



AVIATION BENEFITS

2017



| ICAO



The **Industry High Level Group (IHLG)** was established in September 2013. It is an initiative of the International Civil Aviation Organization (ICAO) Secretary General, bringing together the Heads of four industry organizations: the Airports Council International (ACI), the Civil Air Navigation Services Organisation (CANSO), the International Air Transport Association (IATA) and the International Coordinating Council of Aerospace Industries Associations (ICCAIA). The IHLG is an informal group, which considers matters of global significance to international civil aviation that can be better addressed in a collaborative arrangement between States and the industry rather than working individually on such matters.

This report makes use of material by ACI, CANSO, IATA, ICAO and ICCAIA, as well as the publication of the Air Transport Action Group (ATAG) entitled *Aviation: Benefits Beyond Borders (ABBB)*. While every effort has been made to ensure the quality and accuracy of information in this report, it is made available without any warranty of any kind.

Aviation Benefits 2017



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Foreword

Commercial aviation first took flight over a century ago. The very first commercial aircraft embarked on just a short, 34-kilometre journey, but today the sector has grown remarkably, with passengers and cargo being carried no less than 49 billion kilometres annually, or 10 times the distance from Earth to Neptune.

With over 1,400 scheduled airlines, 26,000 aircraft in service, 3,900 airports and 173 air navigation services providers¹, aviation has established an unmatched global network at the service of travellers and businesses in every corner of the world. It is also the safest and fastest means of transportation available; overcoming oceans and borders to connect people and support sustainable economic growth wherever aircraft fly.

A strong and affordable global air transport network transcends continents, greatly expands local access to foreign supplies and markets, provides invaluable opportunities for cultural and social exchange and enhances emergency and humanitarian response capabilities during crises and public health emergencies.

Current forecasts indicate that air traffic volumes will double in the next 15 years, characterized by a 4.6 per cent annual growth rate for passenger traffic and 4.4 per cent for freight traffic². By spurring tourism and trade as it continues to grow, aviation contributes to increasing consumer benefits and choices, creating jobs and generating numerous socio-spin-offs. The increased connectivity that it delivers leads to further re-investment in aviation, creating a healthy cycle of aviation development and economic prosperity in those countries and regions which set out suitable planning and investment commitments.

This very healthy dynamic of investment and economic development has helped aviation to become a truly global economic force. If it were a country, its gross domestic product (GDP) would be similar to that of Switzerland's at around USD 660 billion (with the total economic impact of USD 2.7 trillion), and the 62.7 million jobs it supports directly and indirectly is comparable to the United Kingdom's current population³.

The challenge going forward is to ensure that future air traffic growth is managed safely, securely and efficiently, with due respect for our sector's concrete environmental commitments. By doing so, we realize sustainable air transport solutions, ensuring that aviation and its many benefits leaves no one, and no country, behind.

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Executive Summary

Aviation is one of the most “global” industries: connecting people, cultures and businesses across continents. Colleagues throughout the sector are committed to raising awareness of the benefits and the role of aviation. The IHLG organizations have collaborated to provide a comprehensive view of the importance of aviation on supporting the global economy and generating social benefits through the prism of sustainable air transport solutions. It is necessary for all stakeholders and partners to work together to maximize the benefits of air transport, and to support the sustainable growth of aviation by connecting more people and more places, more often.

View of the Global Aviation Industry

Aviation has continued to expand. It has weathered crises and demonstrated long-term resilience, becoming an indispensable means of transport. Historically, air transport has doubled in size every fifteen years and has grown faster than most other industries. In 2016, airlines worldwide carried around **3.8 billion passengers** annually with **7.1 trillion revenue passenger kilometres (RPKs)**. **Fifty-three million tonnes of freight** were transported by air, reaching **205 billion freight tonne kilometres (FTKs)**. Every day, around 100,000 flights transport over 10 million passengers and around USD 18 billion worth of goods⁴.

3.8 BILLION

PASSENGERS
carried by airlines
(6.8% increase
from 2015)

53 MILLION

TONNES OF FREIGHT
carried by airlines
(4.0% increase
from 2015)

35 MILLION

**SCHEDULED
COMMERCIAL FLIGHTS**
flown by airlines
(3.7% increase
from 2015)

54,000

ROUTES WORLDWIDE
(over 2,000 new
routes from 2015)

49 BILLION

KILOMETRES FLOWN
by airlines
(5.3% increase
from 2015)

76 MILLION

HOURS FLOWN
by airlines
(5.0% increase
from 2015)

Aviation Is a Major Contributor to Global Economic Prosperity

Aviation provides the only rapid worldwide transportation network, which makes it essential for global business. It generates economic growth, creates jobs, and facilitates international trade and tourism.

According to recent estimates by the cross-industry Air Transport Action Group (ATAG), the total economic impact (direct, indirect, induced and tourism-connected) of the global aviation industry reached **USD 2.7 trillion**, some **3.5 per cent** of world's gross domestic product (GDP) in 2014⁵.

The air transport industry also supported a **total of 62.7 million jobs** globally. It provided 9.9 million direct jobs. Airlines, air navigation service providers and airports directly employed over three million people. The civil aerospace sector (the manufacture of aircraft, systems and engines) employed 1.1 million people. A further 5.5 million worked in other on-airport positions. 52.8 million indirect, induced and tourism-related jobs were supported by aviation⁶.

These estimates do not include other economic benefits of aviation, such as the jobs or economic activity that occur when companies or industries exist because air travel makes them possible, the intrinsic value that the speed and connectivity of air travel provides, or domestic tourism and trade. Including these would increase the employment and global economic impact numbers several-fold.

62.7 MILLION

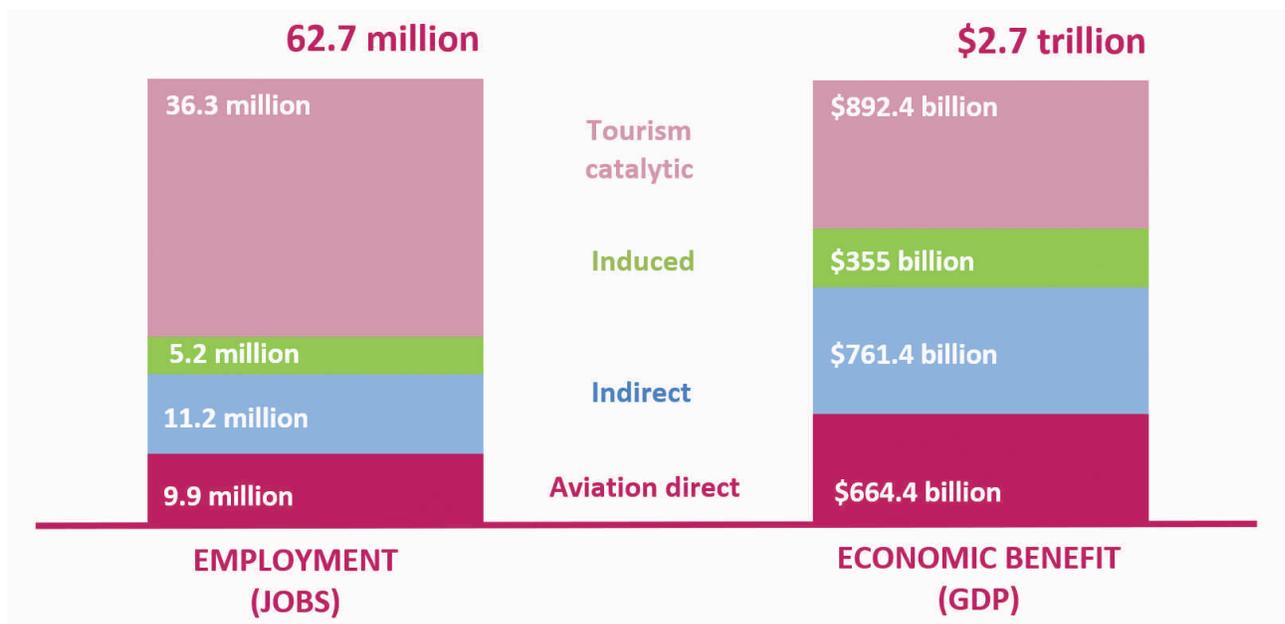
JOBS SUPPORTED

3.5 PER CENT

OF GDP SUPPORTED

\$2.7 TRILLION

ECONOMIC IMPACT



One of the industries that relies most heavily on aviation is **tourism**. By facilitating tourism, air transport helps generate economic growth and alleviate poverty. Currently, approximately **1.2 billion tourists** are crossing borders every year, over half of whom travelled to their destinations by air. In 2014, aviation supported over 36 million jobs within the tourism sector, contributing roughly USD 892 billion a year to global GDP⁷.

Air transport is a driver of **global trade and e-commerce**, allowing globalization of production. The small volumes of air cargo amount to big values in world trade. In 2014, USD 6.4 trillion worth of goods were transported internationally by air, representing **35 per cent of world trade by value, despite representing only 0.5 per cent by volume**⁸. Aviation's advantage over other modes of transport in terms of speed and reliability has contributed to the market for "same-day" and "next-day" delivery services and transportation of urgent or time-sensitive goods.

Some 87 per cent of **business-to-consumer (B2C) e-commerce** parcels are currently carried by air. The e-commerce share of scheduled international mail tonne kilometres (MTKs) grew from 16 per cent to 83 per cent between 2010 and 2016 and is estimated to grow to 91 per cent by 2025⁹.

Aviation Provides Significant Social Benefits

The availability of reliable air transport services provides people with access to what they need: decent livelihoods, food, healthcare, education, safe communities and spaces, etc. Aviation is by far the world's **safest and most efficient** mode of long-range mass transportation. It provides the only possible means of transportation to provide **health care** to many remote communities, and it is a fast and reliable way to deliver urgent **humanitarian aid** during emergencies caused by natural disasters, famine and war.

Furthermore, educational opportunities are made available to students around the world, especially for those students from developing countries who must travel abroad for higher quality education. Aviation also contributes to improving quality of life by broadening travellers' leisure and cultural experiences. It provides an affordable means to visit distant friends and relatives, and fosters awareness of other cultures.



Supporting Sustainable Development Goals

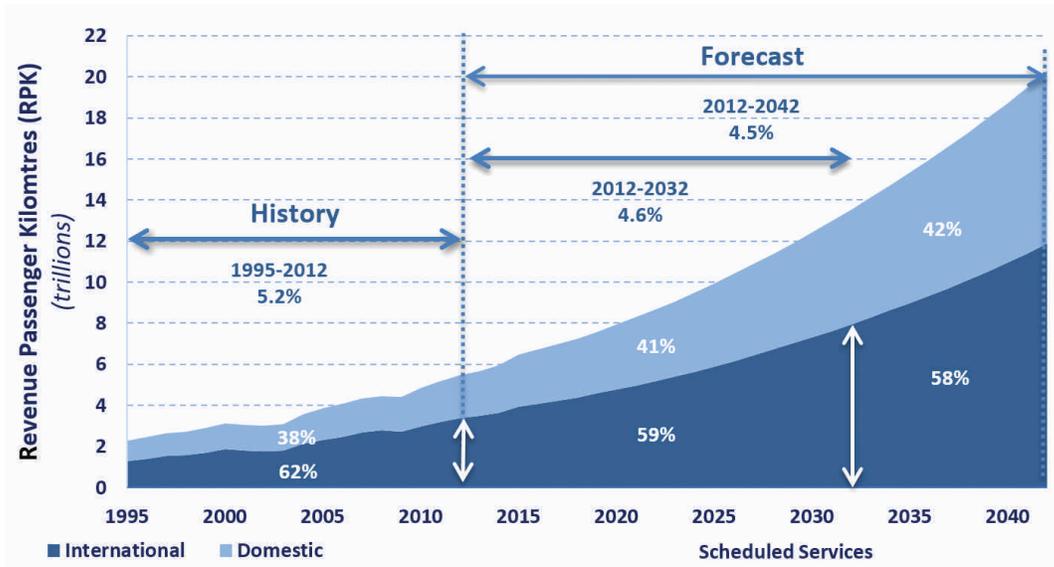
The United Nations (UN) adopted the **Transforming our World: 2030 Agenda for Sustainable Development** in 2015. This Agenda is a plan of action for people, planet and prosperity and seeks to strengthen universal peace in larger freedom. The world should aim to achieve the **17 Sustainable Development Goals (SDGs)** and 169 targets by 2030. Aviation contributes to achieving many of the SDGs directly and indirectly.

Attainment of the SDGs relies on advances in sustainable air transport, which is a driver of sustainable development. In accordance with the recommendation made by the UN Secretary-General's High-level Advisory Group on Sustainable Transport, all stakeholders must make a genuine commitment to transforming the transport system in terms of individual travel and freight into one that is *"safe, affordable, accessible, efficient, and resilient while minimizing carbon and other emissions and environmental impacts"*.

Sustaining the Future of Aviation

By 2034, both air passenger traffic and air freight traffic are expected to more than double, compared to 2016. Passenger traffic is expected to reach over **14 trillion RPKs** with a growth of 4.6 per cent per annum, and freight will expand by 4.4 per cent annually over the same time period, to **466 billion FTKs**¹⁰.

Total passenger traffic: history and forecast



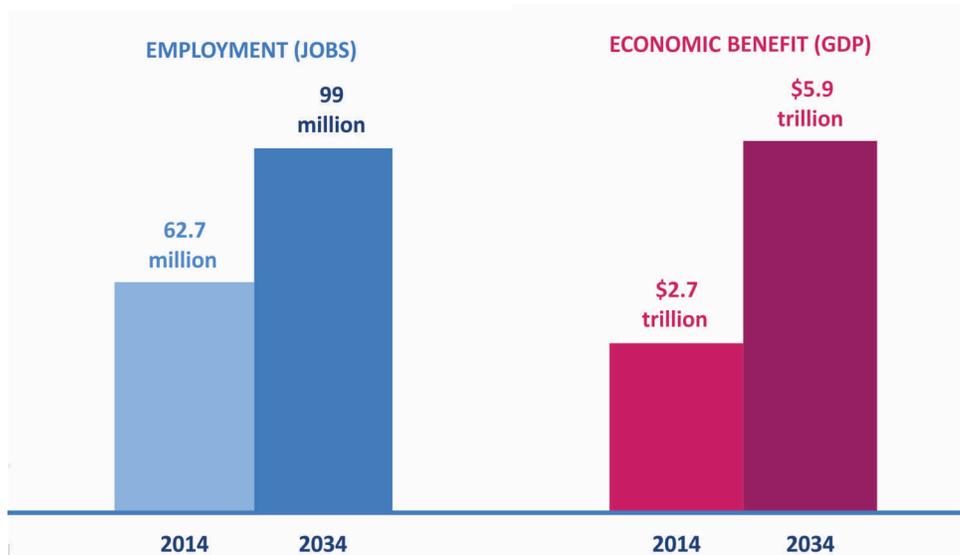
This growth holds tremendous economic potential which will support all States in achieving the UN's 2030 Agenda for Sustainable Development. In 2034, aviation will provide **99 million jobs** and generate **USD 5.9 trillion** in GDP, a 122 per cent increase from 2014¹¹.

