu, PH

CEI – Chiang Rai, THA

CEK – Chelyabinsk, RUS

CEN – Ciudad Obregón, MEX

CGK – Jakarta, INA

CGO – Zhengzhou, PRC

CGQ – Changchun, PRC

CGY – Cagayan de Oro and Iligan, PH

CHC – Christchurch, NZ
CJA – Cajamarca, PE
CJC – Calama, CHL
CJJ – Cheongwon-gu, ROK
CJU – Jeju, ROK
CKG – Chongqing, PRC
CLT – Charlotte, US
CME – Ciudad del Carmen, MEX
CNS – Cairns, AUS
CNX – Chiang Mai, THA
CSX – Changsha, PRC
CTS – Hokkaido, JPN
CTU – Chengdu, PRC
CUN – Cancun, MEX
CUZ – Cusco, PE
CVG – Cincinnati, US
CXR – Nha Trang, VN
DAD – Da Nang, VN
DAL – Dallas, US
DCA – Washington, US
DEN – Denver, US
DFW – Dallas, US
DGO – Durango, MEX
DGT – Dumaguete, PH
DJB – Jambi City, INA
DLC – Dalian, PRC
DLI – Da Lat, VN
DME – Domodedovo, RUS
DMK – Bangkok, THA
DPS – Bali, INA
DRW – Darwin, AUS
DTW – Detroit, US
DUD – Dunedin, NZ
DVO – Davao City, PH
EAT – Douglas County, US
EWR – Newark, US
EZE – Buenos Aires, ARG
FAT – Fresno, US
FLL – Fort Lauderdale, US
FOC – Fuzhou, PRC
FSZ – Shizuoka, JPN
FUK – Fukuoka, JPN
GDL – Guadalajara, MEX
GEG – Spokane, US
GMP – Seoul, ROK
GUM – Tamuning and Barrigada, GUM
GYS – Guangyuan, PRC
HAK – Haikou, PRC
HAN – Ha Noi, VN
HGH – Hangzhou, PRC
HKG – Hong Kong, China, HKC
HKT – Phuket, THA
HND – Tokyo, JPN
HNL – Honolulu, US
HRB – Harbin, PRC
HUI – Hue, VN
HUZ – Huizhou, PRC
IAD – Washington, US
IAH – Houston, US
ICN – Seoul, ROK
ILO – Ilo, PE
IQQ – Iquique, CHL
IQT – Iquitos, PE
ISG – Ishigaki, JPN
ITM – Osaka, JPN
IWK – Iwakuni, JPN
JFK – New York, US
JHB – Johor, MAS
JJN – Quanzhou, PRC
JNZ – Jinzhou, PRC
JOG – Yogyakarta, INA
JUL – Juliaca, PE
KBR – Kota Bharu, MAS
KBV – Krabi, THA
KCH – Kuching, MAS
KGD – Kaliningrad, RUS
KHH – Kaohsiung, CT
KHN – Nanchang, PRC
KIX – Osaka, JPN
KKE – Kerikeri, NZ
KLO – Kalibo, PH
KMG – Kunming, PRC
KNH – Kinmen, PRC
KNO – Kuala Namu, INA

KOJ – Kirishima, JPN

KRR – Krasnodar, RUS

KUF – Samara, RUS

KUL – Kuala Lumpur, MAS

KWL – Guilin, PRC

KZN – Tatarstan, RUS

LAS – Las Vegas, US

LAX – Los Angeles, US

LED – Saint Petersburg, RUS

SVX – Yekaterinburg, RUS

LGA – NY–La Guardia, US

LGK – Padang Matsirat, Langkawi, MAS

LHW – Lanzhou, PRC

LIM – Lima, PE

LOP – Lombok, INA

LPF – Liupanshui, PRC

LPT – Lampang, THA

MBT – Masbate City, PH

MCC – Sacramento, US

MCO – Orlando, US

MDW – Chicago, US

MDZ – Mendoza, ARG

MEL – Melbourne, AUS

MEX – Mexico City, MEX

MFM – Macau, MAC

MIA – Miami, US

MLM – Alvaro Obregon, Michoacan, MEX

MNL – Manilla, PH

MRY – Monterey, US

MSP – Minneapolis–Saint Paul, US

MTT – Cosoleacaque, MEX

MTY – Apodaca, MEX

MZG – Magong City, CT

NBC – Nizhnekamsk, RUS

NGB – Ningbo, PRC

NGO – Nagoya, JPN

NKG – Nanjing, PRC

NKM – Nagoya, JPN

NNG – Nanning, PRC

NPE – Napier, NZ

NPL – New Plymouth, NZ

NRT – Tokyo, JPN

NSN – Nelson, NZ

NTG – Nantong, PRC

OAK – Oakland, US

OAX – Oaxaca, MEX

OKA – Naha, JPN

OOL – Gold Coast, AUS

ORD – Chicago, US

OVB – Novosibirsk, RUS

OZC – Ozamiz, PH

PDG – Sumatra, INA

PEK – Beijing, PRC

PEN – Penang, MAS

PER – Perth, AUS

PHL – Philadelphia, US

PHX – Phoenix, US

PIU – Piura, PE

PLM – Palembang, INA

PLW – Palu, INA

PMC – Puerto Montt, CHL

PMR – Palmerston North City, NZ

PNK – Pontianak, INA

POM – Port Moresby, PNG

PPQ – Paraparaumu, NZ

PQC – Phu Quoc, VN

PSP – Palm Springs, US

PUS – Busan, ROK

PVG – Shanghai, PRC

PVR – Puerto Vallarta, MEX

PXU – Pleiku, VN

PYX – Pattaya, THA

RDU – Raleigh, Durham, US

REP – Siem Reap, KHM

REX – Reynosa, US

RGN – Mingaladon, MMR

RNO – Reno, US

ROC – Rochester, US
ROT – Rotokawa, NZ
ROV – Rostov-on-Don, RUS
RSU – Yeosu, ROK
RTW – Saratov City, RUS
RXS – Roxas City, PH
SAN – San Diego, US
SCL– Santiago, CHL
SEA – Seattle, US
SFO – San Francisco, US
SGN – Ho Chi Minh, VN
SHA – Shanghai, PRC SHE – Shenyang, PRC
SIN – Singapore, SGP
SIP – Simferopol, UKR
SJC – San Jose, US
SJD – San Jose del Cabo, MEX
SLC – Salt Lake City, US
SLP – San Luis Potosi, MEX
SMF – Sacramento, US
SNA – Santa Ana, US
SOC – Solo/Surakarta, INA
SPN – Saipan, US
SRG – Semarang, INA
STL – St. Louis, US
STW – Stavropol Krai, RUS
SUB – Surabaya, INA
SVO – Moscow, RUS
SVX – Koltsovo, RUS
SWA – Jieyang Chaoshan, PRC
SYD – Sydney, AUS
SYO – Sakata, JPN
SYX – Sanya, PRC
SZX – Shenzhen, PRC
TAC – Tacloban, PH
TAM – Tampico, MEX
TAO – Qingdao, PRC
TAV – Tau, ASM
TBP – Tumbes, PE
TDX – Trat, THA
TGG – Kuala Terengganu, MSA
TGZ – Chiapa de Corzo, MEX
TIJ – Tijuana, MEX
TKG – Bandar Lampung, INA
TLC – Toluca, MEX
TNA – Jinan, PRC
TPE – Taipei, CT
TPP – Tarapoto, PE
TRC – Torreon, MEX
TRU – Trujillo, PE
TSA – Songshan, CT
TSN – Tianjin, PRC
TTJ – Tottori, JPN
TXG – Taichung, CT
TYN – Taiyuan, PRC
UFA – Ufa, RUS
UIH – Qui Nhon, VN
UKB – Kobe, JPN
UPG – Makassar, INA
URC – Urumqi, PRC
USM – Koh Samui, THA
VCL – Chu Lai, VN
VDH – Dong Hoi, VN
VER – Veracruz, MEX
VII – Vinh, VN
VKO – Moscow, RUS
VOZ – Voronezh, RUS
VSA – Villahermosa, MEX
VVO – Vladivostok, RUS
WAG – Whanganui, NZ
WEH – Weihai, PRC
WLG – Wellington, NZ
WNZ – Wenzhou, PRC
WRE – Whangarei city, NZ
WUH – Wuhan, PRC
WUX – Wuxi, PRC
XIY – Xi'an, PRC
XMN – Xiamen, PRC
YEG – Edmonton, CDA

YGJ – Yonago, PRC

YHZ – Halifax, CDA

YKA – Kamloops, CDA

YLW – Kelowna, CDA

YNJ – Yanji, PRC

YOW – Ottawa, CDA

YPR – Prince Rupert, CDA

YQM – Moncton, CDA

YQR – Regina, CDA

YSJ – Saint John, CDA

YTS – Timmins, CDA

YUL – Montreal, CDA

YVR – Vancouver, CDA

YWG – Winnipeg, CDA

YXC – Cranbrook, CDA

YXS – Prince George, CDA

YXT – Terrace-Kitimat, CDA

YYB – North Bay, CDA

YYC – Calgary, CDA

YYJ – Victoria, CDA

YYZ – Toronto, CDA

YZP – Sandspit, CDA

YZR – Sarnia, CDA

ZAL – Valdivia, CHL

ZCL – Calera de Victor Rosales, MEX

ZQN – Queenstown, NZ

ZUH – Zhuhai, PRC

# 1. Introduction to the project

The APEC Secretariat and Economies have observed that the flow of goods, services, capital and people in the APEC Region is constrained by air connectivity limitations and gaps that exist between the APEC economies, particularly between the Americas and Asia Pacific. Improving connectivity is a long-term target of the APEC economies. The APEC Tourism Working Group (TWG) and Transport Working Group (TPTWG) are particularly interested in pursuing this long-term target.

