Asia-Pacific Economic Cooperation

Develop Air Connectivity in the APEC Region

CHILE

Tourism Working Group | October 2016

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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 within 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.

Load Factor – The ratio of seats sold to available seats on a particular flight

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.

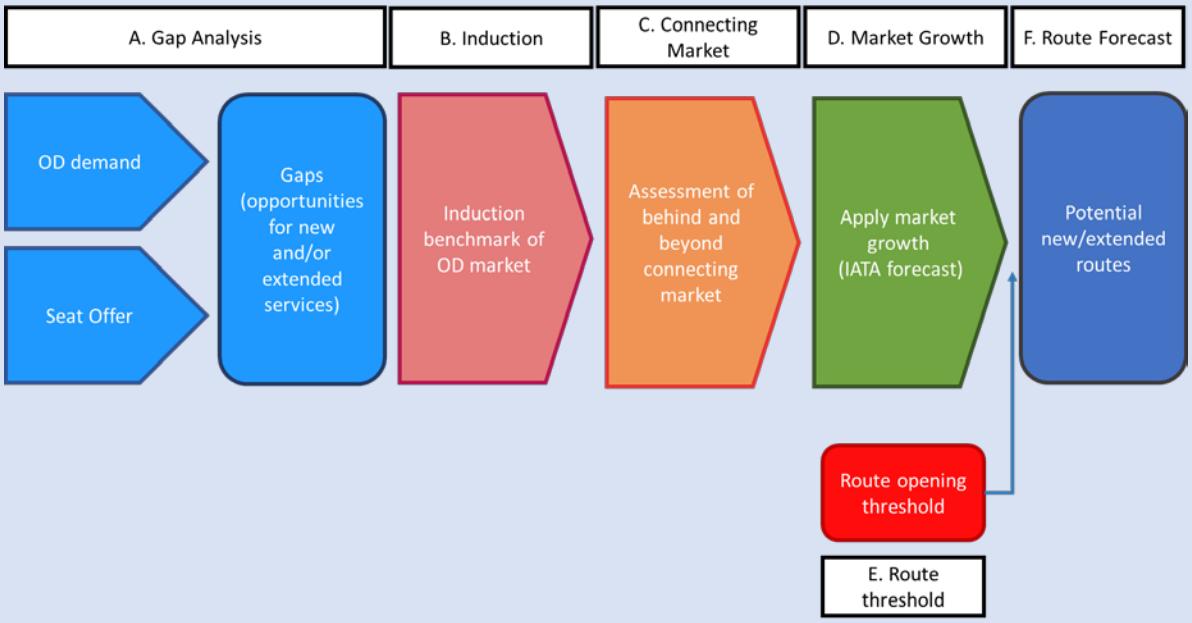

Figure 1: Process used to complete analytical work

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 United Nations World Tourism Organization.

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.

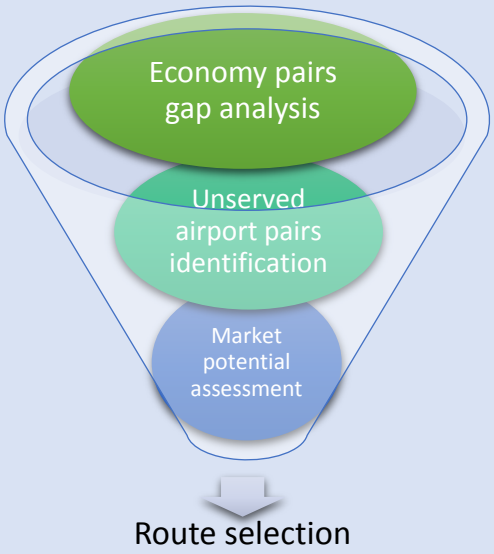

Figure 2: Funnel Approach used to conduct Analysis

The economy-pair analysis allowed to identify unserved markets.

As an example, this analysis showed that there was an average daily demand of 1,183 Passengers Daily Each Way (PDEW) in 2015 that fly via existing connecting routes between Chile and the United States while an average of 1,748 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: 77 Passengers Daily Each Way (PDEW) travelled between SCL and LAX in 2015.