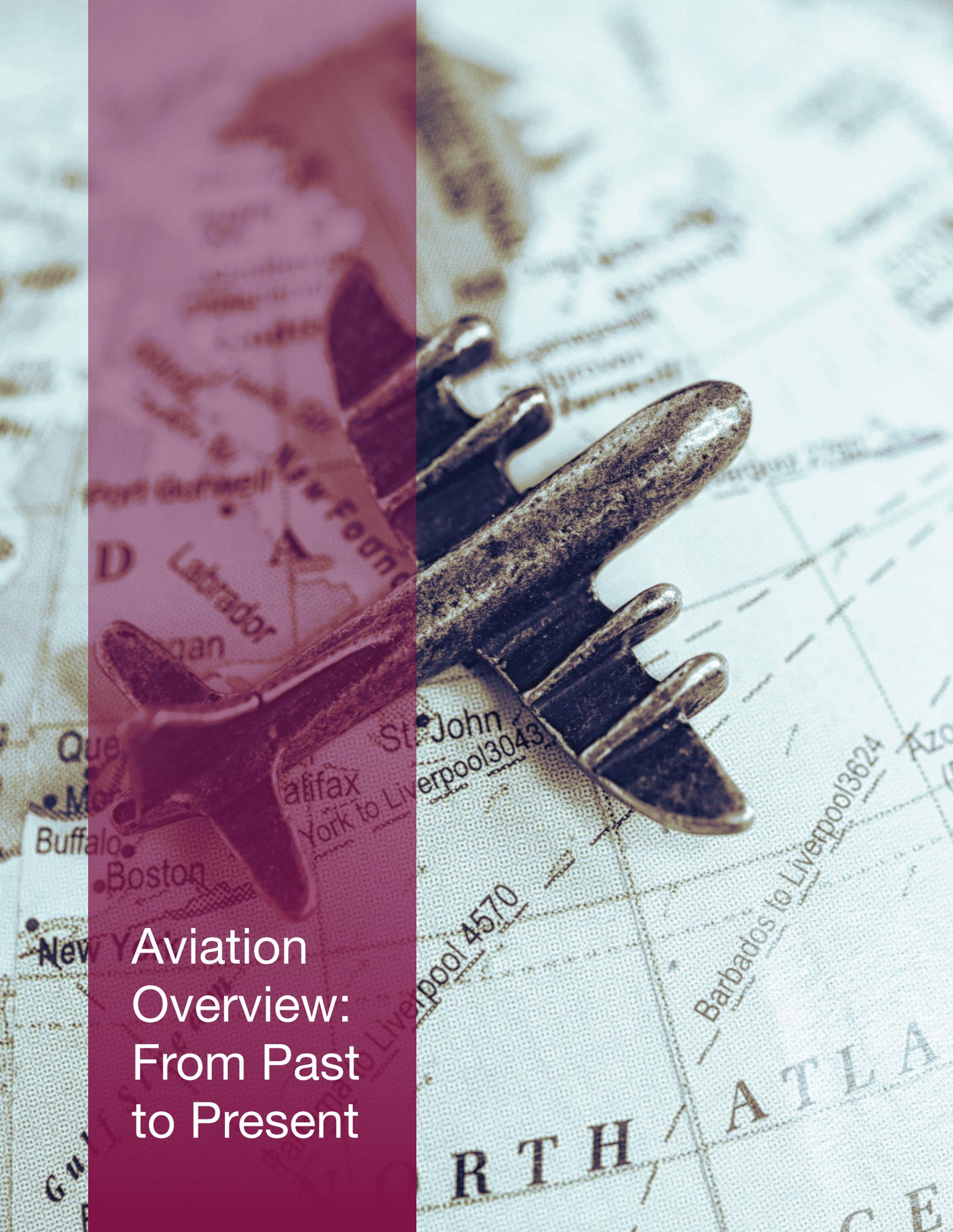
The future growth of air transport will likely depend on sustainable world economic and trade growth, as well as declining airline costs and ticket prices. Other factors, including regulatory regimes (such as liberalization of air transport), technological improvements and fuel costs will also impact future growth.

If traffic growth were to slow by just 1 per cent annually, the total number of jobs supported by the air transport sector would diminish by over 10 per cent (more than 10 million

jobs) and the contribution of the air transport sector to world GDP would drop by some 12 per cent (USD 690 billion¹²).

To encourage this projected growth in a sustainable manner and produce inclusive and productive development and employment, aviation must continue to develop coherent policies with tourism, trade and other transport sectors. A national or regional policy framework consistent with ICAO's standards and policies, and with globally accepted good regulatory practices, can unlock the full value of aviation. New technologies and procedures should also be adopted to further improve connectivity and modernize infrastructure while minimizing any possible adverse impacts of this growth on the environment.





Aviation
Overview:
From Past
to Present

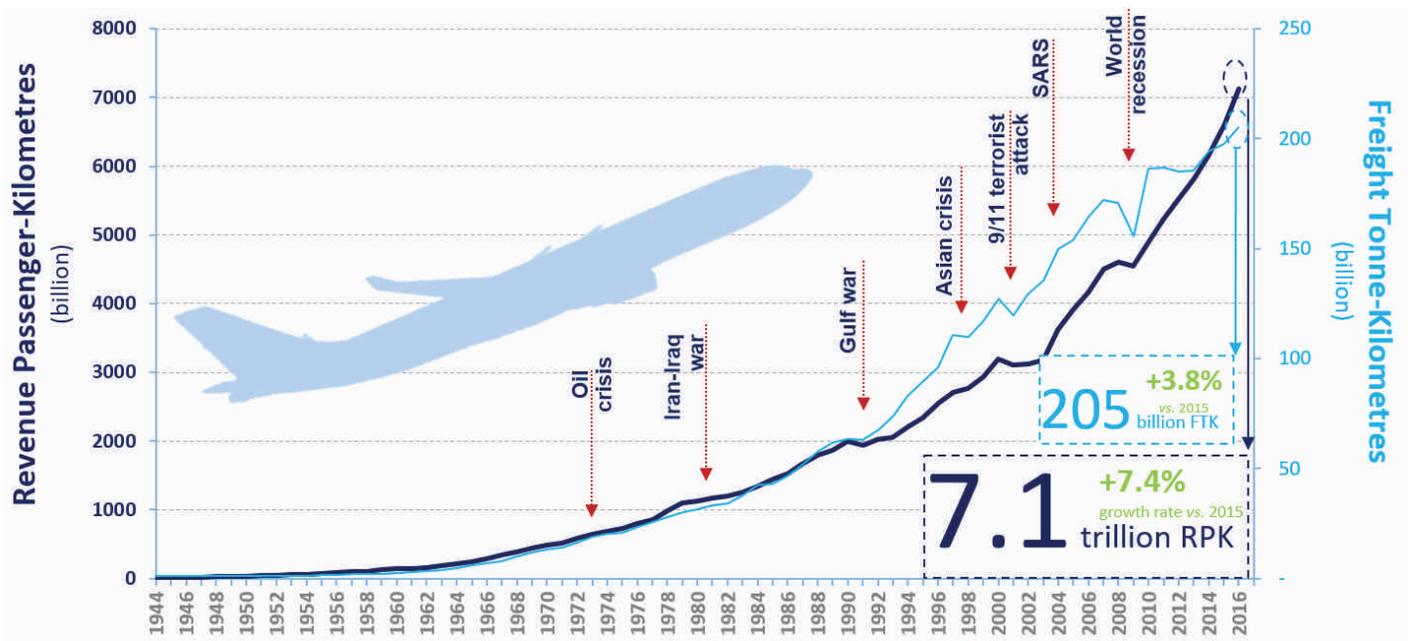
Exponential Growth of Air Traffic

From a long-term historical perspective, air transport has doubled in size every fifteen years and has experienced greater growth than most other industries. Since 1960, increasing demand for passenger and freight services, technological progress and associated investment have combined to multiply the output of the aviation industry by a factor of more than 30. This expansion of air transport compares favourably with the broadest available measure of world output (global GDP), which, when measured in real terms, has multiplied by more than five times over the same period.

It is no mystery why air traffic growth has so consistently defied recessionary cycles. The air transport sector resisted these recessions precisely because it served as one of the most effective tools for ending them – an important consideration for governments at every level in a challenging economic environment.

In 2016, airlines worldwide carried around 3.8 billion passengers annually, logging 7.1 trillion revenue passenger-kilometres (RPKs). Fifty-three million tonnes of freight were transported by air, reaching 205 billion freight tonne-kilometres (FTKs). Every day, aviation moves over 10 million passengers and around USD 18 billion worth of goods on about 100,000 flights¹³.

Asia/Pacific remained the largest region of activity with 33 per cent of world traffic, followed by Europe and North America with 27 per cent and 24 per cent, respectively. The Middle East region represented 9 per cent of world traffic. The Latin America and Caribbean region accounted for 5 per cent while the remaining 2 per cent of world traffic was undertaken by African airlines¹⁴.



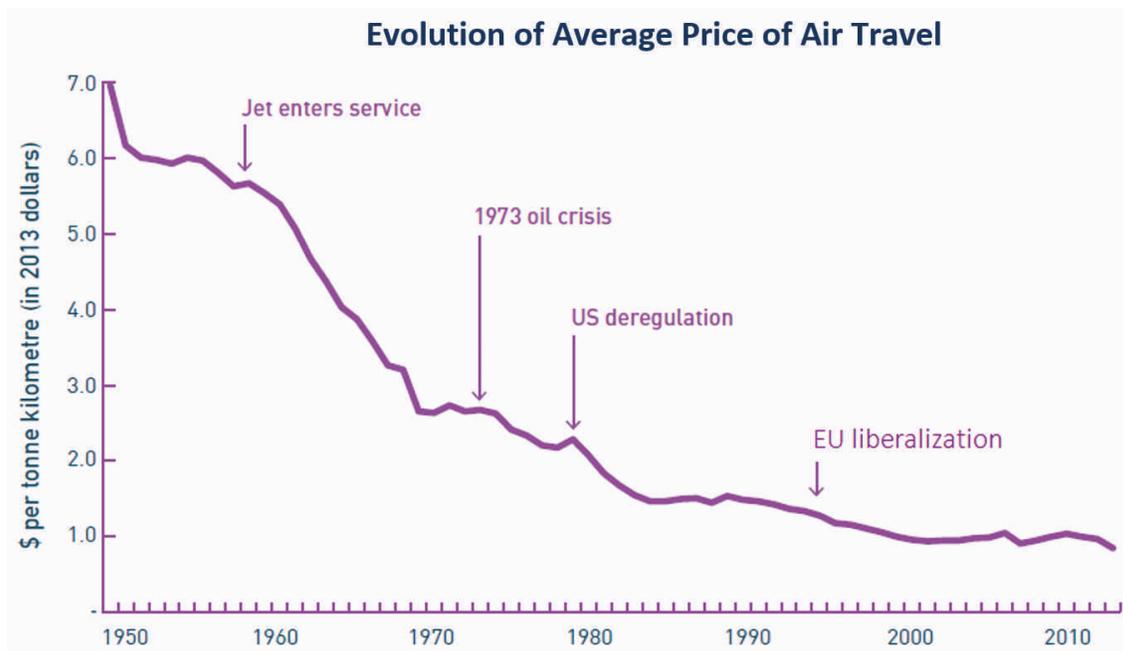
Source: ICAO Annual Report of the Council

Air Travel Affordability

A key driver in the growth of passenger traffic has been the steady decrease in the real cost of air travel — over 60 per cent reduction since 1970¹⁵. This decrease in cost has led to an increase in accessibility of air travel — democratization (from a pursuit reserved for the wealthy to a part of normal middle-class lives). Air travel is no longer a luxury commodity. It is becoming increasingly accessible in the developing world, with various low-cost travel options available to more and more people.

A family trip from Milan to Paris in 1992 would have cost 25 times more than in 2017 - the minimum price for a ticket on this route has dropped from over € 400 to about € 15 today.

Source: *EU Aviation: 25 years of reaching new heights*

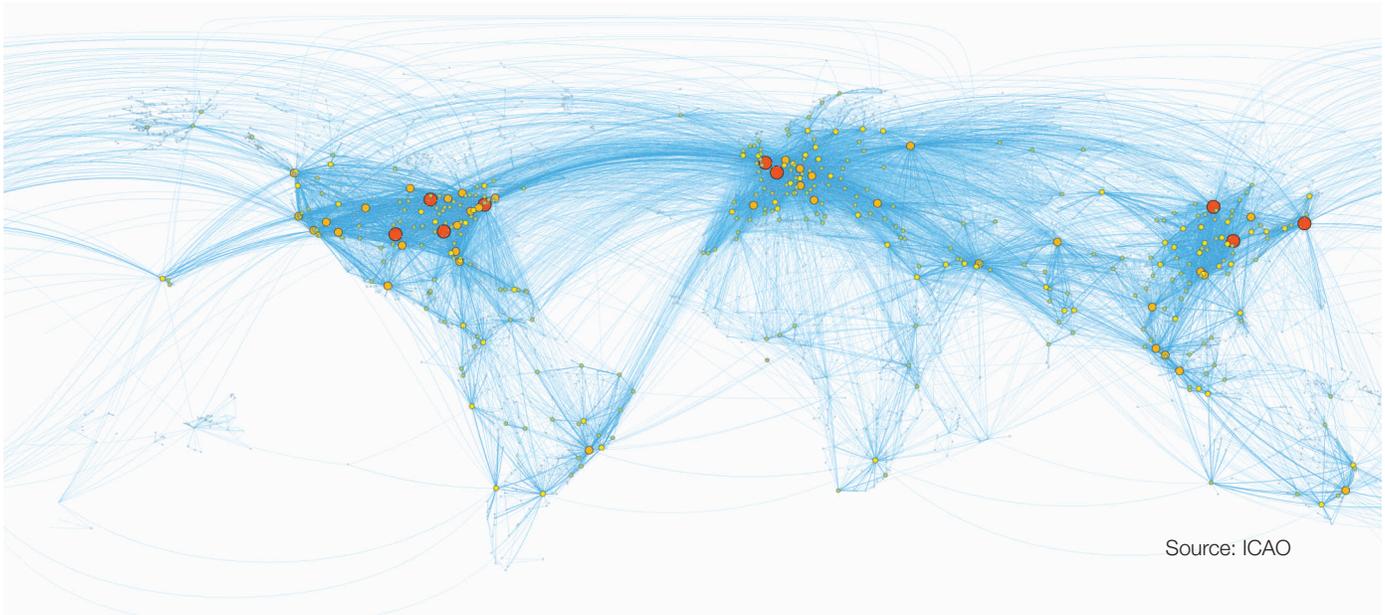


Source: IATA Economics

The aviation industry has undergone a structural transformation and has adjusted to a dynamic marketplace by consolidating and expanding in new markets. The evolution of low-cost carriers (LCCs), particularly since the beginning of the 21st century, is notable in emerging economies, making air travel more affordable. In 2016, LCCs carried an estimated 1.1 billion passengers, which was approximately 29 per cent of the world total scheduled passengers. This indicated a 10.5 per cent growth when compared to the number of passengers carried by LCCs in 2015, one and a half times the rate of the world total average passenger growth¹⁶.