This Project (the "Project") was proposed in 2014 by Thailand and co-sponsored by Australia; Indonesia; Malaysia; Peru; the Philippines; and Chinese Taipei and aims to develop air connectivity in the APEC Region and in turn stimulate a more efficient flow of goods, services, capital and people. The Project has the following objectives:

- To develop market demand-based recommendations for potential new routes, improved flight schedule connection times, and hubs between APEC economies based on analysis of air passenger flow, schedules and new aircraft range capability, including analysis of the number of seats, flights and air traffic.
- To help airlines and regulators develop more accurate demand predictions so they can in turn help APEC economies by providing better air connectivity services, capacity and schedules.

The Project was approved in December 2014, with IATA Consulting selected as the consultant in May 2015. IATA was mandated to complete the following tasks:

1. Develop market demand-based recommendations for potential new routes.
2. Provide recommendations to improve connections between flights at the main hubs linking the APEC economies.
3. Determine which APEC market-pairs could benefit from the introduction of new aircraft with extended range.

# 2. Approach followed and data used

This section explains the methodology applied by IATA and presents the data used to feed the various underlying analysis. To conduct the analysis, IATA took systematic steps identified in Figure 1.

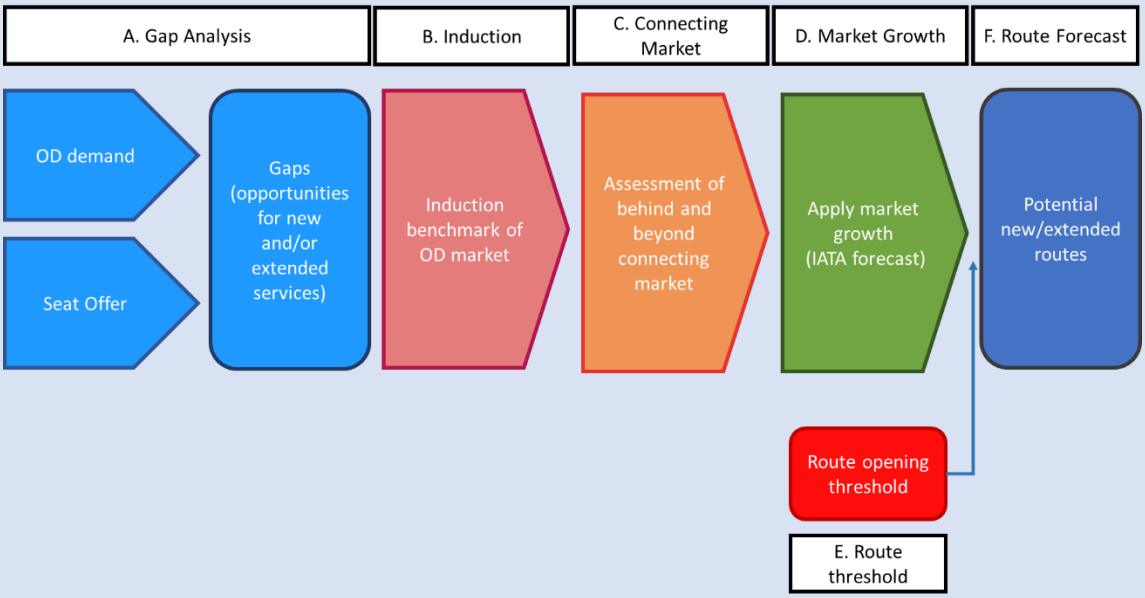


*Figure 1: Process used to complete analytical work*

The first step involved a demand-supply gap analysis aimed at identifying the unserved routes, presenting potential demand for future development. The size that this potential demand could actually represent if turned into direct service in the future was subsequently forecast, using realistic assumptions related to induction, connecting potential and demand growth.

## 2.1 Data fueling the model

Principal data for the model originates from Airport IS. IATA's Airport IS system uses IATA billing and settlement plan data to provide detailed demand and supply information on total air traffic. This data has been available for over a 10-year historical period (since 2005).

***Approximately 18,500 international APEC routes were analyzed in the execution of this study. Airport IS data was particularly relevant in the gap analysis and assumption development.***

Academic articles and published ratios were also used to justify some of the assumptions, including induction and origin destination traffic captured through direct service.

For some of the other variables used in the final traffic determination, economic forecasts were extracted from IHS Global Insight, one of the world's largest commercially available economic databases.

Tourism data was extracted from the World Travel and Tourism Council.

## 2.2 Gap analysis

IATA applied a funnel approach in conducting the analysis. It first considered the market at the economy pair level, followed by city pairs leading to a market potential assessment (see figure below). Both seat supply and seat demand were considered in the analysis to identify gaps in air service.

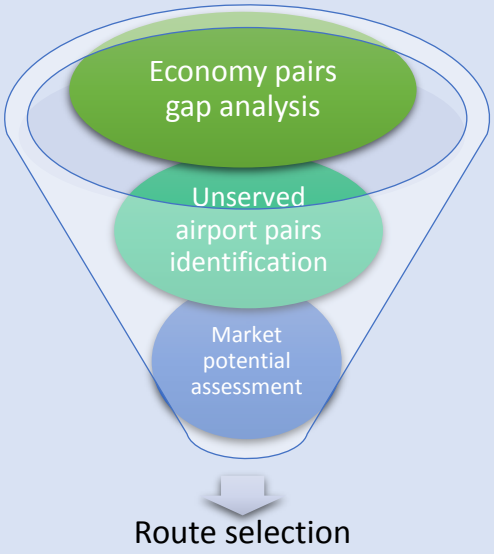


*Figure 2: Funnel approach used to conduct analysis*

The economy-pair analysis allowed IATA to identify unserved markets.

As an example, this analysis showed that there was an average daily demand of 641 Passengers Daily Each Way (PDEW) in 2015 that fly via existing connecting routings between Chinese Taipei and the United States, while an average of 4,039 direct (on non-stop service) seats were offered daily each way.

When extending the analysis down to the city pairs it was possible to identify the largest unserved markets between the two economies: 70 Passengers Daily Each Way (PDEW) travelled between TPE and AKL in 2015.

The top 30 unserved routes for Chinese Taipei are presented in the table below.