The top 30 unserved routes for Chile 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)
SCL	Chile	LAX	United States	77	0	274
SCL	Chile	CUZ	Peru	74	0	0
SCL	Chile	MCO	United States	51	0	0
SCL	Chile	SFO	United States	39	0	0
SCL	Chile	MEL	Australia	31	0	0
SCL	Chile	LGA	United States	27	0	0
SCL	Chile	LGA	United States	27	0	0
SCL	Chile	YUL	Canada	27	0	0
SCL	Chile	ORD	United States	25	0	0
SCL	Chile	YVR	Canada	25	0	0
SCL	Chile	DCA	United States	25	0	0
SCL	Chile	NRT	Japan	24	0	0
SCL	Chile	BOS	United States	23	0	0
SCL	Chile	BNE	Australia	21	0	0
SCL	Chile	EWR	United States	19	0	0
SCL	Chile	FLL	United States	17	0	0
SCL	Chile	PVG	People's Republic of China	17	0	0
SCL	Chile	HKG	Hong Kong, China	16	0	0
SCL	Chile	ICN	Republic of Korea	15	0	0
SCL	Chile	TRU	Peru	13	0	0
SCL	Chile	PEK	China	13	0	0
SCL	Chile	LAS	United States	12	0	0
SCL	Chile	MTY	Mexico	12	0	0
SCL	Chile	AQP	Peru	11	0	0
SCL	Chile	TBP	Peru	11	0	0
SCL	Chile	SJU	United States	11	0	0
SCL	Chile	GDL	Mexico	10	0	0
SCL	Chile	SAN	United States	10	0	0
SCL	Chile	SEA	United States	10	0	0
SCL	Chile	IAS	United States	10	0	0

Table 1: Top 30 unserved routes from Chile, 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 Chile. 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-Peru, Chile	90%	28%	25%

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 SCL to various regions in APEC are shown in the table below.

	SCL
NAFTA	28.6%
Australasia	64.0%
Peru-Chile	10.1%

Table 3: Average rate of connecting passengers at the hub airport in Chile

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 Chile between 2016 and 2018. Growth was typically seen to be approximately 5.4%. 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 service to be offered. Distance considers the feasibility of offering a non-stop flight with existing technology, using 15,000km as a maximum distance. 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 SCL-CUZ 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**
SCL	CUZ	Peru	(A) **74**	(B) 80%	(C) 25%	(D) 10%	
				(1) 59	15		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	**74**		(3) = 1+2
		SCL - CUZ Total Market Potential (2015 Base)				(4) **82**	(4) = 3/(1-D)

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

3. Chile

A summary of Chile and its economy and demographics, aviation demand, and airport specific information is presented in this section.

3.1 Economy and demographics

Chile is located in the South America region and lies between the Andes and the South Pacific Ocean. It has a 4,300km Pacific Ocean coastline and shares borders with Peru, Bolivia and Argentina. It is the longest north-south trending economy in the world.

3.1.1 Demographics

It has a population of 17.77 million. The average annual growth rate was 0.9% between 2010-2015. Urban population grew on average 1% between 2010-2015. 89.4% of the population is urbanised as of 2014. Central Chile is home to the majority of the population (Santiago, Valparaiso and Concepción). The capital city Santiago is home to approximately 36.41% of the total population (UNdata, 2016). The majority of the population speaks the official language of Chile, Spanish (99.5%), with 4.6% of the population speaking one of Chile's indigenous languages.

3.1.2 Economy

Chile has been one of the fastest-growing economies within the Latin America region over the past decade. However, after the economic downtown in 2010-2012, GDP growth fell to 1.9% in 2014 and 2.1% in 2015, compared to 5.8% in 2010. During this period, Chile experienced a slowdown in the mining sector, decline in copper prices and private consumption. Economic growth is expected to reach 1.9% in 2016 and gradually increase to 2.1 % for 2017 (World Bank, 2016). Forecasts show that inflation will remain high in the short term due to the depreciation of the peso (OECD, 2016).