Air Connectivity

The air transport network is dynamic and constantly developing. It is composed of over 1,400 scheduled airlines, over 26,000 aircraft in service, 3,900 airports and 173 air navigation services providers¹⁷. It is truly a global industry connecting all parts of the world seamlessly.



Source: ICAO

Aviation is a customer-focused economic sector. While there is no single definition of air connectivity, it can be viewed as *the ability of a network to move passengers, cargo and mail involving the minimum of transit points, which makes the trip as short as possible with optimal user satisfaction at the minimum price possible*¹⁸.

Improved air connectivity is at the heart of social and economic development. Many States have come to understand the vital role of air connectivity for their economies and they include aviation projects as a priority in their development strategies.

Regulatory Framework

The continuous growth of air traffic and enhanced air connectivity can only be sustained with a globally harmonized regulatory framework. Modern aviation was founded upon the *Convention on International Civil Aviation* (Chicago Convention, 1944)¹⁹, which set forth the core principles permitting international transport by air and led to the creation of the International Civil Aviation Organization (ICAO). The mandate of ICAO, then (as it is today) was to help States to achieve the highest possible degree of uniformity in civil aviation standards, policies and procedures.

Now, ICAO manages over 12,000 global Standards and Recommended Practices (SARPs) across the 19 Annexes to the Chicago Convention. National regulation that follows these global standards ensures not only safety and security of

the aviation system, but also efficient business operations in a market economy. A national or regional policy framework consistent with ICAO's SARPs and policies, and with globally accepted good regulatory practices²⁰, can unlock the full value of aviation.

For the past seven decades, the operation of international air transport services has also been governed by over 5,000 bilateral air services agreements signed between States, which regulate airlines' destinations, routes, capacity and frequency, fares and rates, in addition to other operational matters.

Overly complex bilateral frameworks have, however, added significantly to the cost of doing business, limited choice and competition, and created impediments to the continued growth of air traffic. Since the early 1990s, in response to demands by the aviation industry to reduce regulatory barriers, States began to negotiate more liberal bilateral and multilateral



Preamble

"... the future development of international civil aviation can greatly help to create and preserve friendship and understanding among the nations and peoples of the world..."

agreements, including “open skies” agreements, to allow the industry to do business in a more favourable operating environment and expand into new markets.

In 2015, ICAO adopted the long-term vision for international air transport liberalization, which states that “*We, the Member States of the ICAO, resolve to actively pursue the*

*continuous liberalization of international air transport to the benefit of all stakeholders and the economy at large. We will be guided by the need to ensure respect for the highest levels of safety and security and the principle of fair and equal opportunity for all States and their stakeholders*²¹.”

Is Aviation Special?

Aviation may be considered as “special” due to safety and security requirements and possibly the existence of environmental externalities. According to various economic studies, however, there is little or no evidence that aviation has unique economic characteristics, compared to other modes of transport and service industries. Nevertheless, more than a majority of bilateral air services agreements still include the 70-year-old traditional provisions partially because there is a significant cost in each State to change the well-established regulatory framework.

The key to addressing the dynamic and rapid transformations shaping the aviation sector is the establishment and application of good regulatory practices and, more broadly, good governance – the institutional, regulatory, and policy frameworks in which air transport is designed, implemented and managed. For example, States should comply with ICAO’s global standards and policies; adhere to international air law instruments; separate their oversight functions from the operations of airports and air navigation services; enhance the transparency of relevant States’ policies and practices; take a data-driven approach, including an assessment of the impacts and results of the regulation, etc.



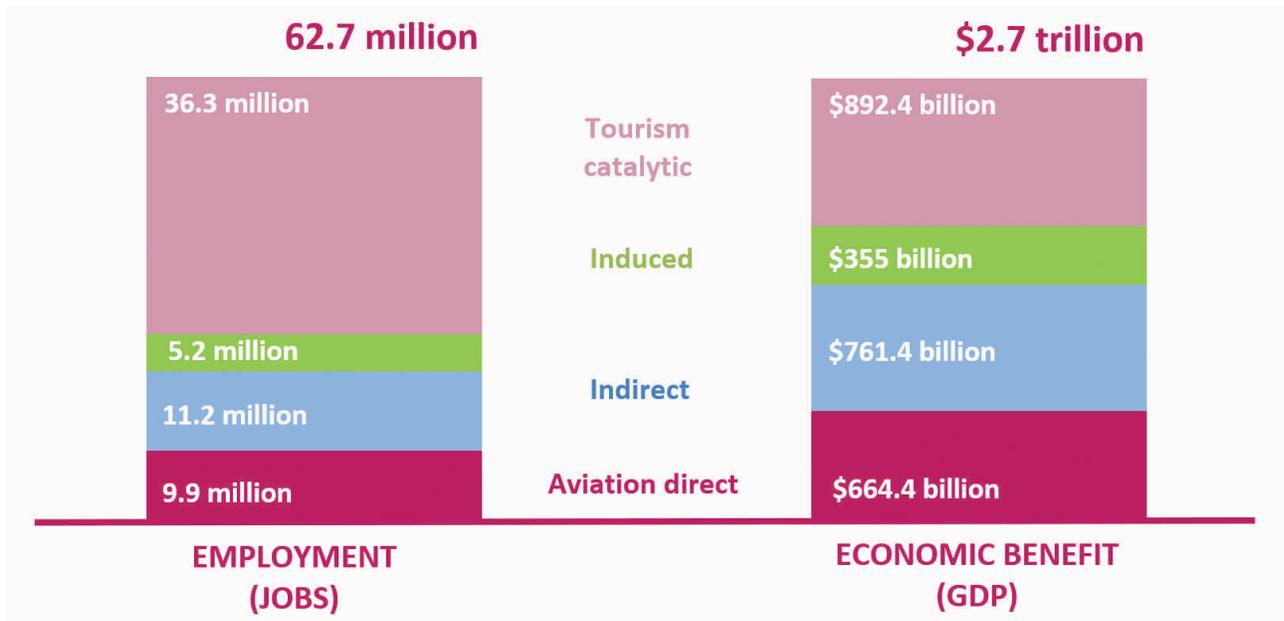
Value of Aviation: Economic Benefits

The growing availability of affordable air transport has considerably widened aviation's role in the modern global economy. Generating wealth and employment from aviation is supported through its own activities and supply chains (direct and indirect) and is an enabler of other industries (induced and tourism-catalytic).

The total economic impact of the aviation industry is some 3.5 per cent of the world's GDP, USD 2.7 trillion, which supports 62.7 million jobs worldwide²².

The contribution of aviation to the global economy is approximately equivalent to the overall GDP of the United Kingdom.

Aviation's global employment and GDP impact, 2014 ²³



Direct Impacts

The aviation industry itself is a source of considerable economic activity, creating jobs that directly serve passengers at airlines, airports and air navigation services providers. These include check-in, baggage handling, on-site retail, cargo and catering facilities. Moreover, aviation directly enables jobs in the manufacturing sector (those companies that produce aircraft, engines and other vital technologies).

In order to transport 3.8 billion passengers to destinations all over the globe and carry 53 million tonnes of freight, the aviation industry generated 9.9 million direct jobs and added USD 664.4 billion to world GDP (0.87%)²⁴. This is about 70 per cent of the size of the automotive industry, which accounts for 1.2 per cent of global GDP²⁵.

Aviation is also one of the most efficient sectors measured in terms of GDP per worker. At USD 65 per worker per year, this is around three and a half times the average across the world economy as a whole, exceeding most other sectors of the economy. Air transport employees are considered to be highly skilled, trained and experienced.



Indirect Impacts

The economic benefits of aviation extend much further than the industry's direct impacts. The indirect impacts include employment and economic activity generated by suppliers to the aviation industry: aviation fuel suppliers; construction companies that build airport facilities; suppliers of sub-components used in aircraft; manufacturers of goods sold in airport retail outlets; and a wide variety of activities in the business services sector (such as call centres, information technology and accountancy).

Over 11 million indirect jobs are supported globally through the purchase of goods and services by companies in the aviation industry. These indirect jobs contributed approximately USD 761 billion to global economic activity in 2014²⁶.

Shared Value - Nuestra Huerta

"Nuestra Huerta" (Our Garden) is a programme initiated by Mariscal Sucre International Airport, Quito, Ecuador, which aims to integrate the area's small agricultural producers in a chain of virtual community commercialization. Currently, 16 producers and their families, residing in parishes around the airport, are participating in Our Garden. Four hundred airport employees consume 36 local products of Our Garden, including fruits, dairy products, vegetables, bread, desserts, cooked grains, and prepared food. In 2016, Our Garden generated 1,069 transactions, a 45 per cent increase from 2015.

The programme involves training for producers in areas such as sound agricultural and manufacturing practices, industrial safety, social responsibility, entrepreneurship and innovation, accounting management, and customer service. With the technical and financial advice of the Inter-American Development Bank, the airport has started to turn Our Garden into a shared value programme. The implementation phase is underway.

Source: *Annual Report, 2016, Quiport*

Induced Impacts

The spending of those directly or indirectly employed in the aviation sector supports additional jobs in other sectors such as retail outlets, companies producing consumer goods and a range of service industries (for example, banks, telecommunication providers and restaurants). Worldwide, over five million induced jobs are supported globally through employees in the aviation industry (whether direct or indirect) using their income to purchase goods and services for their own consumption.

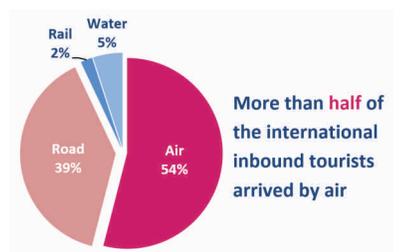
Furthermore, aviation's impact on other industries improves the efficiencies in a wide spectrum of economic activities, for example: offers just-in-time delivery systems in the supply chains; enables international investments into and out of countries and regions; and supports innovations by encouraging effective networking and collaboration between organizations located in different parts of the globe. Good air transport links influence where companies choose to invest. According to a survey, 56 per cent of companies consider international transport links to be an essential factor in where to locate a business in Europe²⁷.

Aviation Supports Tourism

Air transport activities affect multiple sectors of the economy, especially tourism. The connectivity brought by air transport is at the heart of tourism development, providing substantial economic benefits for all

those involved in the tourism value chain. Currently, approximately 1.2 billion tourists are crossing borders every year, over half of whom arrived at their destinations by air²⁸.

In 2016, tourism supported a total of 292.2 million direct, indirect and induced jobs globally and made up 10.2 per cent of world GDP, a total of USD 7.6 trillion²⁹. Through a synergetic relationship, aviation supports over 36 million jobs within the tourism sector, contributing roughly USD 892 billion a year to global GDP. Tourism-related GDP is projected to grow 4.0 per cent annually over the next decade, compared to 2.7 per cent growth of global GDP³⁰.



Spending by international tourists is classified as visitor exports and accounted for over 5 per cent of world trade³¹. Tourism in many countries is a main source of foreign exchange earnings. Particularly for Least Developed Countries (LDCs), Landlocked Developing Countries (LLDCs) and Small Island Developing States (SIDS), tourism is often one of the few activities, for which their location, coupled with exceptional natural and cultural resources, is a strong competitive advantage. Part of foreign exchange earnings do trickle down to different groups of a given society. If tourism is managed with a strong focus on poverty alleviation, it can have a positive impact on reducing poverty levels through employment of local people in tourism enterprises, goods and services provided to tourists, or the running of small and community-based enterprises, etc.³² The graduation of Cabo Verde (2007), Maldives (2011) and Samoa (2014) from LDC status was driven by the strong growth and performance of tourism³³.

Projected growth in tourism facilitated by aviation, contribution to global GDP, 2014-2025³⁴



Aviation Satellite Account

The System of National Accounts (SNA 2008) is the internationally agreed standard set of recommendations on how to compile measures of economic activity in accordance with strict accounting conventions based on economic principles. The SNA describes a set of concepts, definitions, classifications and accounting rules that comprise the standard for measuring such items as GDP.

A great strength of the SNA is that its articulation is sufficiently robust that a great deal of flexibility can be applied in its implementation while still remaining integrated, economically complete and internally consistent. One of the extensive forms of flexibility is a satellite account, which can be used to capture the relative contribution of certain new economic subjects, themes, or sectors of the economy. These new activities are not observable in the traditional SNA because they do not correspond to a specific statistically delineated economic activity. Common examples are satellite accounts for tourism, culture, sports, environment, and unpaid household work.

As there is no existing standard framework to measure the economic size of civil aviation activities within the SNA, ICAO initiated a strategic project to develop an Aviation Satellite Account (ASA). The ASA will enable the generation of macroeconomic data (such as aviation direct GDP, aviation direct gross value added, aviation consumption, and production accounts of the aviation industries) that is comparable with other economic statistics.

The ASA methodological framework will help States: a) increase and improve understanding of aviation's importance relative to the overall national economy; b) highlight inter-dependencies of the civil aviation sector with other sectors to sustain expected growth of economic activities such as tourism (and trade) as an export industry to the national economy; c) design and implement policies to facilitate connectivity as well as investments into aviation, thus promoting the full economic and job creation potential offered by this activity; and d) foster public awareness and develop education programmes to inform and engage people about the imperative of air connectivity, as well as about the importance and benefits of sustainable air transport development.

ICAO plans to submit the ASA framework document to the UN Statistical Commission for its review and endorsement in 2019.

Source: ICAO and the System of National Accounts 2008

Business tourism, specifically meetings, incentives, conferences and exhibitions (MICE) activity, relies significantly on the availability of air travel and can generate a bigger economic impact because business travellers spend more, at least per day, than leisure visitors do. In addition to the expected benefits in the hotel, restaurant, and retail sectors, tourism also fosters growth in industries as varied as agriculture, business services, construction, and real estate.