| Origin Airport | Origin Economy | Destination Airport | Destination Economy | 2015 OD Demand (PDEW) | non-stop seats in 2015 (SDEW) | 1-stop seats in 2015 (SDEW) |
|---|---|---|---|---|---|---|
| TPE | Chinese Taipei | AKL | New Zealand | 77 | 0 | 313 |
| KHH | Chinese Taipei | CGK | Indonesia | 74 | 0 | 0 |
| TPE | Chinese Taipei | BOS | United States | 51 | 0 | 0 |
| TPE | Chinese Taipei | ORD | United States | 39 | 0 | 0 |
| KHH | Chinese Taipei | LAX | United States | 31 | 0 | 0 |
| TPE | Chinese Taipei | PER | Australia | 27 | 0 | 0 |
| TPE | Chinese Taipei | HKT | Thailand | 27 | 0 | 0 |
| TPE | Chinese Taipei | IAD | United States | 27 | 0 | 0 |
| TPE | Chinese Taipei | PDX | United States | 25 | 0 | 0 |
| TPE | Chinese Taipei | SHA | China | 25 | 0 | 0 |
| TPE | Chinese Taipei | VII | Viet Nam | 25 | 0 | 0 |
| KHH | Chinese Taipei | SUB | Indonesia | 24 | 0 | 0 |
| TPE | Chinese Taipei | DFW | United States | 23 | 0 | 0 |
| KHH | Chinese Taipei | BNE | Australia | 21 | 0 | 0 |
| KHH | Chinese Taipei | SYD | Australia | 19 | 0 | 0 |
| TPE | Chinese Taipei | CHC | New Zealand | 17 | 0 | 74 |
| TPE | Chinese Taipei | ATL | United States | 17 | 0 | 0 |
| TPE | Chinese Taipei | AUS | United States | 16 | 0 | 0 |
| KHH | Chinese Taipei | SFO | United States | 15 | 0 | 0 |
| TPE | Chinese Taipei | LAS | United States | 13 | 0 | 0 |
| TPE | Chinese Taipei | KCH | Malaysia | 13 | 0 | 0 |
| TPE | Chinese Taipei | DEN | United States | 12 | 0 | 0 |
| TPE | Chinese Taipei | EWR | United States | 12 | 0 | 0 |
| TPE | Chinese Taipei | SAN | United States | 11 | 0 | 0 |
| TSA | Chinese Taipei | CJU | Republic of Korea | 11 | 0 | 0 |
| KHH | Chinese Taipei | PEN | Indonesia | 11 | 0 | 0 |
| TPE | Chinese Taipei | KNO | Indonesia | 10 | 0 | 0 |
| TPE | Chinese Taipei | YYC | Canada | 10 | 0 | 0 |
| KHH | Chinese Taipei | MEL | Australia | 10 | 0 | 0 |
| TPE | Chinese Taipei | KIJ | Japan | 10 | 0 | 0 |

*Table 1: Top 30 unserved routes from Chinese Taipei, 2015 data*

## 2.3 Induction

To determine realistic estimates of the success of new air service, various assumptions were considered and applied to current passenger demand.

Induction is a well proven concept that explains how new direct air service has a significant impact on increasing the total number of O&D passengers on a city pair market. This is due to product improvement: shorter travel time, greater convenience and more affordable ticket prices. The extent to which the market will be stimulated varies based on current levels of service (price and flight frequency) offered on a particular route. As stated in the Successful Air Service Development presentation (ICF International, 2014) a market's first non-stop flight can stimulate demand by 100% to 300%.

IATA quantified this induction value to show a relationship between two primary factors: region pair and the size of the market before a new route is initiated.

The table below shows the stimulation rates considered for this analysis of Chinese Taipei. For some instances where inadequate data (less than 4 routes) to conduct a region pair analysis was available, other variables were considered including the average of all routes, the average of long-haul routes or the average of short-haul routes, depending on the specific market.

| Market | Base of 10,000 Annual Pax | Base of 25,000 Annual Pax | Base of 50,000 Annual Pax |
|---|---|---|---|
| All APEC Economies | 130% | 42% | 18% |
| Long Haul | 101% | 36% | 16% |
| Short Haul | 150% | 50% | 21% |
| NAFTA-North East Asia | 80% | 35% | 19% |
| Asia - North East Asia | 135% | 55% | 28% |
| South East Asia - North East Asia | 170% | | |
| China - North East Asia | 155% | 66% | 35% |
| Within Northeast Asia | 161% | 61% | 34% |

*Table 2: Stimulation rates applied to the analysis*

## 2.4 Connecting potential

Increasing the quality of connections through alliance agreements, codeshares, shorter journey times or fewer stops increases overall travel demand in connecting markets. It is a normal phenomenon for new routes to not only increase demand for the city pairs served but also for beyond and behind destinations that are now more easily accessible (Swan, 2008). On long-haul routes, typically two-thirds of the passengers will make a connection.

IATA's analysis found that connecting markets would stimulate at various rates depending on the region of origin and the hub airport being flown through. These ratios are applied in determining the impact of a new route on connecting flows.

Connecting rates to be applied in this project for flights connecting at the main hub in Chinese Taipei were estimated based on traffic from various regions flying through TPE.

| | TPE |
|---|---|
| **North America** | 34.4% |
| **Australasia** | 26.0% |
| **Asia** | 5.7% |
| **South East Asia** | 16.2% |
| **China** | 0.3% |
| **North Asia** | 5.8% |

*Table 3: Average rate of connecting passengers at hub airport in Chinese Taipei*

## 2.5 Demand growth

This refers to the consideration of the natural growth observed on a market segment. IATA Economics publishes a detailed inter and intra-regional global traffic forecast. These demand growth forecasts were used to provide a regionally specific rate of growth to and from Chinese Taipei between 2016 and 2018. Growth was typically seen to be approximately 5%. Demand growth also refers to the fact that approximately 80% of a market will choose a non-stop flight option if it is available (Belobaba, 2015).

## 2.6 Other

Other factors including distance and available traffic rights were used to refine the assessment of potential new services to be opened. Distance considers the possibility of offering a non-stop flight with existing technology, using 15,000km as a maximum distance for a non-stop flight. Available traffic rights consider the bilateral agreements between economies and the current use of those bilateral rights.

## 2.7 Final route forecast

After conducting the gap analysis and applying the established rates from the various assumptions, the future market potential was estimated, as illustrated in Figure 3 below for the KHH-CGK route.

| | | | | 1 | 2 | 4 | |
|---|---|---|---|---|---|---|---|
| Origin Airport | Destination Airport | Destination Economy | 2015 OD Non-direct Demand | OD Captured Though Deorect Service | OD Stimulation | Behind/Beyond Connecting Potential | Caculations |
| KHH | CGK | Indonesia | (A) 64 | (B) 80% | (C) 38% | (D) 14% | |
| | | | | (1) 52 | 20 | | (1) = AxB |
| | | | | (2) | | | (2) = 1xC |
| | | | Subtotal | (3) | 71 | | (3) = 1+2 |
| | | KHH - CGK Total Market Potential (2015 Base) | | | | (4) 83 | (4) = 3/(1-D) |

*Figure 3: Example of the various assumptions being applied to determine the potential for a new air service.*

# 3. Chinese Taipei

A summary of Chinese Taipei's economy and demographics, aviation demand, and airport-specific information is presented in this section.

## 3.1 Economy and demographics

The island of Chinese Taipei is located in East Asia, with Mainland China to the west, Japan to the east and northeast, and the Philippines to the south.

### 3.1.1 Demographics

Chinese Taipei's population is estimated at 23.4 million in 2016 (Central Intelligence Agency, 2015). Its population density is approximately 660 persons per square kilometre in 2016, making it the 16th most densely populated region in the world.

Mandarin is the official language and spoken by almost all local residents. Japanese is also spoken by the elder generation, a legacy of Japanese rule in the first half of the 20th century. A number of aboriginal languages are also spoken; despite efforts to preserve them, their use is decreasing.

The birth rate in Chinese Taipei is now below the rate needed to sustain population growth and current growth is caused by increased longevity. The latest estimates indicate that Chinese Taipei's population will peak at 24 million in the next ten years and then gradually begin to decline.

Major urban cities and populations include:

| City | Population (millions) |
|---|---|
| 1. Kaohsiung | 2.8 |
| 2. Taichung | 2.7 |
| 3. Taipei | 2.6 |
| 4. Tainan | 1.9 |

*Table 4: Largest Cities in Chinese Taipei (World Population Review, 2015)*

### 3.1.2 Economy

Chinese Taipei has a dynamic capitalist economy with gradually decreasing government guidance of investment and foreign trade. Exports, led by electronics, machinery, and petrochemicals have provided the primary impetus for economic development. This heavy dependence on exports exposes the economy to fluctuations in world demand. Services is Chinese Taipei's biggest sector, making up of 59% of its GDP, followed by industry (36%) and agriculture (5%). In 2015, Chinese Taipei ranked 22th in terms of economy size and 35th in terms of per capita income. GDP growth has been approximately 2.27% p.a. over the past three years (International Monetary Fund, 2016).

Free trade agreements have proliferated in Chinese Taipei over the past several years. Following the landmark Economic Cooperation Framework Agreement (ECFA) signed with China in June 2010. In July 2013, Chinese Taipei signed a free trade deal with New Zealand - Chinese Taipei's first-ever with an economy with which it does not maintain diplomatic relations - and, in November, inked a trade pact with Singapore. Chinese Taipei's top export partners are China; Hong Kong, China; Singapore; and the US. Main export commodities include semiconductors, petrochemicals, automobile/auto parts, ships, and wireless communication equipment. Its top import origins are China, Japan, and the US The main imports include oil/petroleum, semiconductors, natural gas, coal, steel, and computers (Central Intelligence Agency).