According to WTO (2016), Chile's exports are mainly comprised of fuels and mining products (57.1%), agricultural products (29.2%) and manufactures (13.6%). Natural resources found in Chile include copper, timber, iron ore, nitrates and precious metals. 21.1% of Chile's land is used for agricultural purposes. The main destinations of these exports are China (24.6%), the European Union (14.5%), the United States (12.2%) and Japan (10.0%).

3.1.3 Tourism

Tourism is a major contributor to the Chilean economy. Foreign visitors contribute to over CLP 1,270.3 billion per year to the Chilean economy. Moreover, nearly 36% of foreign visitors arrived in Chile by air in 2009. (Oxford Economics, 2011). Travel contributes to over 20% of the economy's total exports in 2015 (World Tourism Origination, 2016).

3.2 Aviation demand

3.2.1 Recent demand growth

In 2005, 6.6 million passengers travelled to and from Chile. In 2015, more than 17 million passengers travelled to and from Chile. As shown in Figure 5, total passenger air traffic between 2005 and 2015 has nearly tripled within 10 years (Albatross Airport, 2016).

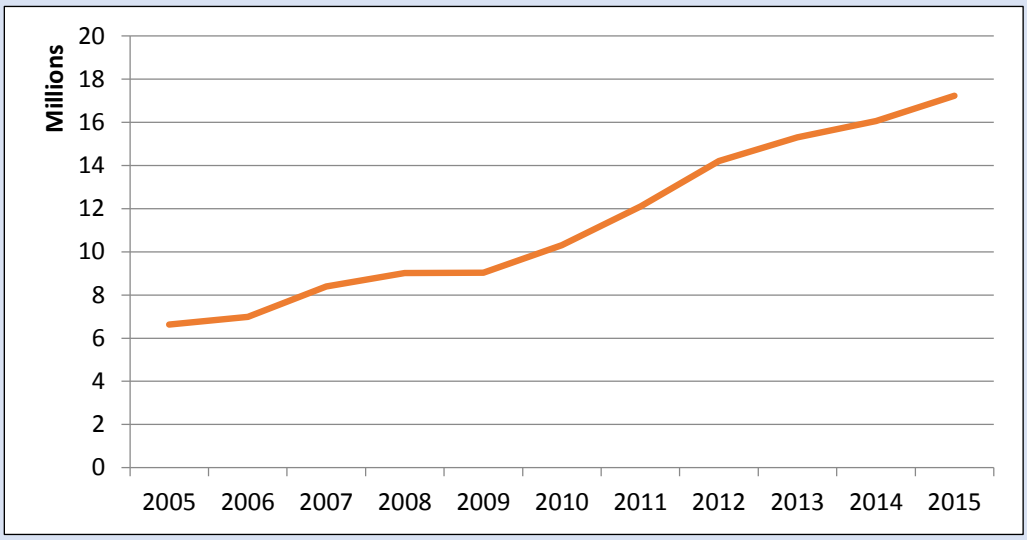

Figure 4: Total air passenger traffic Chile, 2005-2015 (Source: Albatross Airport, 2016)

Regional distribution of Chilean airfreight shows 70% of freight is transported to North America, followed by Caribbean & Central/South America (14%), Europe (12%) and Asia Pacific (4%) (Oxford Economics, 2011). The below figure shows that total cargo traffic in the past 10 years, between 2005 -2015, has maintained an average demand of 27,463 metric tonnes.