Air Connectivity Supports Caribbean Tourism

The Caribbean region is heavily reliant on tourism for its economic health. In many markets such as Cuba, Guyana, Martinique (France), Saint Lucia, Trinidad and Tobago, and Dominican Republic, over 90 per cent of tourists arrive by air. Although for some, such as Bahamas and Saint Kitts and Nevis, the share of arrivals by air is much lower (around 20 per cent), this can be explained by the importance of the cruise industry and limited direct international air connectivity. In 2014, aviation supported USD 27 billion in tourist spending across the region, of which USD 24.3 billion was leisure tourism and USD 2.7 billion was business tourism. This amount would be sufficient to cover public spending on healthcare and education in the entire region.

Source: *A Blueprint for Maximizing the Social and Economic Value of Aviation*, 2016, IATA

A Driver of Global Trade and E-commerce

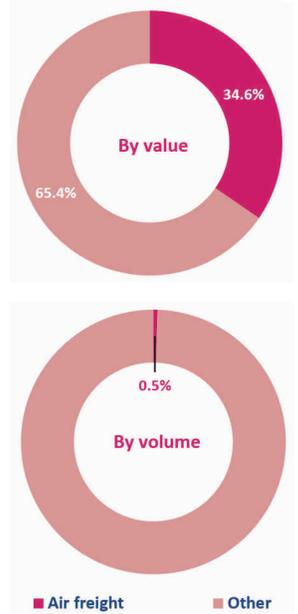
As a trade facilitator, aviation increases the global reach of businesses, enabling them to get products to market in a more convenient and quicker way. It allows businesses to be more responsive to the needs of customers and improves communication between buyers and sellers, including just-in-time inventory management and build-to-order production.

Lower transport costs and improved connectivity have boosted trade flows by globalizing supply chains and associated investments. The availability of air transport allows especially LDCs, LLDCs and SIDS to overcome infrequent boat services or poor infrastructure for ground

transportation. Air cargo service routes are regarded as regional lifelines for these areas.

Although the demand for air freight is limited by cost, which is typically 4 to 5 times that of road transport and 12 to 16 times that of sea transport³⁵, the commodities shipped by air are those that have high value per unit density. Air freight constitutes 34.6 per cent of world trade by value, and total value of transported goods of USD 6.4 trillion, despite representing only 0.5 per cent by volume³⁶. In 2016, air freight carried on scheduled services grew to 34 million tonnes internationally and 53 million tonnes overall³⁷, in line with improving economic prospects, greater industrial production, and more confident consumers.

Air freight, as a proportion of global trade, by volume and by value, 2014



Flowers from Small Growers Around the World - Kenya

In Kenya, over 100,000 jobs (and 500,000 livelihoods) depend on the cut flower industry, which supports 1.6 per cent of the national economy, generating around USD 1 billion in foreign exchange each year. Horticulture is Kenya's fastest growing sector and is ranked third after tourism and tea as a foreign exchange earner. Over 90 per cent of fresh horticultural products are transported by air freight. An estimated 70 per cent of the flowers are grown at the rim of Lake Naivasha, northwest of Nairobi. There are good road network connections between the Lake Naivasha growing area and Nairobi's Jomo Kenyatta International Airport, a distance of about 80-100 kilometres. Flowers picked in the morning reach markets in Amsterdam by evening.

Source: Kenya Flower Council website and *Air Freight: A Market Study with Implications for Landlocked Countries*, 2009, The World Bank

Aviation's speed and reliability has contributed to the market for "same-day" and "next-day" delivery services and transportation of urgent or time-sensitive goods, giving it an advantage over other modes of transport. High value electrical components and perishable products such as food and flowers, are transported all over the world through the efforts of cargo integrators, providing steady employment and economic growth to regions benefiting from such trade.

Driven by advances in internet business, electronic commerce (e-commerce) is increasingly influencing the way enterprises interact among themselves, and with consumers and governments³⁸. It can be a catalyst for the transition of trade transactions involving micro, small and medium-sized enterprises (MSMEs) from the informal

In 2016, air freight carried 53 million tonnes of goods worth USD 6.4 trillion – almost twice the total GDP of Germany!

Source: United Nations Statistics Division – December 2016

to the formal sector and from domestic to international markets.

Some 87 per cent of B2C (business-to-consumer) e-commerce parcels are currently carried by air. The e-commerce share of scheduled international mail tonne kilometres (MTKs) grew from 16 per cent to 83 per cent between 2010 and 2016 and is estimated to grow to 91 per cent by 2025³⁹.

A close-up photograph of a hand interacting with a tablet. The tablet screen displays a stylized world map with several black airplane icons and dashed lines representing flight routes. The background is a soft-focus office environment with a bright light source. A vertical maroon bar is on the left side of the image.

Regional Economic Impact of Aviation

Regional Economic Impact of Aviation⁴⁰

AFRICA

Of all global regions, the African aviation market is probably the one with the most potential for growth. This is because of its emerging industrial sector and its potential in servicing a large and developing population. The economic activity of the continent is improving but is still catching up to other regions of the world.

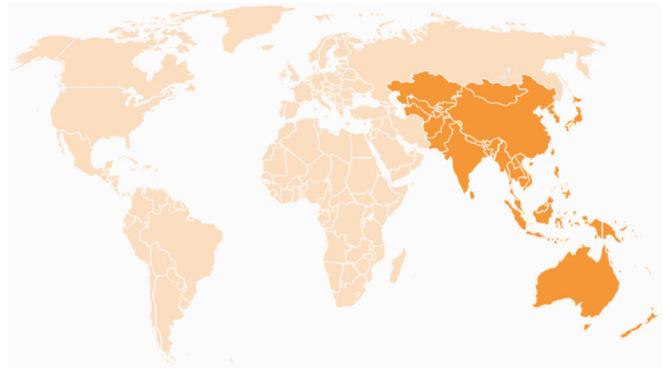
Air transport supports 6.8 million jobs and USD 72.5 billion in GDP in Africa.



ASIA AND PACIFIC

The aviation industry in the Asia and Pacific region has, in recent decades, become a success story with an impressive level of growth. Political commitments made to the liberalization of air services have helped to increase regional and domestic connectivity and enhance intra-regional trade.

Air transport supports 28.8 million jobs and USD 626 billion in GDP in Asia and Pacific.



EUROPE

Europe has one of the most liberalized and integrated markets in the world. The single aviation market created by the European Union (EU) was subsequently expanded to the European Common Aviation Area (ECAA). Over 40 per cent of seats are offered by LCCs, which is the highest among all regions.

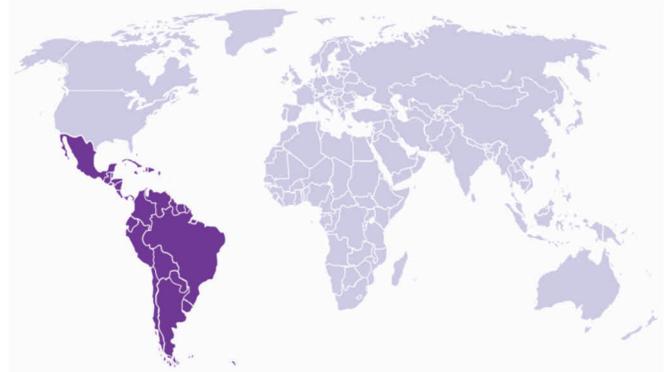
Air transport supports 11.9 million jobs and USD 860 billion in GDP in Europe.



LATIN AMERICA AND THE CARIBBEAN

Latin America and the Caribbean aviation sector has been growing in recent years, with expansion expected to continue over the next two decades. However, infrastructure deficiencies and higher taxes on the sale or use of air transport are constraints to creating jobs and generating economic benefits.

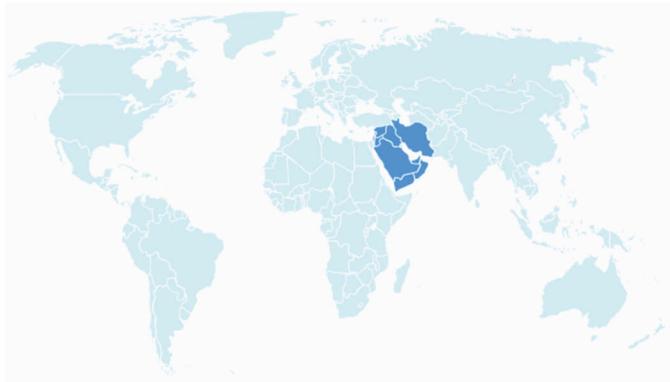
Air transport supports 5.2 million jobs and USD 167 billion in GDP in Latin America and the Caribbean.



MIDDLE EAST

The Middle East region continues to strengthen its hub position, connecting the European and Asia-Pacific markets in line with the west to east shift of the geographical centre of gravity of air transport operations. The region now ranks third in international passenger traffic, having overtaken North America since 2012.

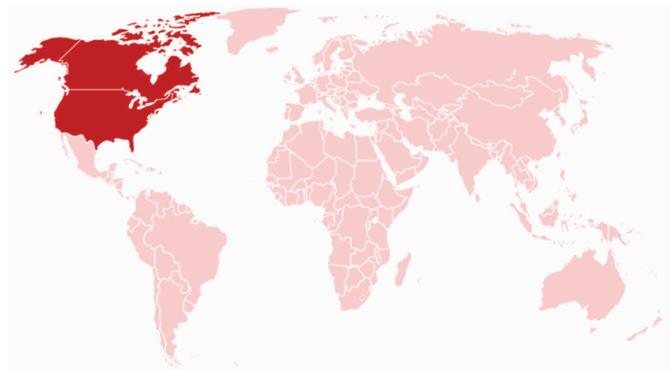
Air transport supports 2.4 million jobs and USD 157.2 billion in GDP in the Middle East.



NORTH AMERICA

North America is, along with Europe, a very mature, consolidated and liberalized market in need of new technology implementation to improve efficiency in aircraft operations. Much of the growth of the region can be attributed to the status of North America as a manufacturing powerhouse.

Air transport supports 7.6 million jobs and USD 791 billion in GDP in North America.





Value of
Aviation:
Social
Benefits

Aviation creates unique possibilities for empowering nations and peoples, regardless of their geographic location. It is a means of allowing people to access what they need: improved livelihoods, food, healthcare, education, safe communities and spaces, etc. Whether it be responses to crises in hours of dire need, humanitarian aid, or leisure activities like vacations and visiting friends and relatives, aviation plays a vital role in promoting social causes and satisfying needs around the world. For all vulnerable groups, as well as for migrant communities and people living in remote and low density rural areas, air transport services are a lifeline to enhance their social inclusion⁴¹.



Safely Connecting People and Businesses is of paramount importance in the operation of approximately 100,000 daily flights. Today, aviation is by far the world's safest and most efficient mode of long-range mass transportation.

Over the last ten years, the world's commercial aviation industry has improved overall safety performance by 54 per cent, with an accident rate of 1.61 accidents per million sectors in 2016, compared to 3.53 in 2007⁴². The safety levels that global air transport enjoys today represent an achievement built on the determination and efforts of the entire aviation community.



Aviation provides the only possible transportation means for certain **Health and Humanitarian Aid**. A prime example of how aviation contributes to public health is the rapid delivery of medical supplies and organs for transplantation worldwide. Not only are these vital

medical supplies time-sensitive, making other modes of transport unviable over long distances, but their destinations are often remote areas where other transport modes are limited. The role of aviation is also critical in pandemic response. When a viral outbreak occurs in one part of the world, the air transport sector can work quickly with governments and international organizations to ensure that it does not travel further.

In 2012, UPS transported over 375,000 influenza vaccines in prefilled syringes from the United States to Lao People's Democratic Republic, maintaining a temperature of 2°C to 8°C.

Source: UPS, The logistics of saving lives

In addition, aviation supports the provision of humanitarian aid to areas facing natural disasters, famine and war – through cargo deliveries, refugee transfers or the evacuation of people. Natural disasters often cut off whole communities. Humanitarian assistance in such circumstances can only reach those in need through the use of airports and air services. In 2015, the World Food Programme (WFP) delivered 62,500 tonnes of food and commodities by air to relieve victims of floods, conflict and disease⁴³.

Air Ambulances

People living in rural and remote areas may face particular challenges. Sourcing food and socialization can be difficult, and one of the biggest obstacles that has to be overcome is healthcare.

One example of this is in Norway, where residents of rural towns benefit from Air Ambulance Services, a programme put in place in 1988 to provide prompt and easy access to healthcare. With a budget of around 800 million Norwegian kroner (USD 91 million) and 20,000 patients helped annually, this service allows remote areas in Norway to maintain their population and assure the urgent care of their medical needs.

Source: luftambulansetjenesten



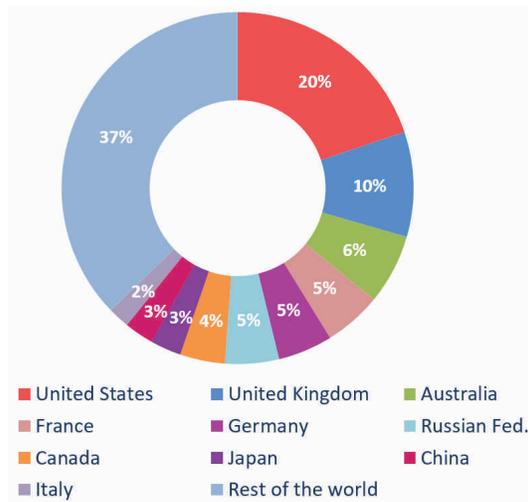
Ensuring inclusive and equitable **Educational Opportunities** and promoting lifelong learning are fundamental needs in a society. The number of students who chose to study abroad increased from 2.1 million in 2000 to 4.6 million in 2015, indicating a new generation of mobile young people eager to learn and expand their horizons⁴⁴.

For many, access to higher quality education necessitates travelling abroad, sometimes to another region of the globe. Without air transport, these opportunities would not be feasible, particularly for shorter-term university exchange programmes such as the European Erasmus system. For students from developing countries, the opportunity to travel to established universities for higher education is invaluable. Not only does this promote individual personal development, but it also delivers consequential benefits for the home country, since these students return home armed

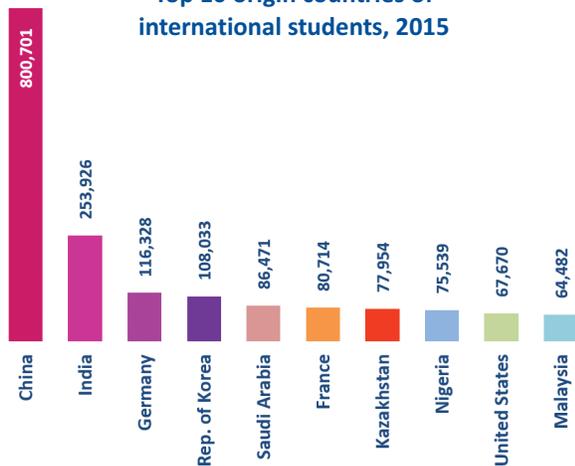
with the knowledge and skills to contribute to their home economy⁴⁵.