Statistics Bureau of Chinese Taipei cut its economic growth forecast for 2016 down from 2.32% to 1.47%, as China's slowdown weighs on export demand. Chinese Taipei's export-led economy has been buffeted by a slowdown on the mainland, and by China becoming an increasingly sophisticated competitor in high-tech manufacturing. The forecast for exports was lowered to -2.78% for 2016, from 1.97% growth seen previously. On the positive side, Chinese Taipei has benefitted from the decline in oil prices, thus suppressing inflation to the point where prices are now declining. Not only has this boosted consumer spending power, it has also given the central bank room to devalue the currency without fear of igniting inflation.

### 3.1.3 Tourism

Chinese Taipei has some impressive scenic sites with six national parks protecting the natural heritage. Taipei city is the vibrant culture and entertainment hub. The National Palace Museum is Chinese Taipei's version of the Forbidden City in Beijing.

Tourism is a main industry and contributor to Chinese Taipei's GDP. In 2014, Chinese Taipei received more than 9.9 million international visitors, an increase from 8 million international visitors in 2013. This figure is expected to increase to 14.9 million by 2026, at an annual growth rate of 3.5%. In 2014 the travel and tourism sector approximately contributes (directly and indirectly) to 5.5% of GDP, and by 2025 this percentage is only forecasted to grow by 0.1% (World Travel and Tourism Council, 2015).

## 3.2 Aviation demand

### 3.2.1 Recent demand growth

Passenger air traffic to and from Chinese Taipei has grown at a rate of 3% p.a. between 2005 and 2015. This growth remains strong between 2012 and 2014, with average annual growth rate at 8.5%, while slows down in 2015 (5% up from 2014). The recent high growth rate is mainly driven by international traffic, which benefits from the liberalized cross-strait air links and the promotion of Chinese Taipei's tourism.

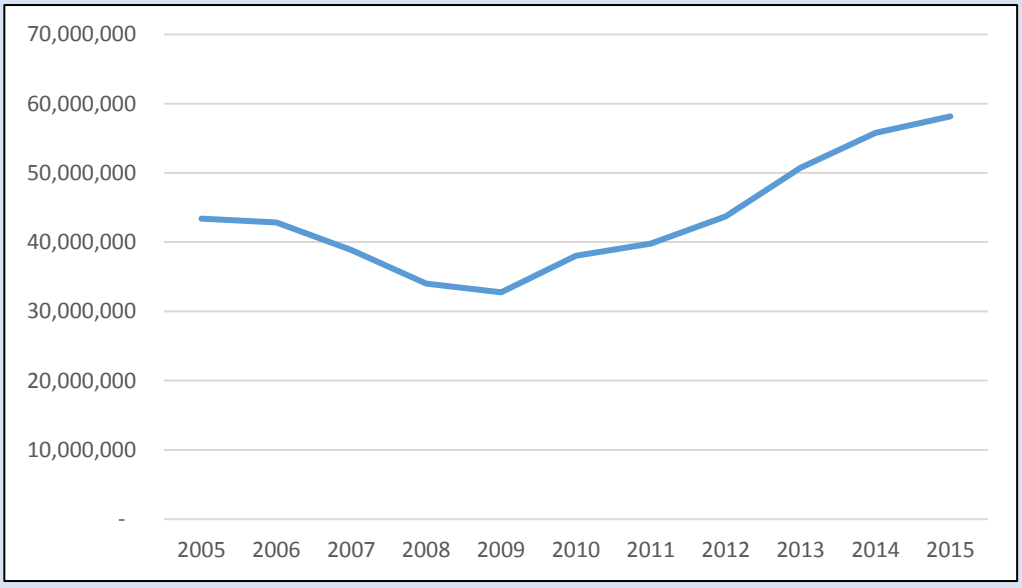


*Figure 4:Total air traffic Chinese Taipei 2004-2015 (Source: Albatross Airport, 2016).*

In terms of air freight, Chinese Taipei plays an important role in air transhipment as a hub connecting Europe, America, Japan and emerging markets in the Asia-Pacific region. The Chinese Taipei-based carrier, China Airlines, has progressively set up an extensive and diversified cargo network on a global

basis over the years. Overall, the annual growth rate of tonnage handled in Chinese Taipei is about 1.7% in the past decade.

### 3.2.2 Current air services to Chinese Taipei

In 2015, there were 301 routes connecting Chinese Taipei to 135 cities around the word. Currently, the routes connecting Chinese Taipei to APEC destinations are shown in the below figure.

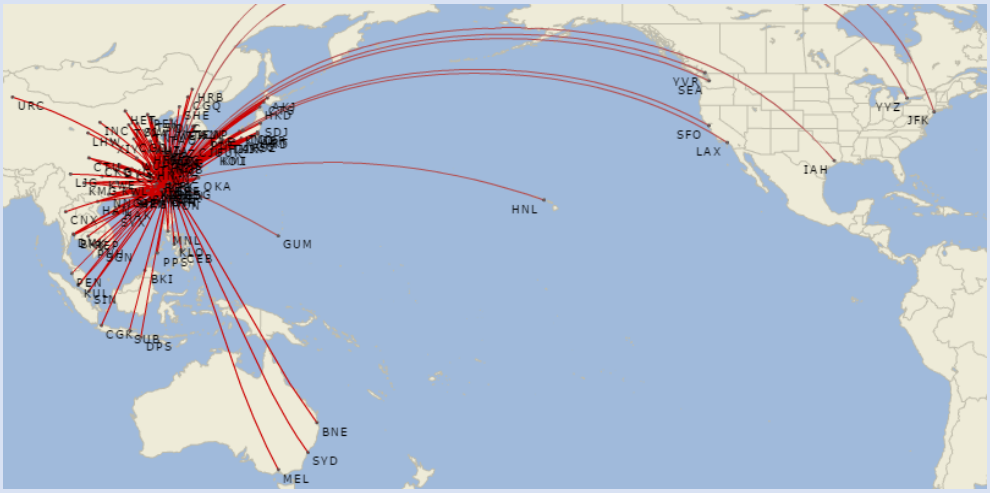


*Figure 5: Non-stop service to and from Chinese Taipei and top APEC destinations May 2016 (Source: Airport IS)*

International capacity to Chinese Taipei has grown from 31.7 million inbound seats in 2005 to 33.1 million in 2015. Growth over this time period has mainly been driven from Asia (China; Hong Kong, China; Japan etc.) and North America (Canada and the US) (Airport IS, 2016).

In 2015, the strongest direct aviation capacity growth within the APEC region was to the Thailand (up by 21.6%); followed by Japan (up by 16.5%); Australia (up by 14.6%); and Singapore (up by 12.7%) (Airport IS, 2016).

### 3.2.3 Aviation and the economy

**Economic Footprint**

In 2009, the aviation sector contributed NTD131 billion (1%) to Chinese Taipei's GDP (Oxford Economics, 2011). This comprises direct and indirect spending. Catalytic benefits through tourism are estimated at another NTD156 billion, bringing the total benefits to NTD287 billion (Oxford Economics, 2011).

From an employment perspective the sector supports 92,000 jobs directly and indirectly and a further 135,000 people through the catalytic effects (Oxford Economics, 2011).

**Consumer Benefits**

The aviation industry has benefits for visiting friends and family and the shipping of high value products. In 2015, a total of 58.2 million passengers and 2.2 million tonnes of freight travelled to, from and within Chinese Taipei by air (Airport IS 2016).

Aviation makes great contribution to the economy through tourism. Foreign visitors' spending is estimated at NTD259 billion each year, and almost all of these visitors (95%) arrive by air (Oxford Economics, 2011).

**Long-term impact**

Economically, aviation has a long-term impact in Chinese Taipei. According to Oxford Economics (2011), air travel enables long-term economic growth by:

- Opening up foreign markets to Chinese Taipei's exports;
- Lowering transport costs;
- Increasing the flexibility of labor supply;
- Speeding the adoption of business practices such as just-in-time-inventory management;
- Raising productivity and hence the economy's long-run supply capacity. It is estimated that a 10% improvement in connectivity relative to GDP would see an NTD8.7 billion per annum increase in long-run GDP for the Chinese Taipei's economy.

### 3.2.4 Government position on aviation

The Civil Aeronautics Administration (CAA) of Chinese Taipei has been taking various initiatives to bolster the overall competitiveness of Chinese Taipei through improved air connectivity and better air transport services.