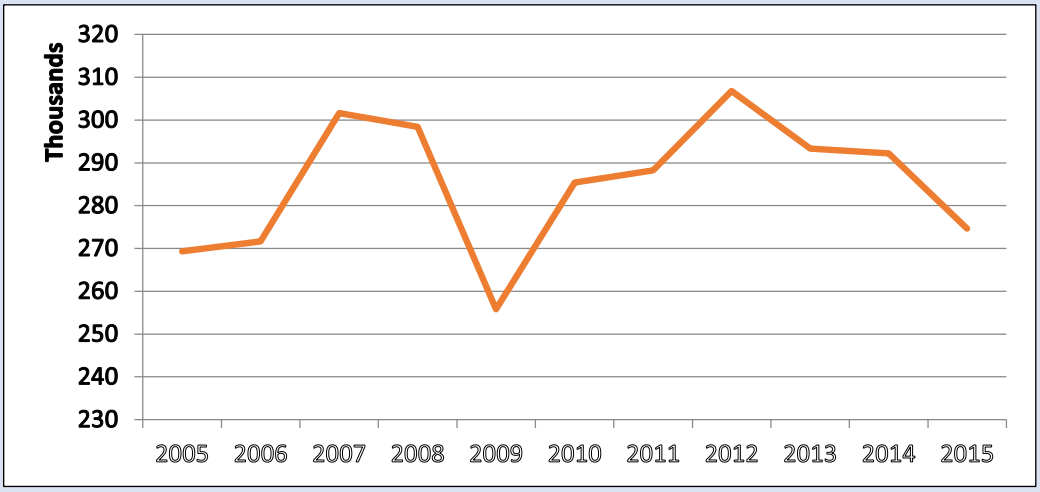

Figure 5: Total cargo traffic Chile, 2005-2015, in thousand tonnes (Source: Albatross Airport, 2016)

3.2.2 Current air services to Chile

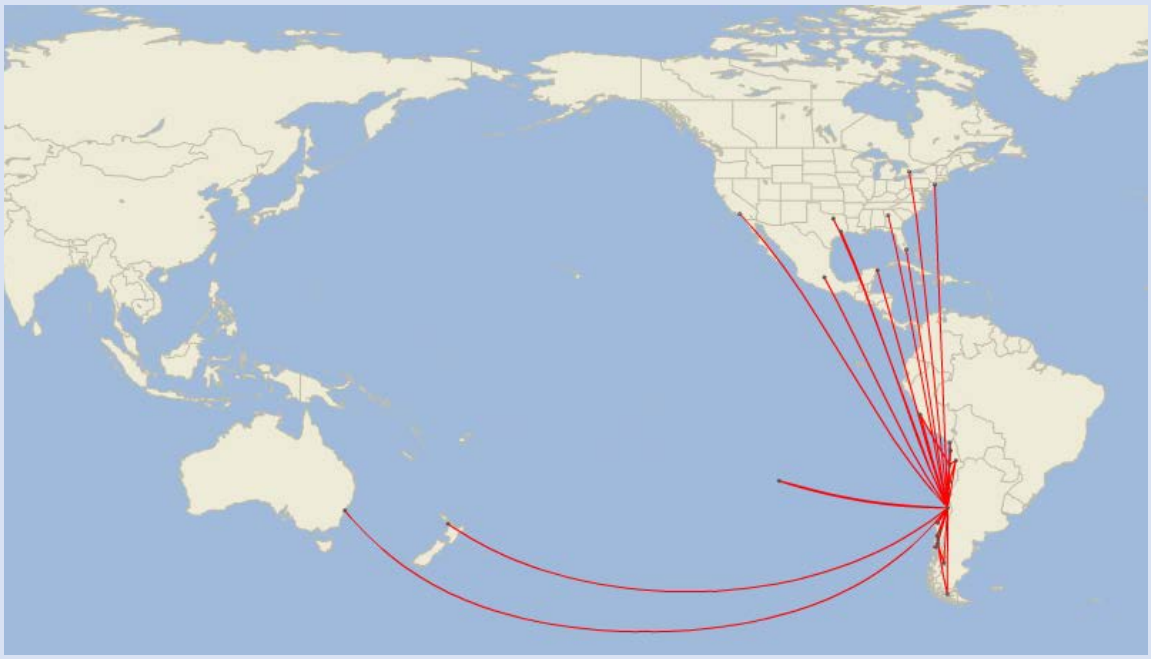

Figure 6: Non-stop service to and from Chile and top APEC destinations March 2016 (Source: Airport IS)

In terms of APEC connections, Chile has direct air services to Australia; Canada; Mexico; New Zealand; Peru; and the United States.