The aviation industry itself also champions quality education for its own employees in areas such as engineering, air traffic management and pilot training. The manufacturing sector, in particular, is working hard to promote education in science, technology, engineering and mathematics. ICAO launched the Next Generation of Aviation Professionals (NGAP) initiative to ensure that adequate qualified aviation professionals are available to operate, manage and maintain the future international air transport system going forward.

Top 10 destination countries for international students, 2015



Top 10 origin countries of international students, 2015



Source: UNESCO Institute for Statistics



Aviation contributes to **Improving Quality of Life** by broadening people's leisure and cultural experiences. It provides an affordable means to visit distant friends and relatives. Low-cost and more frequent access to air travel has increased the range of potential holiday destinations.

As people move for employment, educational or lifestyle reasons, many families are now located in different regions around the world. These movements have resulted in far greater cross-border ties between individuals and States. The International Labour Organization (ILO) estimates that migrant workers make up 4.4 per cent of all workers globally, and that one in six workers in high-income countries travelled there from another country⁴⁶. Many of the host countries of migrant workers, particularly in Europe, have aging populations, making the international labour market essential for their long-term economic well-being and to support those of pensionable age.

"The mastery of the turn is the story of how aviation became practical as a means of transportation. It is the story of how the world became small."

William Langewiesche, journalist and aviator

Fostering awareness of other cultures is another benefit of aviation. Travel offers the possibility to bring people together and experience other people's traditions and ways of living. The opportunities offered to students, families and business travellers, among others, to experience new cultures in different countries, promote a better understanding of society as a whole, and facilitate closer international integration.

Essential Air Services

The assurance of “essential services” has generally been considered to be a major responsibility of States. Although there is no uniform definition of essential services, such services may be described as basic economic services of general interest, which are necessary for the efficient functioning of society. They consist of those which are indispensable to life and health (for example, water, electricity and gas supplies) and those which are vital for the assurance of social participation (for example, postal, telecommunication and transport services), with some variations reflecting different economic, social, political and cultural developments among States. The term “public service” is often used to describe an essential service in the energy, transport, and certain broadcasting sectors, while the term “universal service” is used in relation to the health, postal and telecommunication sectors.

Since many air services to remote or peripheral destinations may not be commercially viable (i.e. rendering any operation unprofitable), mainly due to a very low traffic volume, they would not be provided by the market in the absence of government intervention or some kinds of subsidies and incentives. The result here is that choice may be limited or non-existent. Theoretically, if such air services could be supported by the State concerned in a way that would not distort the normal working of the market, welfare (economic and social benefits) would be maximized with the continued provision of an adequate level of services. An additional dimension is that in several instances the responsible authorities clearly recognize the socio-political value of such initiatives both in terms of public satisfaction or the need to secure “widespread buy-in” to a specific programme such as liberalization initiative.

Another objective of assurance of essential air services is to facilitate and even drive economic development, primarily through stimulating inward tourism and investments. Tourism is increasingly being recognized by the international community and its institutions as a focal instrument for development, with special emphasis on the capacity of the sector to assist poverty alleviation. For many LDCs, LLDCs and SIDS, in particular, tourism is often, or has the potential to be, their major export and offers one common comparative advantage that these States share in the services-dominated global marketplace.

Source: A Study of an Essential Service and Tourism Development Route Scheme, 2005, ICAO-UNWTO

Sustainable Air Transport Solutions

R APR MAY JUN JUL AUG

In September 2015, world leaders gathered at the UN and adopted the *Transforming our World: 2030 Agenda for Sustainable Development*⁴⁷. This Agenda is a plan of action for people, planet and prosperity and seeks to strengthen universal peace in larger freedom. The world should aim to achieve the 17 Sustainable Development Goals (SDGs) and 169 targets by 2030.

Attainment of the SDGs relies on advances in sustainable air transport, which is a driver of sustainable development. Needs for assistance and capacity-building, including infrastructure, should be mapped out and prioritized in line with the SDGs. All stakeholders must make a genuine commitment to transforming the transport system in terms of individual travel and freight into one that is “safe, affordable, accessible, efficient, and resilient while minimizing carbon and other emissions and environmental impacts”⁴⁸.



Affordability is key, most especially if transportation networks in the 21st century are to be truly inclusive, and fulfil their promise to provide the practical mobility that is so urgently needed today. Accessibility is another fundamental requirement, because only 50 per cent of the world’s over 7.5 billion people have access to an international airport within 100 kilometres radius⁴⁹. Resiliency also helps to highlight that the massive investments required for quality aviation infrastructure and modernization worldwide must be directed to well-managed projects and products with dedicated accountability and quality assurance mechanisms.

Many of the SDGs are directly and indirectly connected to sustainable air transport. Besides the aforementioned social and economic benefits, aviation contributes to the SDGs⁵⁰ in the following ways:

- **SDG 8** calls on governments to promote inclusive and sustainable economic growth, employment and decent work for all. Through policy convergence

between air transport and tourism, aviation directly contributes to SDG Target 8.9: *devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products by 2030*.

- **SDG 9**, building resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation, is a prerequisite to the mobility of people and goods. Aviation is one of the most innovative industries in the world. The manufacturing sector is continually developing new technology and creates significant urban infrastructure through the construction of airports and navigational infrastructure⁵¹.

Carbon Offsetting and Reduction Scheme for International Aviation (CORSA)

The social and economic benefits of aviation come with an environmental cost. For aviation to grow sustainably, it is vital to improve the environmental performance of air transport, and in particular to tackle climate change, which is a global problem and requires global efforts.

In October 2016, the 39th Session of ICAO’s Assembly reached a historic agreement on a global market-based measure to address CO₂ emissions from international aviation, referred to as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSA). This agreed scheme is the first GMBM that addresses CO₂ emissions from any industry sector. It complements the many other efforts to mitigate CO₂ emissions, including driving greater innovation in aircraft technologies, more streamlined operational procedures and sustainable alternative fuels.

To accommodate the special circumstances and respective capabilities of States, the implementation of CORSA will begin with a pilot phase from 2021 through 2023, followed by a first phase from 2024 through 2026. Participation in both of these early stages will be voluntary and the next phase from 2027 to 2035 would see all States on board. Some exemptions were accepted for LDCs, LLDCs and SIDS and States with very low levels of international aviation activity.

- **SDG 11** aims at making cities inclusive, safe, resilient and sustainable. Aviation plays a fundamental role in overcoming the social exclusion of vulnerable groups because aviation-related infrastructure is a major part of urban and rural communities worldwide and contributes to the connectivity of populations through integrated transport links⁵².
- **SDG 13**, urgent action to combat climate change and its impacts, is a key priority for every responsible citizen or organization today. According to most recent figures from the Intergovernmental Panel on Climate Change (IPCC), aviation (domestic and international) accounts for approximately 2 per cent of

global CO₂ emissions produced by human activity; international aviation is responsible for approximately 1.3 per cent of global CO₂ emissions⁵³.

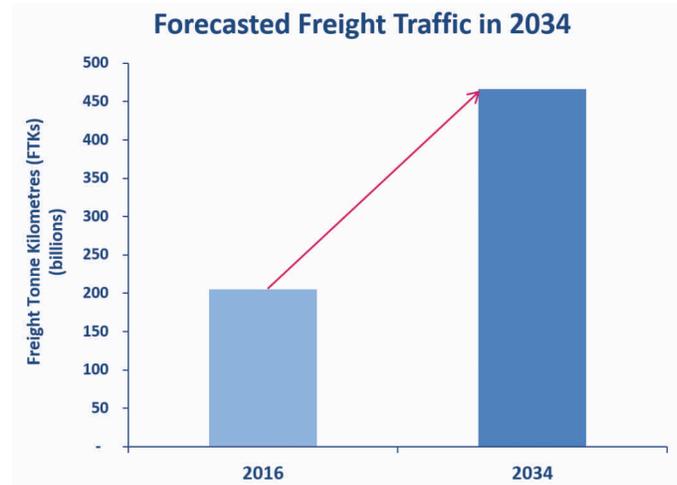
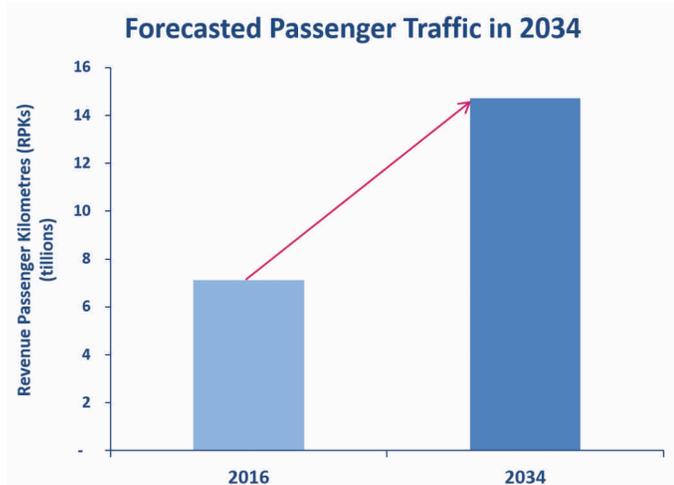
Progress towards the goals needs to be monitored and evaluated by adequate and quality data. ICAO is a custodial agency responsible for collecting traffic data and sharing the information with the UN system to support the agreed global indicator (passenger and freight volumes by mode of transport) of the SDG target 9.1 – *Develop quality, reliable, sustainable and resilient infrastructure with a focus on affordable and equitable access for all*⁵⁴. This global indicator helps States to take a data-driven approach and address infrastructure gaps through appropriate policy and financing interventions.

A wireframe illustration of an airplane, split vertically. The left half is rendered in a reddish-pink color against a dark blue background, while the right half is rendered in a light blue color against a lighter blue background. The airplane is shown from a low-angle perspective, flying towards the right. The text is positioned in the lower-left quadrant of the image.

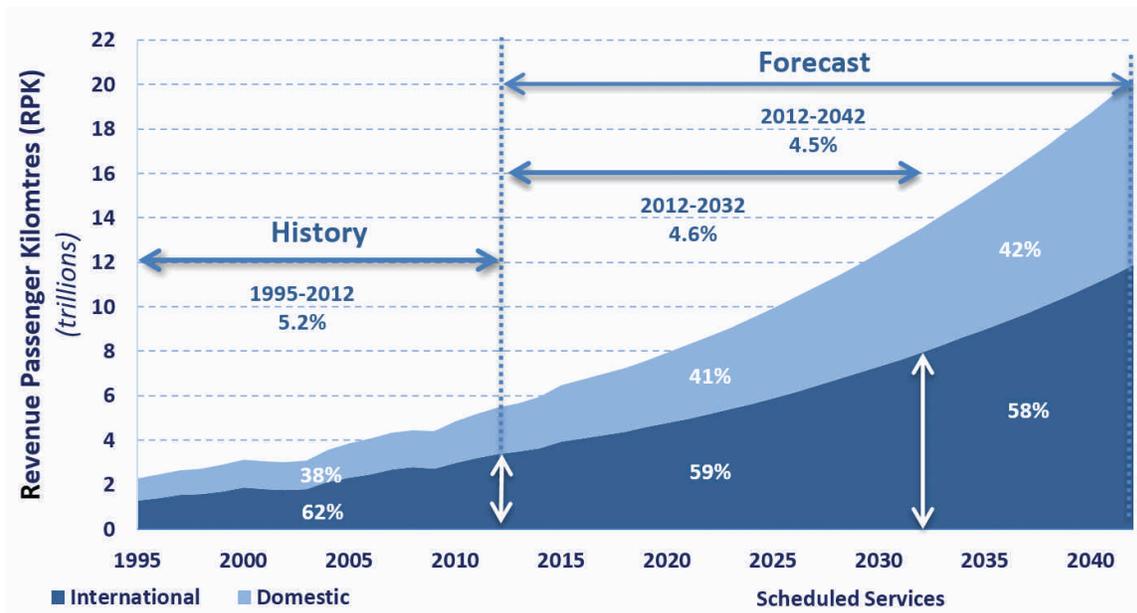
Modernizing
Aviation to
Maximize
its Benefits

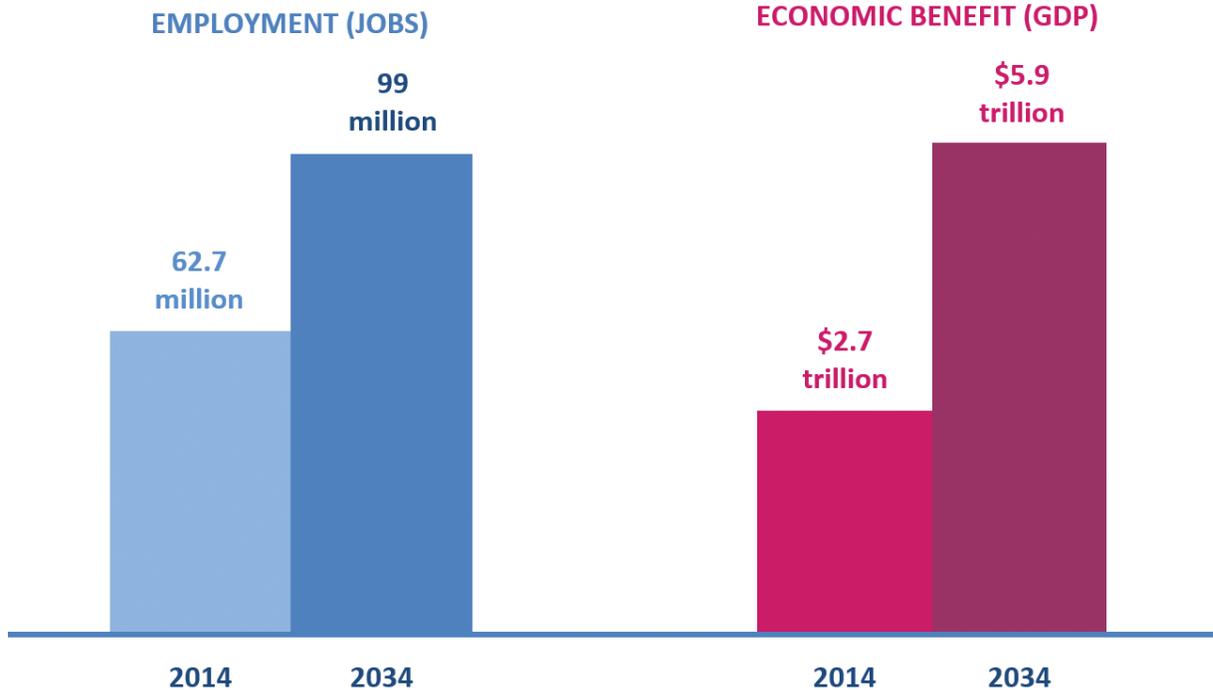
According to the latest long-term traffic forecasts, by 2034, both air passenger traffic and air freight traffic are expected to more than double, compared to 2016. Passenger traffic is expected to be over 14 trillion RPKs with a growth of 4.5 per cent per annum, and freight will expand by 4.2 per cent annually over the same time period, reaching 466 billion FTKs⁵⁵.