CAA has been striving to obtain more traffic rights by signing or revising bilateral agreements with other economies or regions. By the end of 2015, Chinese Taipei had air service agreements with 55 countries or regions. With regard to cross-strait air transportation, it started on July 4, 2008 from direct weekend charter flights to daily charter flights. Then, cross-strait scheduled flights were inaugurated in Aug. 31, 2009. Accumulated, cross-strait flights carried a total of 57.8 million passengers and 1.12 million metric tonnes of cargo at the end of 2015.

To elevate the service quality of Taoyuan International Airport and thus enhance its international competitiveness, the government has been pressing ahead with the "Taoyuan International Aerotropolis Plan". It aims to raise TPE's ASQ (Airport Service Quality) ranking and to help the airport live up to its slogan of "connecting the world with heart" as a top tier international airport and an economic engine for the region.

To improve flight safety, the CAA has established and implemented the State Safety Program (SSP) in accordance with standards set by the International Civil Aviation Organization (ICAO). It has also overseen airline operations, put in place the Safety Management System (SMS) for repair facilities, trained personnel, and dealt with violations.

## 3.3 Airport-specific information

### 3.7.1 Busiest airports in Chinese Taipei

| Rank | Airport | Annual Traffic Statistics (2014 or 2015) | % of Total Chinese Taipei's Market |
|---|---|---|---|
| 1 | TPE | 38.5 | 66.2% |
| 2 | KHH | 6.0 | 10.3% |
| 3 | TSA | 5.9 | 10.1% |
| 4 | TXG | 2.3 | 4.0% |
| 5 | KNH | 2.2 | 3.8% |
| 6 | MZG | 2.1 | 3.6% |
| | Other Airports | 1.2 | 2.1% |

*Table 5: Top 7 busiest airports in Chinese Taipei (Source: Albatross Airport, 2016).*

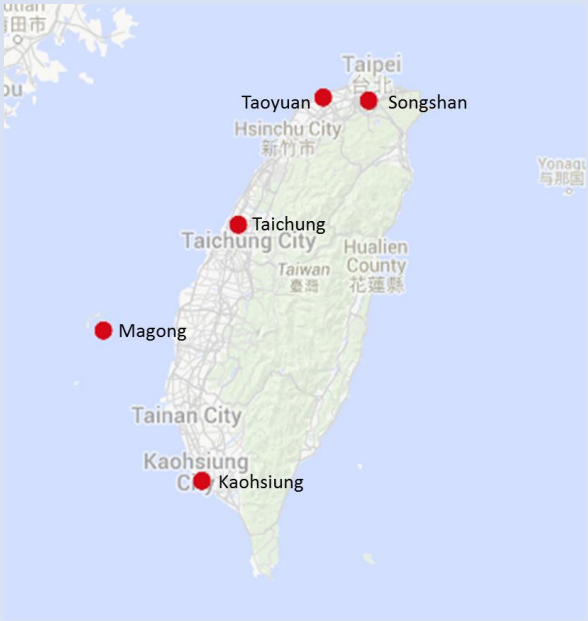


*Figure 6: Map of Chinese Taipei's busiest airports (Source: Google maps)*

**Taoyuan International Airport (TPE)**

Taoyuan International Airport is an international airport serving as the main gateway for Chinese Taipei. Located at Taoyuan city about 40km west of Chinese Taipei, the airport is Chinese Taipei's largest and busiest airport. It is one of five airports in Chinese Taipei with regular international flights, and is by far the busiest international air entry point amongst them. In 2015, it handled 38.5 million passengers. It is the main international hub for China Airlines and EVA Air. TPE currently has two parallel runways and two terminals, and a NTD300 billion proposal to build a third runway and a third terminal has been under feasibility study and consultation. In addition, the airport has the Taoyuan Business Aviation Centre, which started operation in September 2011, and has its own VIP terminal and facilities separate from the public terminals.

**Kaohsiung International Airport (KHH)**

Kaohsiung International Airport is a medium-sized commercial airport in Kaohsiung City. KHH is the second busiest airport in Chinese Taipei. In 2015, it handled 6 million passengers. It is a hub for China Airlines, TransAsia Airways, Eva Air, Uni Air, Mandarin Airlines, Tigerair Taiwan and Far Eastern Air. KHH has one runway and two terminals, one domestic and one international.

**Taipei Songshan Airport (TSA)**

Taipei Songshan Airport, located in Taipei city, is a mid-size airport for both commercial and military purposes. TSA, mainly a domestic hub, also provides limited scheduled flights to mainland China, Republic of Korea and Japan, to be differentiated from TPE, where the vast majority of international flights are served. In 2015, it handled 5.86 million passengers. It serves as a hub for Mandarin Airlines, Transasia Airways, Far Eastern Air Transport and UNI Air, and as a focus city for China Airlines and TransAsia Airways. The airport has one runway and two terminals.

**Taichung Airport (TXG)**

Taichung Airport, located in Taichung, is an airport for both commercial and military purposes. As a regional international airport for the central parts of Chinese Taipei, it now provides services to Hong Kong, China; Japan; Republic of Korea; and Ho Chi Minh City, Ha Noi in Viet Nam. In 2015, it served 2.34 million domestic and international passengers. TXG has one runway and two terminals, handling domestic and international traffic respectively.

### 3.7.2 Principal airline operators

A number of major airlines are based in Chinese Taipei, these include China Airlines, EVA Air, TransAsia Airways, Uni Air, Mandarin Airlines, Far Eastern Air Transport and LCC airlines such as Tigerair Taiwan and V Air.

**China Airlines**

China Airlines is the largest airline of Chinese Taipei. It has hubs at TPE and KHH. It commenced service in 1920, and is now a member of SkyTeam. China Airlines has two airline subsidiaries: Mandarin Airlines operates flights to domestic and some regional destinations; Tigerair Taiwan is a low-cost carrier established by China Airlines and Singaporean airline group Tigerair Holdings. The airlines' fleet comprises 82 aircrafts.

Other APEC destinations it and its subsidiaries serve are Australia; Canada; China; Hong Kong, China; Indonesia; Japan; Republic of Korea; Malaysia; New Zealand; the Philippines; Singapore; Thailand; the US; and Viet Nam.

**EVA Air**

EVA Air is the second largest international airline of Chinese Taipei based at TPE. It was founded in 1989, and now is a member of Star Alliance. UNI Air is a domestic and regional subsidiary of EVA Air. EVA Air's fleet comprises 67 aircrafts.

Other APEC destinations it and its subsidiary serve are Australia; Canada; China; Hong Kong, China; Indonesia; Japan; Republic of Korea; Malaysia; the Philippines; Singapore; Thailand; the US; and Viet Nam.

**TransAsia Airways**

TransAsia Airways is an airline based in Taipei, Chinese Taipei. Though the company started its operations focusing mainly on the domestic market, it now approaches some regional international routes and focuses mainly on Southeast and Northeast Asia and cross-strait flights. V Air is a subsidiary budget airline of TransAsia. It has hubs at TSA, TPE, and KHH. It has a fleet of 20 aircrafts.

Other APEC destinations it serves are China; Japan; and Republic of Korea.

**Far Eastern Air Transport**

Far Eastern Air Transport is an airline based in Chinese Taipei. The company started its operations focusing mainly on the cross-strait flights. It has a fleet of 8 aircrafts.

Other APEC destinations it serves are cities in China.

**Tigerair Taiwan**

Tigerair Taiwan is a low-cost carrier (LCC) based at TPE. It was the first Chinese Taipei-based LCC to start operations and one of the two LCCs in Chinese Taipei (the other being V Air of Transasia Airways). It was formed in 2014, as a joint venture between China Airlines Group and Tiger Airways Holdings. The airline currently has 8 aircrafts.

Other APEC destinations it serves are China; Japan; Singapore; and Thailand.

**V Air**

V Air, a franchise subsidiary of TransAsia Airways, is the second low-cost airline based in Chinese Taipei. It started operations on 17 December 2014, primarily with the focus on Northeast and Southeast Asia, from its main hub at TPE. It has a fleet of 4 aircrafts.

Other APEC destinations it serves are Japan, Republic of Korea, the Philippines and Thailand.

# 4. Medium-term new route opportunities

This section of the report is dedicated to explaining the potential future air service developments to and from Chinese Taipei within the APEC region over the next three years. Service gaps, route traffic forecasts, and high-level feasibility analysis conducted are hereby presented.

## 4.1 Service gaps

As part of the process, air services to Chinese Taipei were considered at both economy-pair and city pair-basis.