Air services across the Pacific from Chile to Asia are not always feasible. This is partly due to the limitations in current aircraft technology in terms of range. It is also costly for the airlines to operate such ultra-long-haul routes. At present, a lot of the trans-pacific traffic are routed through other aviation hubs in the APEC economies in the United States such as Los Angeles and San Francisco. IATA anticipates that these hubs will continue to perform their current functions in the medium to long term.

3.2.3 Aviation and the economy

Economic Footprint

In 2009, the aviation sector contributed CLP 1,427 billion (1.6%) to Chilean GDP (Oxford Economics, 2011). This comprises direct and indirect spending. Catalytic benefits through tourism are estimated at another CLP 1,272 billion, bringing the total benefits to CLP 2,700 billion or 3% of GDP.

From an employment perspective, the sector supports 73,000 jobs directly and indirectly and a further 88,000 people through the catalytic effects.

Consumer Benefits

The aviation industry has benefits for visiting friends and family and the shipping of high value products. In 2009, a total of 10 million passengers and 262,000 tonnes of freight travelled to, from and within Chile by air.

It is estimated that the value of benefits from the aviation industry to travellers is worth CLP 1,724 billion a year (in excess of expenditures). Moreover, the estimated benefits to shippers exceed CLP 211 billion (in excess of expenditures) (Oxford Economics, 2011).

Long-term impact

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

- Opening up foreign markets to Chilean exports;
- Lowering transport costs, particularly over long distances, helping to increase competition because suppliers can service a wider area and potentially reduce average costs through increased economies of scale;
- Increasing the flexibility of labour supply, which should enhance allocative efficiency and bring down the natural rate of unemployment;
- Encouraging Chilean businesses to invest and specialize in areas that play to the economy's strengths;
- Speeding the adoption of new business practices, such as just-in-time-inventory management that relies on quick and reliable delivery of essential supplies;
- 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 a CLP 57.6 billion per annum increase in long-run GDP for the Chilean economy.

3.2.4 Government position on aviation

The two major coalitions in Chile hold strong consensus on the need for global economic integration and to maintain a liberalized market economy.

The Ministry of Public Works – Airports department is responsible for public expenditure on airports and related infrastructure expenditures. The Ministry of Public Works has interests in increasing accessibility and connectivity in Chile and has supported building better infrastructure to support the aviation network, including support for a 175,000 square meter terminal expansion project at the

Arturo Merino Benitez International Airport and the modernization of Airport Arica, Punta Arenas Airport to Airports in Iquique, La Serena and Chillan. It is expected that the Undurraga Minister will invest US 1,100 million in national airport infrastructure between 2014-2017 in order to improve the economy's's network of airports and airfields (Dirección de Aeropuertos, 2016).

The Chilean government provides timely and transparency on government projects, bids and expenditures to the public and is easily accessible (Gobierno de Chile, 2016).

3.3 Airport-specific information

3.3.1 Busiest airports in Chile

Airport	Location	Passengers
SCL	Santiago	15,312,649
ANF	Antofagasta	1,863,907
CJC	Calama	1,441,656
IQQ	Iquique	1,250,315
PMC	Puerto Montt	1,224,814

Table 4: Busiest airports in Chile 2013 (Source: JAC, 2016)

Figure 7: Map of Chile's airports (Source: Google maps)

Arturo Merino Benitez International Airport (SCL)

The Arturo Merino Benitez International Airport is Chile's principal hub airport. It is the largest aviation facility and busiest international airport in Chile. The airport lies 15km from downtown Santiago. SCL provides both domestic and international flight services. It is ranked the seventh busiest airport within Latin America based on aircraft movements in 2013 (JAC, 2016). It plays as a major gateway for passengers to and from South America to Australia and New Zealand.

On 23 April 2015, the airport passed the consortium for Nuevo Pudahuel to continue to operate the airport and allow for the construction of a new 175,000 square meter terminal in order to increase the airport's capacity to 30 million passengers a year, with potential for further expansion to 45 million (Albatross Airport, 2016).