If this projected growth is achieved, then in 2034, aviation will provide a total of 99 million jobs consisting of 14.9 million direct jobs, 39.6 million indirect and induced jobs, and 44.6 million tourism-catalytic jobs. It will also generate a total of USD 5.9 trillion in GDP, a 122 per cent increase from 2014, consisting of direct contribution of USD 1.5 trillion, indirect and induced contributions of USD 3.9 trillion, and tourism-catalytic contribution of 0.5 trillion⁵⁶.



Total passenger traffic: history and forecast





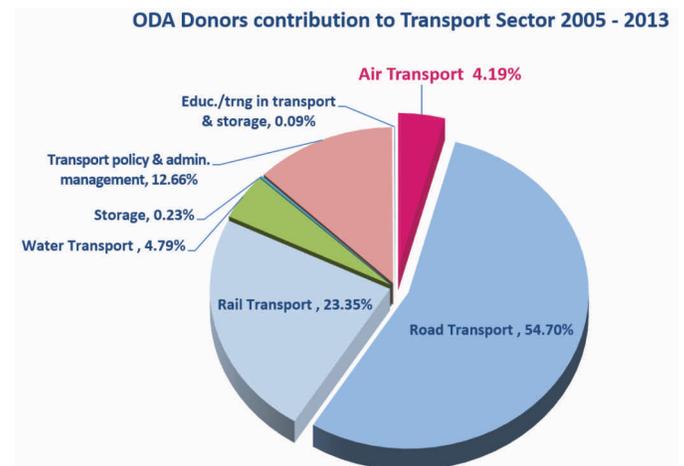
Funding, Financing and Investment

To foster this projected growth in a sustainable manner, a large number of investments in the modernization and expansion of quality aviation infrastructure are required over a long period. The global investment needs for airport expansion and construction, for example, are estimated at USD 1.8 trillion from 2015 to 2030⁵⁷. Investment in aviation infrastructure ensures that the capacity of the global aviation system can meet future demand; generate gains such as reductions in travel time and improvement of service predictability and reliability; and, at the same time, maintain public confidence that aviation is safe, secure and environmentally responsible.

Although aviation's socio-economic benefits, its cross-cutting nature and multiple links to other economic sectors are widely recognized, this has rarely translated into the level of investment which is necessary to truly derive these benefits. It is noteworthy that air transport received a mere 4.2 per cent (USD 4.6 billion) of the total Official Development Assistance (ODA) provided by all donors for economic infrastructure and services for the past decade

(2005-2013). In comparison, road transport was allocated a share of 54.7 per cent, which amounts to USD 60.9 billion⁵⁸.

Unlike other modes of transport, the aviation industry has been paying for a vast majority of its own infrastructure costs (runways, airport terminals, air traffic control), rather than being financed through taxation, public investment or subsidies. Infrastructure costs are covered through payments of user charges, most of which are added to airfares. In 2016, airlines and passengers were estimated to have paid USD 125.9 billion to airports and air navigation



services providers⁵⁹. In addition, airlines and their customers were estimated to generate USD 117 billion in tax revenues in 2016, which is equivalent to 45 per cent of the industry's gross value added (firm-level equivalent to GDP)⁶⁰, paid to local, provincial and national authorities through passenger duties, domestic value-added tax, customs and immigration levies, etc.

To build a transparent, stable and predictable investment climate, it is necessary for States to take pragmatic measures, for example, by engaging multi-stakeholders, diversifying funding sources and elevating the role of the private sector, including through private investment, business reform, private finance initiatives, public-private partnerships (PPP) and various incentive schemes.

Airport Development and Expansion

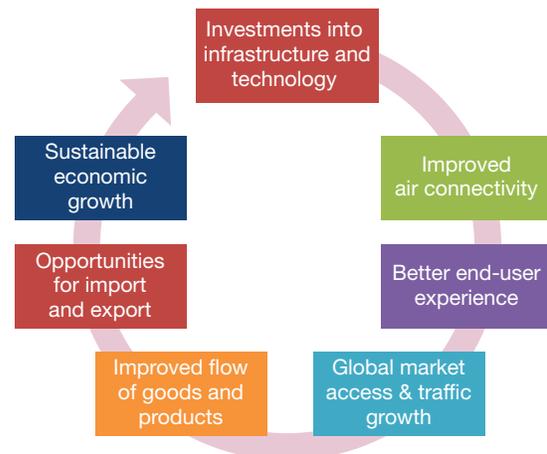
Airports are capital intensive businesses. If airport infrastructure improvements cannot keep pace with the projected demand growth, then in 2030, congestion at the 100 largest airports in the world will result in as much as 1,200 million passengers (i.e. around 20 per cent of the demand) lost or redirected to less attractive airports. As these airports represent 85 per cent of the global demand in 2030, the number of passengers affected by congestion amounts to 17 per cent of all traffic⁶¹.

Airport development projects are very large in scope and have a long time horizon from planning to completion, usually with multiple adjustments to the original plan along the way. They are also complex because of the involvement of a wide variety of stakeholders and revenue sources. Airport operators have moved beyond being mere infrastructure providers for aeronautical activities, to varied and far-reaching enterprises. Non-aeronautical and non-operating revenues make up 39.8 and 4.2 per cent, respectively. These revenues contribute to the diversification in an airport's income portfolio.

Airports no longer operate as a homogeneous group of public utilities. Instead they are a heterogeneous group with ownership structures ranging from government-owned, to partially or fully privatized. Even government-owned and government-managed airports are increasingly required to have a commercial focus. Nevertheless, most of the private investment typically flows to airports with a sufficient critical mass of traffic to guarantee an expected return for investor outlay.

Airport operators have moved beyond being mere infrastructure providers for aeronautical activities, to varied and far-reaching enterprises. Non-aeronautical and non-operating revenues make up 39.8 and 4.2 per cent, respectively. These revenues contribute to the diversification in an airport's income portfolio.

Source: ACI



The key consideration is whether value is created both for investors, relative to overall airport costs, and for passengers and other airport customers. Value creation not only helps generate returns but also ensures the future availability of capital to fund operations and future innovations. Many airports have dedicated themselves to delivering a stellar customer experience. Promoting a culture of continuous service improvement has become a matter of gaining competitive advantage, building business confidence and optimizing non-aeronautical revenue performance.

In addition, through their community outreach efforts, airports continue to foster closer links to local residents and neighbourhoods. Successful cases of airport-community cooperation have led to decreased crime rates, greater employment, and an increase in the number of successful firms in and around the airport.

Integrated Transport Planning

The work of the UN Secretary-General's High-Level Advisory Group on Sustainable Transport (2016)⁶² and the Global Sustainable Transport Conference (Ashgabat, 2016)⁶³ highlighted the need to integrate all sustainable

Belt and Road Initiative

The Belt and Road initiative is a development strategy proposed by China that aims to promote the connectivity of Asian, European and African continents and their adjacent seas, establish and strengthen partnerships among over 65 countries along the Belt and Road. The identified 65 countries jointly account for 62 per cent and 30 per cent of the world's population and GDP, respectively. In the next five years, China is estimated to invest up to USD 150 billion in Belt and Road countries and regions.

The initiative calls for the integration of the region into a cohesive economic area through building infrastructure, increasing culture exchanges, and broadening trade. On the basis of respecting each other's sovereignty and security concerns, countries along the Belt and Road should improve the connectivity of their infrastructure construction plans and technical standards systems, jointly push forward the construction of international trunk passageways, and form an infrastructure network connecting all sub-regions in Asia, and between Asia, Europe and Africa step by step.

Countries need to improve the region's infrastructure, and put in place a secure and efficient network of land, sea and air passages, lifting their connectivity to a higher level to further enhance trade and investment facilitation. For air transport, the initiative calls for expansion and building platforms and mechanisms for comprehensive civil aviation cooperation, and quickening the pace in improving aviation infrastructure.

transport planning efforts with a balanced development of transport modes. Intermodal or multi-modal connectivity with air transport should encompass all modes of transportation flows to, from and within the airport.

Policies to promote intermodal transport connectivity aim to enhance the mobility of people and businesses travelling or transporting goods through airports by creating efficient and comprehensive transport systems.

Close cooperation between the airport, city and government is a precondition to link the airport infrastructure with the road and railway networks, and to enable other urban planning initiatives to further increase connectivity and user satisfaction. Especially in the long-range movement of

freight and people, it is important that standards and procedures are harmonized across countries and modes of transport. Whether a shipment is crossing a national border, or a passenger is transferring from an aircraft to train or car, the infrastructure and operational links among modes should be well-conceived and as seamless as possible⁶⁴.

Increased connectivity, combined with ever advancing technological capabilities like high-speed rail, can create competition for airlines. Such alternatives will, however, remain limited to short-haul routes. They are less flexible than the connectivity offered by aviation because of the vast investment required in "locked" infrastructure on the ground.

The strategic placement of quality intermodal infrastructure does not only enhance the connectivity of airports but also supports the sustainable social, economic and environmental development of the region. For example, several airports have structured their development with the aerotropolis concept (airport city) which integrates airports with business centres and local communities, providing far reaching benefits for many stakeholders. Land-use planning and management is also a vital instrument in ensuring that the activities nearby airports are compatible with aviation, and that the gains achieved by the reduced noise of the latest generation of aircraft are not offset by further residential development around airports.

Optimizing Air Traffic Management

The optimization and improvement of the overall aviation system generates substantial economic and environmental gains in the face of dramatic traffic growth projections and the pressing need for more determined and effective climate related stewardship.

Upgrading air traffic systems would add an estimated USD 300 billion per year to the global economy.

Source: Boeing

In Europe, the Single European Sky Air Traffic Management Research (SESAR) project aims to consolidate fragmented European airspace into a single zone. This will enable far more efficient routing for civil aircraft, resulting in savings between 8 and 14 minutes of flight time, 300 to 500 kilograms of fuel, and 948 to 1,576 kilograms of CO₂ per

flight. The implementation of the SESAR project requires a total of €3.7 billion investment from 2008 to 2024⁶⁵.

There are parallel initiatives in other regions. In the United States, the Next Generation Air Transportation System (NextGen) is the ongoing transformation from a ground-based system of air traffic control to a satellite-based system of air traffic management, resulting in an overall benefit-to-cost ratio of 3-to-1⁶⁶. In the Asia and Pacific region, upgrading air navigation services would increase the overall aviation contribution to regional GDP from USD 470 billion in 2010 to USD 2,358.76 billion by the year 2030⁶⁷.

Fly Your Ideas

Innovation is key to aerospace manufacturing; new ideas are seen as extremely valuable and don't always come from established, experienced engineers.

The Airbus competition, Fly Your Ideas, challenges young students to come up with new ideas for the future of aviation in partnership with UNESCO. It fosters young talent, with quality of education that can help drive sustainable development forward beyond the aviation sector itself. From the launch in 2008 to 2017, more than 20,000 students from over 650 universities in over 100 countries worldwide have taken part.

Source: Airbus

The ICAO *Global Air Navigation Plan (GANP)*⁶⁸ provides States with a comprehensive planning tool supporting the global interoperability and harmonization of air navigation modernization programmes among States. Recognizing that each project has different infrastructure needs that require different solutions, this rolling, 15-year strategic plan leverages existing technologies and addresses required solutions based on the consensus-driven Aviation System Block Upgrade (ASBU) system. The implementation of ASBU is phased over non-overlapping six-year time increments through 2031 and beyond. The investment requirement for each phase is presented in this structured approach, making it easier to obtain buy-in from States, equipment manufacturers, operators and service providers.

Engine of Growth: Innovation and Exploration

Today's aerospace and aircraft manufacturing industry seeks to produce more efficient aircraft which safely accommodate increasing demand. Modern aircraft produced today are about 80 per cent more fuel efficient per passenger kilometre than in the 1960s, and each new generation of aircraft continues this downward trend.

"The Wright Brothers created the single greatest cultural force since the invention of writing. The airplane became the first World Wide Web, bringing people, languages, ideas, and values together."

Bill Gates, Microsoft Corporation

Civil aerospace manufacturers are research and development (R&D) intensive, spending an estimated USD 15 billion each year on R&D globally⁶⁹. For example, Canadian

Technology Investments in Asia-Pacific

The Asia-Pacific region, which leads global air traffic growth, has seen a particular boost with investments from major aircraft manufacturers. Boeing's industrial footprint spans major Asia-Pacific economies and is expanding to meet increases in the company's commercial production.

More than 65 Japanese companies support Boeing programmes, accounting for over 40 per cent – about 22,000 direct and indirect jobs – of Japan's aerospace employment. Japan builds 35 per cent of the 787 Dreamliner airframe and more than 20 per cent of the 777. Boeing collaborates with Japanese industry and universities to develop advanced manufacturing technologies and other innovations that will benefit Japan's current and future workforce.

Chinese companies supply every Boeing commercial programme, from the vertical fin and horizontal stabilizer for Boeing's Next-Generation 737 and 747-8 to the rudder, wing-to-body fairing panels and other components for the 787. Meanwhile, the aircraft maker has trained more than 50,000 pilots, technicians, factory workers and other professionals in China's fast-growing aviation industry.

Source: ABBB, 2016, ATAG

aerospace manufacturers generated close to 30 per cent of overall Canadian manufacturing R&D and the industry was six times as R&D intensive (18%) as the manufacturing industry average⁷⁰.

Aviation's focus on technological innovation generates consequential benefits for wider society. The benefits to society of research and development spending by the aerospace industry are estimated to be much higher than in manufacturing as a whole. Every USD 100 million of spending on research eventually generates additional GDP benefits of USD 70 million, year after year⁷¹. Aerospace also drives the development of technologies that can be used in other sectors.

The continued demand for new technology nurtures the development of specialized parts manufacturing clusters worldwide. In turn, the growth of these clusters creates an increasing demand for highly-skilled technicians and designers from local communities. This improves the educational, career and wage prospects of residents, as well as their quality of life.