### 4.1.2 Economy pair analysis

The following table outlines the supply and demand for air travel between Chinese Taipei and other APEC economies. The data essentially shows the economy pairs where

- non-stop service is sufficiently supplied (in green),
- air service is adequate but may need to be improved in the long term (in yellow), and
- air service is at a shortfall and should be improved in the medium term (in red).

| Origin/Destination Economy | O/D Demand (PDEW) | O/D Non-Stop Seat Offer (SDEW) | One Stop Seat Offer (SDEW) | Ratio of Demand to Supply |
|---|---|---|---|---|
| Australia (AUS) | 477 | 480 | 0 | 99% |
| Brunei Darussalam (BD) | 1 | 0 | 0 | * |
| Canada (CDA) | 259 | 639 | 0 | 41% |
| Chile (CHL) | 2 | 0 | 0 | * |
| People's Republic of China (PRC) | 17,116 | 20,481 | 0 | 84% |
| Hong Kong, China (HKC) | 9,326 | 15,726 | 0 | 59% |
| Indonesia (INA) | 1,077 | 1,297 | 527 | 59% |
| Japan (JPN) | 13,324 | 18,358 | 0 | 73% |
| Republic of Korea (ROK) | 3,102 | 4,038 | 0 | 77% |
| Malaysia (MAS) | 1,477 | 1,997 | 0 | 74% |
| Mexico (MEX) | 6 | 0 | 0 | * |
| New Zealand (NZ) | 105 | 0 | 439 | 24% |
| Papua New Guinea (PNG) | 0 | 0 | 0 | * |
| Peru (PE) | 3 | 0 | 0 | * |
| The Republic of the Philippines (PH) | 773 | 1,373 | 0 | 56% |
| Russia (RUS) | 2 | 0 | 0 | * |
| Singapore (SGP) | 1,883 | 2,975 | 0 | 63% |
| Chinese Taipei (CT) | 5,175 | 7,648 | 0 | 68% |
| Thailand (THA) | 1,809 | 3,103 | 0 | 58% |
| United States (US) | 2,792 | 4,019 | 607 | 60% |
| Viet Nam (VN) | 1,865 | 2,968 | 0 | 63% |

*Table 6: Total demand-to-supply ratio PDEW (Source: IATA analysis of Airport IS Data)*

*** Delineates an economy pair with no air services that has inadequate demand to consider air services in the long term**

**** Delineates an economy pair with no air services that may have adequate demand for service in the long term (next 10 years)**

Typical ratios found in highly liberalized international markets with adequate capacity for demand ranges from 60% to 80%.

In some cases, the demand-to-supply ratio is less than 60%, however supply is still adequate as the low percentage figure may be representative of high rates of connecting passengers flying between economies (not shown in the above table – only OD traffic is displayed).

Where demand-to-supply ratios are higher than 80%, seat offer should be increased between economy pairs (e.g. Chinese Taipei and Australia at 99% where the non-stop supply barely covers the total demand between the economies).

Based on the above analysis at the economy level, Chinese Taipei may have an opportunity to improve service to 7 economies in the long term (highlighted in yellow in the above table), and could take actions to improve service with Australia and China in the medium term (highlighted in red).

**Australia (AUS)**

Between Australia and Chinese Taipei, there was a demand of 477 PDEW in 2015 and is currently served by 480 direct seats per day. There is a strong case of adding additional frequencies between the two economies.

**Canada (CDA)**

Canada has direct service from Chinese Taipei. In 2015, the demand between the two economies was close to 260 PDEW with a seat offer of over 630 seats a day and therefore the demand is well served.

**Peoples Republic of China (PRC)**

In 2015, there was an average total demand of 17,100 PDEW between all points in Chinese Taipei and all points in China. At present, direct services are restricted by air services agreements and this market has a strong potential to grow, should the market continue to liberalize.

**Hong Kong, China (HKC)**

The daily demand between Hong Kong, China and Chinese Taipei was over 9,300 passengers while there were over 15,700 seats being offered on the market. While it seems the capacity is over-supplied, a lot of seats were offered to passengers that depart Chinese Taipei and transfer to other destinations and vice versa.

**Indonesia (INA)**

Indonesia had more than 1,000 PDEW. Overall the two economies have adequate levels of service with close to 1,300 seats offered per day. However, KHH-CGK is identified as one of the potential routes that can be opened to cater for the strong leisure demand.

**Japan (JPN)**

Japan is the second largest market for Chinese Taipei after China. In 2015, the daily demand reaches 13,300 PDEW with a supply of 18,400 seats per day. The supply is currently sufficient on an economy-pair point of view, but the current demand-to-supply ratio has already reached 73%, indicating that there is a chance for frequency increase in the medium term.

**Republic of Korea (ROK)**

Supply for non-stop flights to the Republic of Korea is 4,000 seats per day with a demand of over 3,100 PDEW, so the supply is still sufficient. However, it is recommended that Chinese Taipei continues to monitor the growth of the market for opportunities to increase frequencies in the medium term.

**Malaysia (MAS)**

Demand-to-supply ratio for Malaysia is currently at 74%, which means there is an opportunity to add extra frequencies between the two economies. In 2015, the demand was 1,470 PDEW with a supply of almost 2,000 seats.

**New Zealand (NZ)**

In 2015, there was a demand of 105 passengers per day between Chinese Taipei and New Zealand. Currently there are no direct services between the two economies; they are being served by a one-stop service via BNE or SYD. However, the TPE-AKL route is expected to have a good potential to become a direct service in a few years and further elaboration is presented in section 4.3 below.

**The Republic of the Philippines (PH)**

Demand to the Philippines had more than 770 PDEW in 2015 with a supply of close to 1,400 seats. The air services between the two economies are adequate in terms of frequencies and destinations.

**Singapore (SGP)**

Between Singapore and Chinese Taipei, there are close to 1,900 PDEW with a supply of almost 3,000 seats. The supply is considered currently adequate. A number of low-cost carriers from Singapore fly between Chinese Taipei and Singapore with an onward journey to Japan or the Republic of Korea, leveraging on their 5$^{th}$ freedom traffic rights.

**Thailand (THA)**

The market between Chinese Taipei and Thailand is one of the more mature markets with services optimized both in terms of the number of routes and frequencies. Some secondary cities of the two economies are also linked with the help of low-cost carriers, so the air services between the two member economies can be considered sufficient at this point in time.

**United States (US)**

Between Chinese Taipei and the United States, there are close to 2,800 passengers per day with a supply of just over 4,000 seats. One route that has been identified as a potential new direct service from TPE is the route to ORD. The analysis is elaborated in Section 4.3.

**Viet Nam (VN)**

On an economy-pair standpoint, air services between Viet Nam and Chinese Taipei are adequately served right now, with just under 3,000 seats per day serving 1,865 passengers per day each way. The following section will look into greater details at these shortfalls in supply at a city pair level.

### 4.1.3 City pair analysis by APEC economy

When considering the shortfall in service to city pairs, 7 have a demand of over 30 PDEW with no non-stop service, as illustrated in table 8 below. These 7 routes are spread throughout the different economies identified at the economic pair analysis in the previous section. This section explains in greater details the economy pairs with air service development potential to Chinese Taipei.

| Origin Airport | Origin Economy | Destination Airport | Destination Economy | 2015 OD Demand |
|---|---|---|---|---|
| TPE | Chinese Taipei | PER | Australia | 34 |
| KHH | Chinese Taipei | CGK | Indonesia | 64 |
| TPE | Chinese Taipei | AKL | New Zealand | 70 |
| TPE | Chinese Taipei | HKT | Thailand | 30 |
| TPE | Chinese Taipei | BOS | United States | 45 |
| TPE | Chinese Taipei | ORD | United States | 38 |
| KHH | Chinese Taipei | LAX | United States | 37 |

*Table 7: APEC routes to Chinese Taipei with over 30 PDEW with no non-stop service (Source: IATA analysis of Airport IS data).*

## 4.2 High-level feasibility considerations

As shown in the above section, city pairs with 30 PDEW (10,950 annual passengers one-way) were considered as the minimum threshold for analysis. 7 city pairs to and from Chinese Taipei met this criterion.

As a way to further define a potentially viable route, IATA used two metrics: distance and market size. Due to aircraft range restrictions distance eliminated any city pairs over 15,000km apart from one another.

The second criterion used the application of induction and connection potential rates (unique to each region and route type) to the existing OD demand in order to determine whether the route would garner a minimum demand of 158 PDEW for ultra-long-haul routes (over 12,000km), 110 PDEW for long-haul routes (between 4,000km and 12,000km), or 75 PDEW for short-haul routes (under 4,000km) in the coming three years with behind and beyond potential and OD stimulation factored in (see section 4.3 below for detailed breakdown of the factors).