Cerro Moreno International Airport (ANF)

The Cerro Moreno International Airport (Antofagasta airport) is located in Antofagasta, Chile. It is located 10 kilometres north of Antofagasta.

El Loa Airport (CJC)

El Loa Airport is the major airport serving Calama, one of the largest airports in Chile. It is located approximately 6 kilometres away from the city centre.

Diego Aracena International Airport (IQQ)

Diego Aracena International Airport (Iquique Airport) is located 45 kilometres south of the city centre of Iquique. It shares a runway with the Chilean Air Force.

El Tepual Airport (PMC)

El Tepual Airport is located approximately 15 kilometres from Puerto Montt. The airport caters for aircrafts up to the size of a Boeing 757.

3.3.2 Principal airline operators

LATAM airlines

LATAM airlines, formerly LAN airlines S.A., accounts for approximately 70% of total commercial flights in Chile. Its hub is located at SCL. LATAM airlines is one of the founding members of LATAM airlines Group, the largest Latin American airline holding company. LATAM airlines' fleet of passenger aircrafts include: Boeing 787-9, Boeing 787-8, Boeing 767-300, Airbus 321, Airbus 320-200, Airbus 319, Dash8-200, Boeing 767-300, Boeing 777-300, Airbus A319, Airbus A320, Airbus A321 and the Airbus A330. It offers services to America, Europe, Asia, Oceania, South America and Brazil. The airline also offers cargo services (LATAM, 2016).

Sky airline

Sky airline is the second largest airline in Chile. It is a low cost airline, also based in Santiago at SCL. It has an extensive network serving the domestic market and currently serves international destinations limited to Bolivia, Argentina, Brazil and Peru. It currently has a fleet of 16 passenger aircrafts in operation, comprised of the Airbus A319-100 and Airbus A320-200.

4. Medium-term new route opportunities

This section of the report is dedicated to explaining the potential future air service developments to and from Chile 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 Chile were considered at both economy pair and city pair levels.

4.1.1 Economy pair analysis

The following table outlines the supply and demand for air travel between Chile 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)	135	215	599	17%
Brunei Darussalam (BD)	0	0	0	*
Canada (CDA)	141	194	0	72%
Chile (CHL)	22,207	30,744	2,556	67%
People's Republic of China (PRC)	35	0	0	*
Hong Kong, China (HKC)	16	0	0	*
Indonesia (INA)	2	0	0	*
Japan (JPN)	34	0	0	*
Republic of Korea (ROK)	18	0	0	*
Malaysia (MAS)	1	0	0	*
Mexico (MEX)	390	435	0	90%
New Zealand (NZ)	36	448	0	8%
Papua New Guinea (PNG)	0	0	0	*
Peru (PE)	939	1,864	0	50%
The Republic of the Philippines (PH)	5	0	0	*
Russia (RUS)	0	0	0	*
Singapore (SGP)	3	0	0	*
Chinese Taipei (CT)	2	0	0	*
Thailand (THA)	9	0	0	*
United States (US)	1,178	1,766	1,036	42%
Viet Nam (VN)	1	0	0	*

Table 5: 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 under 60%, but 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. Chile and Mexico at 90% where the non-stop supply is barely enough to cover the total demand between the economies).

Based on the above analysis at the economy level, Chile may have an opportunity to improve domestic services and to Canada in the long term (highlighted in yellow in the above table), and could take actions to improve service with Mexico in the medium term (highlighted in red).

The following section will look into greater details at these shortfalls in supply at a city pair level.

4.1.2 City pair analysis by APEC economy

When considering the shortfall in service to city pairs, 7 routes have a demand of over 30 PDEW with no non-stop service, as illustrated in Table 6 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 Chile.

Origin Airport	Origin Economy	Destination Airport	Destination Economy	2015 OD Demand (PDEW)
SCL	Chile	MEL	Australia	31
SCL	Chile	CUZ	Peru	74
SCL	Chile	LAX	United States	77
SCL	Chile	MCO	United States	51
SCL	Chile	SFO	United States	39
YYZ	Canada	SGN	Viet Nam	70
YVR	Canada	SGN	Viet Nam	78

Table 6: APEC routes to Chile with over 30 PDEW and no non-stop service (Source: IATA analysis of Airport IS data).