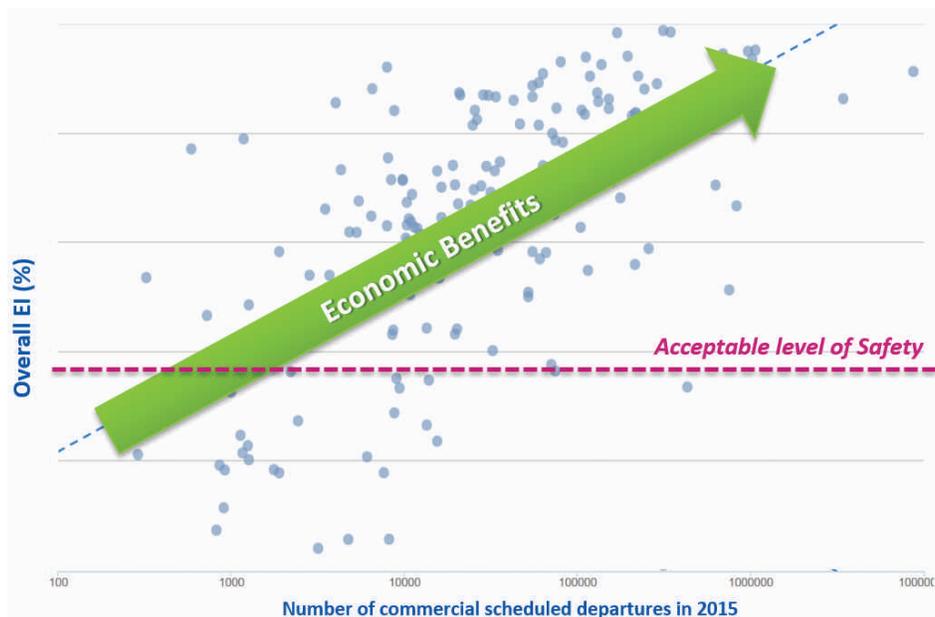
How Safety Affects Air Traffic

The growth of air traffic depends on various factors such as airfares, relative prices, real income, level of output, etc. Although there is not a clear understanding of how safety performance affects traffic demand, public safety reputation might affect travellers' choice of destinations and airlines. Accident and incident might lead to an immediate decline of demand to travel with the particular airline. For airlines and States with already high safety records, further improvement of safety performance might be less significant for their traffic growth.

A potential impact of safety on traffic demand can be estimated using the econometric model, which uses an effective Implementation (EI) score measured by the ICAO Universal Safety Oversight Audit Programme Continuous Monitoring Approach as a proxy to each State's safety performance. With all other factors affecting traffic being constant, this hypothetical analysis suggests that 10 per cent improvement of the EI of a State's safety oversight system might generate, on average, an additional 1.8 per cent of aircraft departures from the State concerned.

Source: ICAO

Aviation Safety and Economic Development



A hand holding a white paper airplane against a blue sky background. The image is split vertically by a semi-transparent purple bar. The text is located in the lower-left quadrant of the purple bar.

Leading
Aviation
for a Better
Future

Aviation makes the dream and desire of being able to fly a reality. As we see in this report, it is in the business of connecting people, overcoming oceans and borders, and creating significant economic benefits. At the same time, aviation has vastly enhanced the safety of flight, and addressed ever-changing security challenges.

Other means of access that are available — telecommunication, e-commerce, and perhaps, 3-D printing, may, in the near future, substitute some air travel or impact the growth and nature of the demand. Nonetheless, moving people and goods over short and long distances remains vital to sustainable development. The key is meeting the needs of people in their personal and economic lives while respecting the ability of future generations to meet their needs: the essence of sustainable development⁷².

“The desire to fly is an idea handed down to us by our ancestors who... looked enviously on the birds soaring freely through space... on the infinite highway of the air.”

Wilbur Wright, inventor and aviation pioneer

The future of aviation is dependent upon a vibrant economy, which, in turn, relies on a strong international community and healthy environment capable of supporting over seven billion people. Other factors, such as regulatory regimes, technological improvements and fuel costs will also impact future growth.

Forecasts suggest that, in 2034, aviation will provide 99 million jobs and generate USD 5.9 trillion in GDP, a 122 per cent increase from 2014. By any measure, these numbers are impressive. However, if the traffic growth were to slow

Economic Benefits of Liberalization

Since the signature of the Air Transport Agreement between the European Union (EU) and the United States in 2007, 52 new routes have been opened, and 6 million additional passengers have been flying between both sides of the Atlantic. The agreement generated savings of € 230 per passenger compared to ticket prices before the agreement was signed.

Source: *Fact Sheet: An Ambitious International Aviation Policy*, 2017, European Commission

by just 1 per cent annually, the total number of jobs to be supported by the air transport sector would be over 10 per cent less (more than 10 million) and the contribution of the air transport sector to world GDP would be around 12 per cent less (USD 690 billion lower)⁷³.

So, can we say that the current air transport system is sustainable? The quick answer is not yet, and that one of the main impediments to sustainability is fragmentation—fragmentation of the industry along national and regional lines, fragmentation of the economic value chain. Whether the fragmentation is geographic or economic—or a combination of the two — barriers posed to the air transport system impede efficiency, generate friction and hinder growth. Removing operational and/or regulatory barriers and deficiencies is of fundamental importance to ensure and promote sustainable air transport and maximize its contribution to economies.

For example, air transport suffers from a fragmented regulatory system, which proved its value in the past but needs to be profoundly adapted for the demands of today and, most assuredly, tomorrow. That fragmentation could increase if countries move away from global practices, creating a fundamental challenge for the industry. Regulations should facilitate transformation and new technologies. Efforts in this respect must focus on the establishment and application of good regulatory practices and governance for air transport, including modernization, harmonization and convergence of regulatory approaches and regimes of States, and the promotion of connectivity, competition, transparency and choice for consumers.

Needless to say, aviation can only be sustainable if it does not compromise the environment. Technological progress and operational improvements continue but the rate of traffic growth will result in a net increase in aircraft noise and aviation emissions without taking additional measures. Even as early as 2010, ICAO and its Member States adopted the ambitious aspirational goals for the international aviation sector of “improving fuel efficiency by two per cent per year and from 2020 keeping net CO₂ emissions at the same



levels". The more States join the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), which was adopted in October 2016, the higher environmental integrity can be achieved. Each State participating in the CORSIA brings us closer to meeting the aspirational goal of carbon neutral growth from 2020.

For sustainable air transport development, another aspirational goal or long-term ambition will be *"no constraints of infrastructure capacity, technology and financial resources for aviation development"*. Quality aviation infrastructure should safely accommodate the increase in air traffic demand, and respond to the diversified needs of providers, users and consumers, global environmental concerns, and other issues inherent in the current air transport systems.

In this regard, States should, in partnership with international and regional organizations, the industry, as well as multi-lateral development banks and other financial institutions, inter alia:

- diversify funding and financing sources with the elevation of the role of the private sector and the effective use of domestic resources and international development funding;
- create enabling institutional, legal and regulatory frameworks to encourage investments;
- reflect the priorities of the aviation sector in national/regional development plans;
- integrate air transport and urban planning (including land-use planning) initiatives with an appropriately-balanced development of transport modes;
- establish strategic infrastructure targets and monitoring and evaluation frameworks using a data-driven approach; and
- design public awareness campaigns and education programmes to raise business confidence and foster an informed and engaged public as a crucial partner.

We urge all stakeholders to pledge the highest level of commitment to maximizing the benefits of aviation in a sustainable manner that is safe, affordable, accessible, efficient, resilient and environmentally responsible.

Check List: Maximizing the Benefits of Aviation

The check list below provides a guide for maximizing aviation benefits in a sustainable manner. The implementation of this check list will require leadership and concerted, coordinated actions from public authorities at all levels, together with aviation stakeholders, financial sectors, and international and regional organizations.

Economic Development Planning – Mainstream the priorities of the aviation sector in States' economic development planning so that aviation can be used as an economic development driver.

Air Transport Regulatory Framework – Establish and apply good governance for air transport, i.e. the institutional, regulatory, and policy frameworks, in which air transport is designed, implemented and managed.

Aviation Infrastructure – Develop quality aviation infrastructure (including air navigation systems and airports) commensurate with the level of predicted traffic growth and based on ICAO's global plans.

Resource Mobilization – Promote diversified funding and financing sources in partnership with States, international and regional organizations, the industry, as well as multi-lateral development banks and other financial institutions.

Safety and Security – Comply with ICAO's global standards and policies, as well as the industry standards to continue enhancing civil aviation safety and security.

Environmental Protection – Reinforce efforts toward minimizing the environmental effects from civil aviation activities, especially the achievement of the aspirational goals of carbon neutral growth from 2020.

Public Engagement – Foster an informed and engaged public as a crucial partner to advance sustainable air transport solutions.



Appendix:
Regional
Summary

AFRICA

The growth of passenger traffic (measured in revenue passenger-kilometres (RPKs)) and load factors achieved by African airlines has been systematically below the world average since 2011. Few airlines in the region are able to turn a profit due to lower load factors and higher costs than the world average.

While the African States are in the process of implementing the Yamoussoukro Decision concerning the liberalization of access to air transport markets in Africa, the most notable progress was made at the sub-regional group level, especially led by Regional Economic Communities (RECs) of the African Union (AU).



Benefits of Aviation⁷⁴

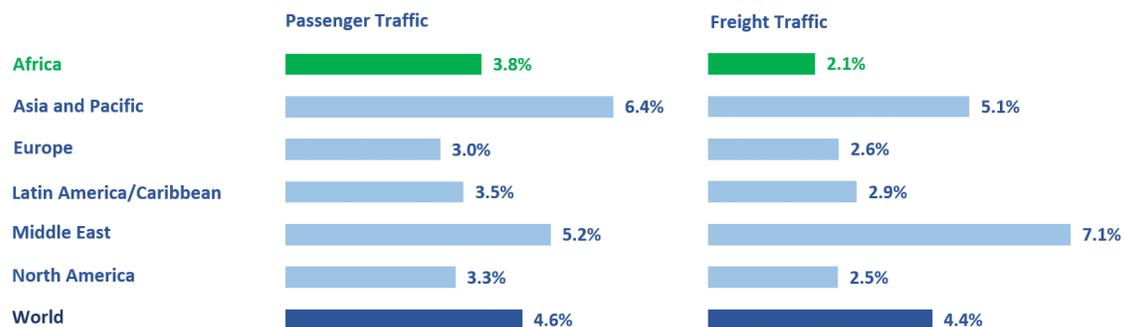
Air transport supports 6.8 million jobs and contributed USD 72.5 billion to gross domestic product (GDP) in Africa.

Besides the USD 9.9 billion of direct impact in GDP, the sector impact reaches economies. The effect of the procurement of goods and services through the supply chain has an impact of USD 11.3 billion. The benefits that arise when employees of the industry and its supply chain spend their wages in the local consumer economy account for another USD 5.2 billion of economic impact. Direct, indirect and induced, respectively, contribute USD 26 billion to the African GDP. In addition, the spending by foreign tourists in the region accounts for USD 46 billion of the total economic impact.

Total jobs and GDP supported by aviation in Africa, 2014

JOB TOTAL		GDP TOTAL
6.8 million		\$72.5 billion
5,800,000	Tourism catalytic	\$46 bn
219,000	Induced	\$5.2 bn
417,000	Indirect	\$11.3 bn
381,000	Aviation direct	\$9.9 bn

Projected annual growth of total passenger and freight traffic by region up to 2032



Outlook

The African aviation market probably has the most potential for growth out of all global regions. This is because it is a young industry with a large and increasing population. However, this potential may not be fully translated into real air traffic growth. According to ICAO's long-term traffic forecasts, passenger traffic for the Africa region is expected to grow by around 3.8 per cent annually up to 2032 but be slightly slower than world total growth. For freight traffic, the region is projected to grow by 2.1 per cent annually for the same period as passenger traffic, the slowest growth rate among all regions⁷⁵.

This increase will, in turn, drive growth in the economic output and jobs that are supported by air transport in the next decade. By 2034, it is forecasted that the impact of air transport and the tourism it facilitates in Africa will have grown to support 12 million jobs (78 per cent more than in 2014) and a USD 198 billion contribution to GDP (a 173 per cent increase)⁷⁶.

Challenges

The first and most obvious condition to realizing aviation's benefits and, consequently, supporting the attainment of the AU Agenda 2063 is to improve compliance with ICAO's global standards. It is necessary to establish and/or align infrastructure programmes and plans at the national/regional level that are consistent with the ICAO global strategic plans for aviation, and stimulate common and interoperable air transport systems.

However, it remains difficult for African States and aviation stakeholders to access funds and/or ensure financing for the modernization and expansion of their infrastructure (such as airports, runways, telecommunication equipment, air cargo warehousing, meteorology facilities, etc.). For example, the infrastructure and investment required for the aviation sector is not well covered by the Programme for Infrastructural Development for Africa (PIDA) and the New Partnership for Africa's Development (NEPAD), including the Move Africa initiative. Of the over 50 projects under the PIDA, no more than three projects involve civil aviation, despite the predication that 17 airports on the African continent will be saturated by 2020⁷⁷.

International assistance platforms for infrastructure development in Africa, such as the Tokyo International Conference on African Development (TICAD) and the Forum on China-Africa Cooperation (FOCAC), have also paid limited attention to the aviation sector.

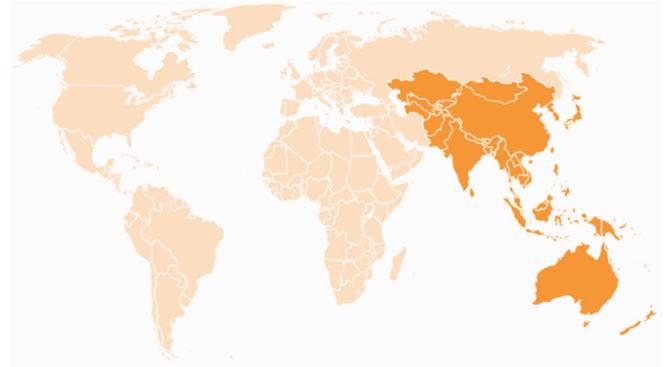
In addition, the slow implementation of the Yamoussoukro Decision creates regulatory impediments to operational freedom and investments in aviation, and therefore results in lower connectivity in the continent and less competitiveness of African airlines. Only 20 African States committed to implementing the Single African Air Transport Market (SAATM) established in the framework of the Yamoussoukro Decision.

In the region, skills shortages are also posing a considerable short-term obstacle to growth, with a lack of adequately trained pilots, air traffic controllers, engineers, as well as tourism industry personnel. Africa needs more and better trained personnel to meet not only current requirements but also the needs for future growth and new technologies.

ASIA AND PACIFIC

Airlines of Asia and Pacific have consistently recorded passenger traffic growth higher than the world average since 2009. In 2010, Asia and Pacific overtook North America in RPK traffic and became the world's largest region. Today, one third of worldwide RPKs are performed by airlines registered in Asia and Pacific. Five of the top ten countries in terms of tourism are located in Asia and Pacific. The region also carries the largest share of freight traffic with 40 per cent of the world freight (measured in freight tonne-kilometres (FTKs)).

States in Asia and Pacific have the most diversified policies on air transport, ranging from very liberal open skies policies to traditional protectionist approaches. Nevertheless, a majority of States have embarked on the road to liberalization in the past two decades, which led to rapid growth of air traffic, especially in major markets such as Australia, China, India, Japan, the Republic of Korea and States belonging to the Association of Southeast Asian Nations (ASEAN). Governments have also put significant effort into upgrading and improving the quality of these networks, with the region boasting a number of world class aviation hubs.