This filtering process led to the selection of two routes that are presented in the table below with more details in the next section.

| Origin Airport | Origin Economy | Destination Airport | Destination Economy | 2015 OD Demand | 2015 Estimated Market Potential | Distance viable for non-stop flight with current technology | Market size adequate for non-stop service in the medium term | Proposed Route |
|---|---|---|---|---|---|---|---|---|
| TPE | Chinese Taipei | AKL | New Zealand | 70 | 111 | ✓ | ✓ | Yes |
| KHH | Chinese Taipei | CGK | Indonesia | 64 | 83 | ✓ | ✓ | Yes |
| TPE | Chinese Taipei | BOS | United States | 45 | 97 | ✓ | ✗ | No |
| TPE | Chinese Taipei | ORD | United States | 38 | 114 | ✓ | ✗ | No |
| KHH | Chinese Taipei | LAX | United States | 37 | 65 | ✓ | ✗ | No |
| TPE | Chinese Taipei | PER | Australia | 34 | 89 | ✓ | ✗ | No |
| TPE | Chinese Taipei | HKT | Thailand | 30 | 72 | ✓ | ✗ | No |
| TPE | Chinese Taipei | IAD | United States | 27 | 71 | ✓ | ✗ | No |
| TPE | Chinese Taipei | PDX | United States | 26 | 70 | ✓ | ✗ | No |
| TPE | Chinese Taipei | SHA | China | 24 | 47 | ✓ | ✗ | No |

*Table 8: Summary of high-level route feasibility considerations*

## 4.3 Proposed route analysis

IATA narrowed the above selection to two different routes from Chinese Taipei. This section decomposes the route potential and presents a forecast of the current demand in the medium term.

### 4.7.1 Route #1 TPE-AKL

TPE-AKL 2015 total route potential definition:

| | | | | 1 | 2 | 4 | |
|---|---|---|---|---|---|---|---|
| Origin Airport | Destination Airport | Destination Economy | 2015 OD Non-direct Demand | OD Captured Though Deorect Service | OD Stimulation | Behind/Beyond Connecting Potential | Caculations |
| TPE | AKL | New Zealand | (A) 70 | (B) 80% | (C) 38% | (D) 31% | |
| | | | | (1) 56 | 22 | | (1) = AxB |
| | | | | (2) | | | (2) = 1xC |
| | | | Subtotal | (3) | 77 | | (3) = 1+2 |
| | | TPE - AKL Total Market Potential (2015 Base) | | | | (4) 111 | (4) = 3/(1-D) |

Based on 2015 demand figures, IATA estimates that the TPE-AKL route presents a potential of 111 PDEW for a direct service between the two cities.

This potential would grow to 130 by 2018 as displayed in the short-term forecast in the following table. This forecast uses the 2015 estimated demand and applies to it the IATA inter- and intra-regional global traffic forecast published by our Economics Division.

| Economy Pair | City Pair | 2015 Base | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|
| Chinese Taipei-New Zealand | TPE-AKL | 111 | 117 | 123 | 130 |

### 4.7.2 Route #2 KHH-CGK

KHH-CGK 2015 total route potential definition:

| | | | | 1 | 2 | 4 | |
|---|---|---|---|---|---|---|---|
| Origin Airport | Destination Airport | Destination Economy | 2015 OD Non-direct Demand | OD Captured Though Deorect Service | OD Stimulation | Behind/Beyond Connecting Potential | Caculations |
| KHH | CGK | Indonesia | (A) 64 | (B) 80% | (C) 38% | (D) 14% | |
| | | | | (1) 52 | 20 | | (1) = AxB |
| | | | | (2) | | | (2) = 1xC |
| | | | Subtotal | (3) | 71 | | (3) = 1+2 |
| | | KHH - CGK Total Market Potential (2015 Base) | | | | (4) 83 | (4) = 3/(1-D) |

Based on 2015 demand figures, IATA estimates that the KHH-CGK route presents a market potential of 83 PDEW for a direct service between the two cities.

This potential would grow to 97 by 2018 as displayed in the short-term forecast in the following table. This forecast uses the 2015 estimated demand and applies to it the IATA inter- and intra-regional global traffic forecast published by our Economics Division.

| Economy Pair | City Pair | 2015 Base | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|
| Chinese Taipei-Indonesia | KHH-CGK | 83 | 88 | 92 | 97 |

## 4.8 Proposed scheduled operations

This section considers the above route through three main operational/feasibility criteria:

- air service agreements
- airline network strategies and fleets
- route economics

Additionally, proposed operational aspects of the route are presented including an indicative start date based on market maturity, a proposed airline to serve the route, type of aircraft to be used, flight frequency, and estimated load factors.

### 4.8.1 Route #1 TPE-AKL

The TPE-AKL route could be served by China Airlines and bring connecting traffic from New Zealand via TPE to Asia and Europe.

China Airlines can make use of the new A350-900 aircraft configured with 306 seats. Considering the estimated market potential of 123 PDEW in 2017, the service could start with four times per week and provide an adequate load factor on the route. The proposed service would operate at an estimated average load factor of 71% as illustrated below:

| Route (non-directional) | Minimum Opening Date | Airline | Aircraft | # of Seats | Frequency per Week | Number of Pax per Flight | Load Factor |
|---|---|---|---|---|---|---|---|
| TPE-AKL | 2017 | China Airlines | A350-900 | 306 | 4 | 216 | 71% |

### 4.8.2 Route #2 KHH-CGK

The KHH-CGK route is ideal for Garuda Indonesia to operate on this route. This service can bring connecting traffic to CGK and on to Garuda's extensive domestic and international network. Considering the market potential estimated for 2017 of 92 PDEW. A 5-weekly service could be offered when opening the route. The proposed service would operate at an estimated average load factor of 81% as illustrated below with a Garuda Indonesia B737-800 aircraft:

| Route (non-directional) | Minimum Opening Date | Airline | Aircraft | # of Seats | Frequency per Week | Number of Pax per Flight | Load Factor |
|---|---|---|---|---|---|---|---|
| KHH-CGK | 2017 | Garuda Indonesia | B737-800 | 160 | 5 | 129 | 81% |

# 5. Conclusions and opportunities

In addition to the development of new air services in the medium term, other opportunities for air service development such as connectivity improvement, route frequency increases, and long-term developments are also presented.

## 5.1 Connectivity improvement

This section identifies poorly connected markets that could be better served by improved connecting times, hence granting additional access to already existing yet less accessible connecting markets.

IATA examined flights departing to and from TPE and is pleased to report that currently the flight connections for the two base airlines, China Airlines and EVA Air, are very well optimized. A small selection of improvements can be suggested based on optimal connecting time-related considerations:

- EVA Air flight 52 currently leaves for IAH at 22:00. If the departure time can be delayed by 30 minutes to 22:30, it can potentially catch the connections from BKK, MNL, HKG, and DPS.
- China Airlines flight 53 for BNE currently leaves TPE at 23:50 and misses the connections from PEK and HKG. The connections can be optimized by delaying the departure time by 35 minutes to 00:25.

## 5.2 Route frequency increase

IATA considered all of the international non-stop routes from Chinese Taipei to determine whether the current non-stop supply adequately matches the demand. Numerous city pairs from Chinese Taipei with inadequate non-stop service were identified.

Due to the fact that most aircraft only fly at an average 80% load factor, the ideal demand-to-supply ratio should be under 85%. All of the identified routes in the table below have demand-to-supply ratios of greater than 85%.

Strategies to improve the non-stop service could involve adding an additional weekly frequency or increasing the size of the aircraft serving the route. Each route has different operational constraints depending on the distance and type of market being served (short-haul vs. long-haul or business vs. leisure market).