4.2 High-level feasibility considerations

City pairs with over 30 PDEW (10,950 annual passengers one-way) were considered as the minimum threshold for analysis. All the city pairs to and from Chile apart from MEL 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, city pairs with a distance of over 15,000km apart from one another are eliminated. The second criterion used the application of induction and connection of 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 a detailed breakdown of the factors).

This filtering process led to the selection of one route that is 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 Long Term	Proposed Route
SCL	Chile	LAX	United States	77	118	✓	×	No
SCL	Chile	CUZ	Peru	74	82	✓	✓	Yes
SCL	Chile	MCO	United States	51	81	✓	×	No
SCL	Chile	SFO	United States	39	69	✓	×	No
SCL	Chile	MEL	Australia	31	119	✓	×	No

Table 7: Summary of high-level route feasibility considerations

4.3 Proposed route analysis

IATA narrowed the above selection to one route. This section decomposes the route potential and presents a forecast of the current demand in the medium term.

4.3.1 Route #1 SCL-CUZ

SCL-CUZ 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
SCL	CUZ	Peru	(A) 74	(B) 80%	(C) 25%	(D) 10%	
				(1) 59	15		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	74		(3) = 1+2
		SCL - CUZ Total Market Potential (2015 Base)				(4) 82	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the SCL-CUZ route presents a potential of 82 PDEW for a direct service between the two cities.

This potential would grow to 96 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
Chile-Peru	SCL-CUZ	82	86	91	96

4.4 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.

4.4.1 Route #1 SCL-CUZ

The SCL-CUZ route could be served by LATAM using the 150 seats A320 aircraft, considering the estimated market potential of 91 PDEW in 2017 and assuming the new service will capture 80% of the market. The new service could start with service of five flights per week and operate at an estimated average load factor of 85% as illustrated below:

Route (Non-Directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per Week	Number of Pax per Flight	Load Factor
SCL-CUZ	2017	LATAM	A320	150	5	127	85%

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 operating to and from SCL for this analysis. A small selection of improvements can be identified based on optimal connecting time-related considerations. Below is a summary of the potential optimizations:

- LATAM airlines flight 801 bound for AKL, currently leaves SCL at 23:55. Should the departure time be moved back by 40 minutes to 00:35, the flight will be able to allow more connections from IQQ, CJC and LIM.

- By moving the departure time of LATAM flight 532 to JFK by 35 minutes to 22:50, it will allow connections from MCC, CCP, and EZE.
- If LATAM flight 704 to Madrid is retimed by 25 minutes to a 18:40 departure from SCL, it will allow connections from CCP, CJC, PMC, ZAL and MDZ.

5.2 Route frequency increase

IATA considered all of the international non-stop routes from Chile to determine whether the current non-stop supply adequately matches the demand. One city pair from Chile with inadequate non-stop service was identified.

Due to the fact that most aircrafts 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%.

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
CUN	Mexico	SCL	Chile	188	49	138	379%

Table 8: List of routes with potential for frequency increase

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).

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
SCL	Chile	LAX	United States	77	118	✓	✓	Yes
SCL	Chile	MEL	Australia	31	119	✓	✓	Yes

Table 9: 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 8: Range limit for the latest generation of aircraft from Santiago (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 Chilean airports.
- Encourage airlines, especially LATAM, 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

- Address terminal capacity issues at SCL.
- Runway capacity at SCL is expected to be saturated by 2025 according to IATA's estimate. Advanced planning is required to address the runway capacity issue in the next decade.
- 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 Chilean Tourism Authority, the Chamber of Commerce etc., to gain a deeper understanding of the development of 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 services for the benefit of the world's consumers. IATA provides fundamental support and leadership for the commercial aviation industry. IATA is fully committed to supporting 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.

AIRPORTS, PASSENGERS & SECURITY

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, AirportIS and PaxIS 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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