| Origin Airport | Origin Economy | Destination Airport | Destination Economy | 2015 OD Demand (PDEW) | Non-Stop Seats in 2015 (SDEW) | Demand Excess over Supply (PDEW) | Ratio of Demand to Non-Stop Supply |
|---|---|---|---|---|---|---|---|
| TPE | Chinese Taipei | MEL | Australia | 80 | 24 | 56 | 328% |
| KHH | Chinese Taipei | PEK | China | 73 | 23 | 50 | 323% |
| KHH | Chinese Taipei | HAK | China | 23 | 10 | 13 | 233% |
| KHH | Chinese Taipei | TAO | China | 35 | 24 | 11 | 147% |
| KHH | Chinese Taipei | CTU | China | 57 | 41 | 16 | 140% |
| TPE | Chinese Taipei | NNG | China | 211 | 152 | 59 | 138% |
| KHH | Chinese Taipei | CKG | China | 53 | 44 | 9 | 121% |
| TPE | Chinese Taipei | CKG | China | 212 | 176 | 36 | 120% |
| KHH | Chinese Taipei | NNG | China | 51 | 43 | 8 | 119% |
| KHH | Chinese Taipei | NKG | China | 76 | 69 | 7 | 110% |
| KHH | Chinese Taipei | CAN | China | 52 | 48 | 4 | 109% |
| KHH | Chinese Taipei | TSN | China | 27 | 25 | 2 | 108% |
| TPE | Chinese Taipei | TSN | China | 101 | 96 | 5 | 105% |
| TPE | Chinese Taipei | WUH | China | 175 | 167 | 8 | 105% |
| KHH | Chinese Taipei | KWL | China | 31 | 29 | 1 | 104% |
| TPE | Chinese Taipei | CTU | China | 326 | 317 | 8 | 103% |
| TPE | Chinese Taipei | SWA | China | 21 | 21 | 0 | 101% |
| TPE | Chinese Taipei | KMG | China | 139 | 141 | -2 | 98% |
| TPE | Chinese Taipei | PEK | China | 1230 | 1303 | -73 | 94% |
| KHH | Chinese Taipei | NGB | China | 67 | 72 | -5 | 94% |
| KHH | Chinese Taipei | PVG | China | 443 | 474 | -31 | 93% |
| TPE | Chinese Taipei | XIY | China | 214 | 231 | -18 | 92% |
| RMQ | Chinese Taipei | PVG | China | 72 | 79 | -8 | 90% |
| KHH | Chinese Taipei | CSX | China | 58 | 65 | -7 | 90% |
| TPE | Chinese Taipei | SYX | China | 38 | 42 | -4 | 90% |
| TPE | Chinese Taipei | SUB | Indonesia | 116 | 85 | 31 | 137% |
| TPE | Chinese Taipei | PEN | Malaysia | 131 | 90 | 41 | 146% |
| KHH | Chinese Taipei | KUL | Malaysia | 48 | 36 | 12 | 134% |
| TPE | Chinese Taipei | CEB | The Philippines | 23 | 3 | 19 | 664% |
| TPE | Chinese Taipei | CJU | Republic of Korea | 55 | 56 | -1 | 98% |
| KHH | Chinese Taipei | SIN | Singapore | 106 | 111 | -5 | 95% |
| TPE | Chinese Taipei | CNX | Thailand | 124 | 133 | -9 | 93% |
| KHH | Chinese Taipei | BKK | Thailand | 144 | 158 | -14 | 91% |
| TPE | Chinese Taipei | HNL | United States | 78 | 86 | -8 | 90% |
| TPE | Chinese Taipei | DAD | Viet Nam | 26 | 14 | 12 | 189% |

*Table 9: List of routes with potential for frequency increase*

## 5.3 Long-term new route opportunities

As the growing economy continues to drive air traffic growth, some routes identified in section 4 are expected to become viable in the longer term:

| Origin Airport | Origin Economy | Destination Airport | Destination Economy | 2015 OD Demand | 2015 Estimated Market Potential | Distance viable for non-stop flight with current technology | Market size adequate for non-stop service in the Long term | Proposed Route |
|---|---|---|---|---|---|---|---|---|
| KHH | Chinese Taipei | LAX | United States | 37 | 65 | ✓ | ✓ | Yes |
| TPE | Chinese Taipei | DFW | United States | 20 | 98 | ✓ | ✓ | Yes |
| TPE | Chinese Taipei | ORD | United States | 38 | 114 | ✓ | ✓ | Yes |

*Table 10: Long-term route opportunities*

## 5.4 Development of aircraft technology

The latest aircraft available on the market, Airbus' A350-900 and Boeing's B787-9, are capable of flying ultra-long-haul routes. The technical capabilities of these aircrafts will allow new direct routes to be operated between APEC economies across the Pacific. The following map illustrates the range limit[1] of the A350-900 and B787-9:


*Figure 7: Range limit for the latest generation of aircraft from Chinese Taipei (Source: GCMap)*

[1] For illustration only. Based on published range for the base model of each aircraft type. Specific operating conditions may affect the range of the aircraft.

# 6. Recommendations to improve air connectivity

The various recommendations to improve air connectivity both generically and specifically for each APEC member economy are presented in this section.

## 6.1 Generic recommendations

This chapter provides recommendations applicable to all economies such as greater liberalization of air routes by allowing more access and the elimination of curfews and operational restrictions.

- Continue to liberalize the air services market to other APEC economies, allowing the fullest access to Chinese Taipei airports.
- Encourage airlines to explore the opportunities on the ultra-long-haul market when they take delivery of new generation of long-haul aircraft.

## 6.2 Specific recommendations

- Ensure that adequate planning is in place for other international airports in Chinese Taipei to cater for long-term traffic growth.
- Cross-strait policies have a major impact on traffic between Chinese Taipei and China and continuing the liberalization effort in recent years will strengthen the connectivity between the two economies and open up more markets for the base airlines in Chinese Taipei.
- Closely work with the airline industry to enhance sustainability and profitability of the industry.

## 6.3 How the APEC economy's regulator can help

- Work closely with different stakeholders, for example the airline industry Chinese Taipei Tourism Authority, the Chamber of Commerce etc., to gain a deeper understanding of the development of the aviation demand.
- Ensure that the major international airports have an adequate investment and improvement program to cater for future traffic demand.
- Explore the possibility of relaxing visa requirements for tourists.
- Reduce Passenger Movement Charge on international air passengers.

# 7. Appendix

## 7.1 Overview of IATA and IATA Consulting

### 7.1.1 IATA

IATA – The International Air Transport Association was founded in 1945 as the prime vehicle for inter-airline cooperation in promoting safe, reliable, secure and economical air service for the benefit of the world's consumers. IATA is fully committed to supporting the commercial aviation industry's stakeholders and governments in their efforts to achieve profitability and long-term viability.

**IATA's mission:**

- To represent, lead and serve the airline industry.

**IATA's vision:**

- To be the force for value creation and innovation, driving a safe, secure and profitable air transport industry that sustainably connects and enriches our world.

**IATA in numbers:**

- 250+ member airlines
- 83% of total air traffic
- $387B processed by IATA financial systems
- 1,400+ employees
- 54 offices in 53 countries

### 7.1.2 IATA Consulting

**IATA Consulting overview**

IATA Consulting has comprehensive experience in the full array of business challenges facing the aviation sector. Serving the airline industry for 70 years, IATA has developed unrivalled practical experience, which we bring forth to provide the best solutions to our clients.

With our depth and breadth of aviation industry experience, we assist clients to maximize the value of their operating model, realize growth ambitions and gain insights that translate into sustainable competitive advantages.

IATA Consulting has expertise in the following areas:

**SAFETY & FLIGHT OPERATIONS**

Solutions for aviation organizations and airlines to improve safety, efficiency and air transport management.

**ENVIRONMENT & ECONOMICS**

Solutions for fulfilling the vision of a safer, more competitive and sustainable aviation industry.

**AIRLINES**

Solutions to achieve real and lasting results in every aspect of airline commercial and operational management.

**AIRPORTS, PASSENGERS & SECURITY**

Solutions to plan your airport efficiently to avoid costly mistakes and profit from untapped opportunities.

**GROUND HANDLING & CARGO**

Solutions to optimize your operations and improve your safety and security while reducing costs.

**Our Clients**

IATA Consulting has successfully demonstrated its capabilities by providing airlines, airports, tourism offices and other organizations with accurate, unbiased and reliable high quality information and analysis to help them define and understand their markets, while ensuring their long-term facility development and financial success.

IATA is trusted by multiple clients all over the world including airlines, airports, governments and aviation institutions.


**Why IATA Consulting was chosen for this project**

IATA has, over time, recruited and retained some of the most highly experienced and capable aviation consulting resources within the aviation industry. Due to its position at the heart of the industry, IATA has access to exceptionally skilled and informed subject matter experts and specialists. IATA Consulting's objective is to make a positive difference in its clients' performance, while delivering quality services to all industry stakeholders.

IATA Consulting provides its customers with vast knowledge and expertise in all sectors of the industry worldwide. Our approach has been finely tuned to leverage IATA's global presence and industry thought leadership position in the development of tailored solutions that fit with local cultural considerations and embody international best practices. Our consultants rely on international state-of-the-art standards, unmatched access to data, and products and expert resources to provide cost-efficient and highly informed solutions.

IATA is backed by a robust set of decision support tools, Airport IS and Pax IS have been essential to undertake this study.

**Airport IS** and **Pax IS** are the most comprehensive aviation databases available in the marketplace, capturing 100% of traffic around the world and bringing together total market supply and demand under a single platform. The data provided is accurate and reliable as it is captured through IATA's Billing and Settlement Plan (BSP).

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