Total jobs and GDP supported by aviation in Asia and Pacific, 2014

JOB TOTAL		GDP TOTAL
28.8 million		\$626 billion
19,900,000	Tourism catalytic	\$261.8 bn
1,700,000	Induced	\$72.9 bn
3,800,000	Indirect	\$158.2 bn
3,300,000	Aviation direct	\$133.3 bn

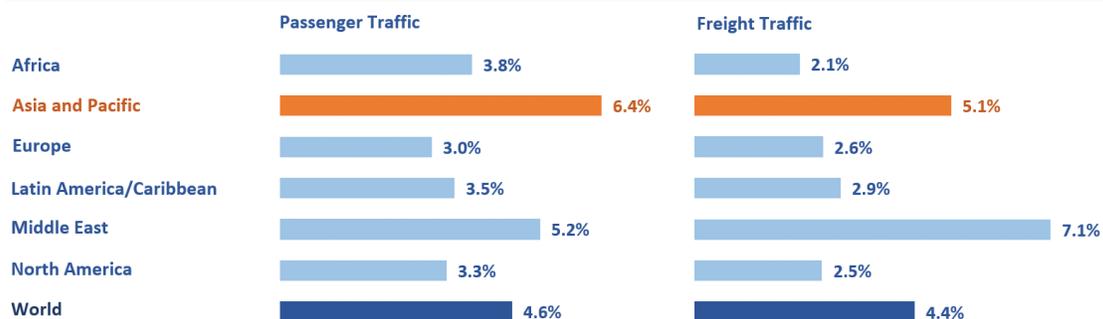
Benefits of Aviation ⁷⁸

Air transport supports 28.8 million jobs and USD 626 billion in GDP in the Asia and Pacific region.

Besides the USD 133.3 billion of direct impact in GDP, the sector impact reaches further through the Asia and Pacific region economies. The effect of the procurement of goods and services through the supply chain has an impact of USD 158.2 billion. The benefits that arise when employees of the industry and its supply chain spend their wages in the local consumer economy account for another USD 72.9

billion of economic impact. Direct, indirect and induced, respectively, contribute USD 364 billion to the Asia and Pacific GDP. In addition, the spending of foreign tourists in the region accounts for USD 261.8 billion of the total economic impact.

Projected annual growth of total passenger and freight traffic by region up to 2032



Outlook

The wider trend of liberalization is likely to provide a further boost to the region's expanding tourism industry, trade connections, and air connectivity. According to ICAO's long-term traffic forecasts, Asia and Pacific is expected to be the fastest growing region in terms of passenger traffic, at an annual rate of 6.4 per cent up to 2032. For freight traffic, the region is projected to grow 5.1 per cent annually for the same period as passenger traffic, the second highest growth rate among all regions⁷⁹.

This increase will, in turn, drive growth in the economic output and jobs that are supported by air transport in the next decade. By 2034, it is forecasted that the impact of air transport and the tourism it facilitates in Asia and Pacific will have grown to support 44.3 million jobs (54 per cent more than in 2014) and a USD 1.7 trillion contribution to GDP (a 171 per cent increase)⁸⁰.

Challenges

Aviation infrastructure improvements may not keep pace with the faster demand growth. Due to airport capacity constraints, in 2030, around 33 per cent of traffic at the region's 22 busiest airports will be lost or redirected to less attractive airports⁸¹. Closing infrastructure gaps requires

massive investment in new infrastructure projects and for the adequate maintenance and upgrading of those already in place. The investment needs for airport expansion and construction in the region are estimated at USD 6.51 billion per year till 2020⁸².

With regard to public finance, governments must consider how to mobilize greater domestic resources, access new external resources and improve public expenditure management. Concerning private finance, public-private partnerships have already become a key mechanism for channelling private resources for infrastructure development in the Asia and Pacific region⁸³.

The projected expansion of the aviation sector in the region will also bring the need for effective regulatory oversight that keeps pace with this growth, as well as the recruitment and training of the necessary skilled manpower. The most likely scenario is that airlines in the Asia and Pacific region will need to train an average of 13,983 pilots a year until 2030 while the industry is only able to train 4,935 pilots a year⁸⁴.

In addition, the Asia and Pacific region has yet to achieve a kind of "seamless connectivity" that would allow countries to make the optimal use of air transport, and thereby bring down transport and logistics costs. The facilitation of transport and the improvement of logistics performance would enhance the competitiveness of the region's developing countries⁸⁵.

EUROPE

Europe is one of the most liberalized regions in terms of air transport policies and activities led by the Member States of the European Union (EU). The EU single aviation market was originally created in 1997. By integrating neighbouring States into the single aviation market, a European Common Aviation Area (ECAA) was formed in 2006, covering 36 contracting parties.

Today, half of international passengers worldwide are carried by European airlines. Europe overtook North America in 2012 and ranks second in total RPKs. European airlines have achieved load factors consistently higher than the world average since 2011. Within Europe, over 40 per cent of seats are offered by low-cost carriers (LCCs), which is the highest among all regions.



Benefits of Aviation

Air transport supports 11.9 million jobs and USD 860 billion in GDP in Europe⁸⁶.

Besides the USD 192.8 billion of direct impact in GDP, the sector impact reaches further through European economies. The effect of the procurement of goods and services through the supply chain has an impact of USD 233.4 billion. The benefits that arise when employees of the industry and its supply chain spend their wages in the local consumer economy account for another USD 105.2 billion of economic impact. Direct, indirect and induced, respectively, contribute USD 531 billion to the GDP in Europe. In addition, the spending of foreign tourists in the region accounts for USD 328.1 billion of the total economic impact⁸⁷.

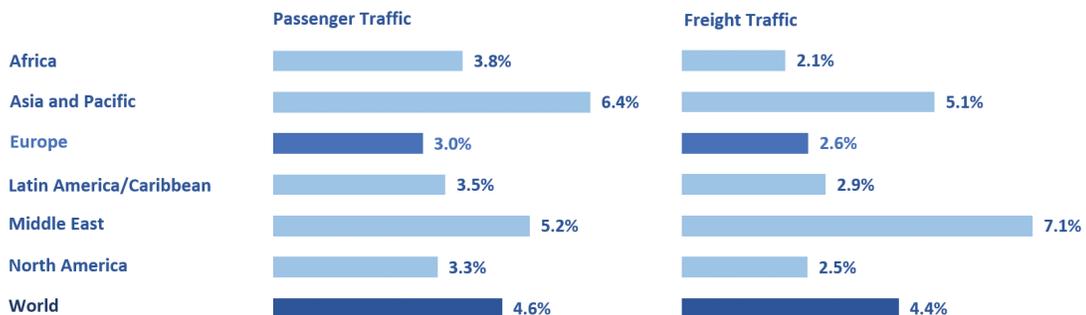
According to the estimate by the ACI-Europe study⁸⁸, European airports directly contributed to the employment

Total jobs and GDP supported by aviation in Europe, 2014

JOB TOTAL		GDP TOTAL
11.9 million	Tourism catalytic	\$860 billion
5,000,000		\$328.1 bn
1,400,000	Induced	\$105.2 bn
3,000,000	Indirect	\$233.4 bn
2,500,000	Aviation direct	\$192.8 bn

of 1.7 million people, earning a total of € 68.5 billion in 2013. In addition, € 101.6 billion in GDP was generated, equal to 0.6 per cent of the GDP of Europe. Once European airports' Direct, indirect, induced and catalytic (including tourism, trade, investments, etc.) economic impacts are taken into account, they supported roughly 4.1 per cent (€ 647.5 billion) of total European GDP and 12.3 million jobs, earning € 356 billion in income annually.

Projected annual growth of total passenger and freight traffic by region up to 2032



Outlook

Although the relative maturity and limited airport capacity in Western Europe leads to slower traffic growth, emerging economies in the east are contributing to the overall growth in the region. According to ICAO's long-term traffic forecasts, total passenger traffic of Europe is expected to grow by around 3.0 per cent annually up to 2032, the slowest growth among all regions. For freight traffic, the region is projected to grow 2.6 per cent annually for the same period as passenger traffic, slower than total world growth⁸⁹.

This increase will, in turn, drive growth in the economic output and jobs that are supported by air transport in the next decade. By 2034, it is forecasted that the impact of air transport and the tourism it facilitates in Europe will have grown to support 17 million jobs (41 per cent more than in 2014) and a USD 1.6 trillion contribution to GDP (an 86 per cent increase)⁹⁰.

Challenges

The restrictions of infrastructure development across the continent are leading to capacity shortfalls. According to EUROCONTROL's analysis, in the summer period 2012, six airports were considered "congested" in the sense of operating at 80 per cent or more of their capacity for over

three hours per day. In the most-likely scenario, this will climb to 30 airports in 2035. Congestion in the network affects day-to-day delays but it also influences the ability to respond to an unusual event⁹¹.

The economic impact associated with the gap between capacity and demand is estimated to be two million jobs and USD 132 billion (€ 96.7 billion) in GDP, including direct activity at the airport, indirect and induced impacts, and the lost tourism, trade and investment due to low connectivity growth. Furthermore, the majority of this loss is in the general economy, not the airports or aviation sector⁹².

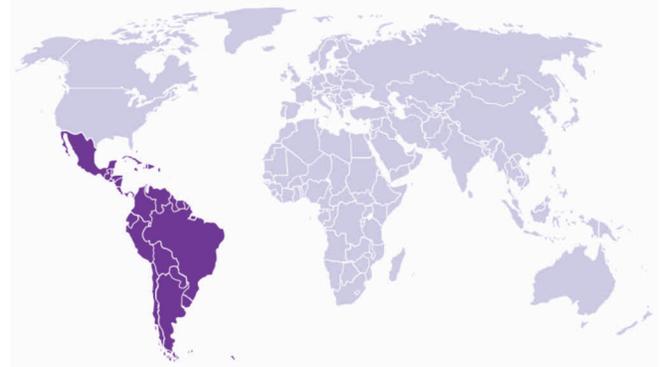
Slower growth is a threat to aviation's long-term ability to provide mobility in the region. For example, competition with hubs in the Middle East region for connecting traffic between West and East will result in slower growth of transferring passengers at European hubs on the long-haul traffic flows. Capability to continually improve cost efficiency will be restrained in a market with slower rates of growth⁹³.

Moreover, as the geographic centre of gravity of air transport operations and technology gains is increasingly outside Europe, the benefits that Europe has derived from being at the forefront of aviation could diminish. There is an increasing probability that investors will be fatigued by the lack of return on investment in some portions of the industry, and thus divert their focus away from Europe to regions where aviation will grow faster⁹⁴.

LATIN AMERICA AND THE CARIBBEAN

The air transport sector in Latin America and the Caribbean is characterized by the liberalization of several domestic and regional markets, combined with a consolidation of airlines. Regional air transport liberalization initiatives have resulted in the adoption of agreements by the Andean Community (CAN), the Caribbean Community (CARICOM), the Southern Common Market (MECROSUR) and the Association of Caribbean States (ACS). All of these initiatives aim to harmonize air transport policies and to liberalize the granting of traffic rights and market access at the regional level.

With sporting events such as the Olympics and the football World Cup providing an additional boost, passenger traffic growth and load factors achieved in the past years are in line with the world average.



Benefits of Aviation⁹⁵

Air transport supports 5.2 million jobs and USD 167 billion in GDP in Latin America and the Caribbean.

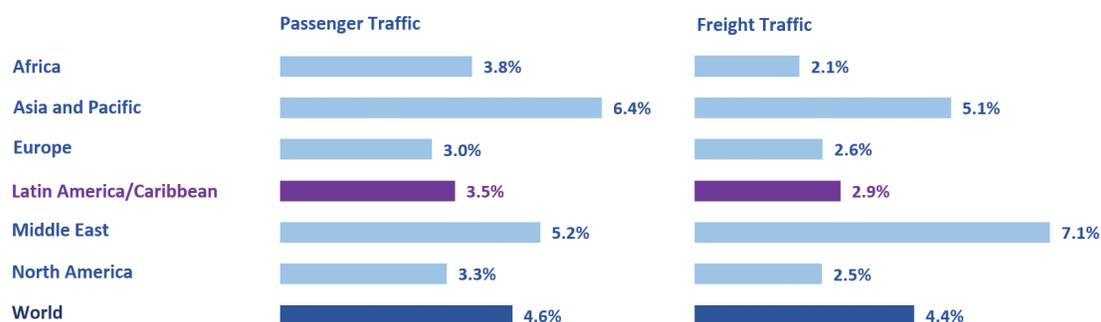
Besides the USD 40 billion of direct impact in GDP, the sector impact reaches further through Latin America and the Caribbean economies. The effect of the procurement of goods and services through the supply chain has an impact of USD 45.9 billion. The benefits that arise when employees of the industry and its supply chains spend their wages in the local consumer economy account for another USD 21.3 billion. Direct, Indirect and Induced, respectively, contribute USD 107 billion to the GDP in Latin America and the Caribbean. In addition, the spending of foreign tourists

Total jobs and GDP supported by aviation in Latin America and the Caribbean, 2014



in the region accounts for USD 60 billion of the total economic impact.

Projected annual growth of total passenger and freight traffic by region up to 2032



Outlook

In addition to continuous economic growth, air travel demand will be stimulated by increasing airline competition across the region. According to ICAO's long-term traffic forecasts, total passenger traffic of Latin America and the Caribbean region is expected to grow by around 3.5 per cent annually up to 2032, faster than total world growth. For freight traffic, the region is projected to grow 2.9 per cent annually for the same period as passenger traffic, slower than total world growth⁹⁶.

This increase will, in turn, drive growth in the economic output and jobs that are supported by air transport in the next decade. By 2034, it is forecasted that the impact of air transport and the tourism it facilitates in Latin America/Caribbean will have grown to support 9.7 million jobs (88 per cent more than in 2014) and a USD 430 billion contribution to GDP (a 157 per cent increase)⁹⁷.

Challenges

Infrastructure deficiencies have long been an issue in the region. Major airports in Argentina, Colombia, Ecuador, Mexico and Peru face growth constraints. Among the world's 134 economies analysed by the World Economic Forum, for example, Panama ranks 6th, Ecuador 39th, Chile 47th and Mexico 61st in quality of air transport infrastructure, but Argentina (86th), Brazil (94th), Colombia (76th), El Salvador (74th), Peru (80th) and Venezuela (127th) are below average⁹⁸. While plans are in place to

address these issues, relief is years away at best. In the meantime, there will be lost opportunities for creating jobs and spurring economic growth.

The projected expansion of the aviation sector in the region will also bring the need for effective regulatory oversight that keeps pace with this growth, as well as the recruitment and training of the necessary skilled manpower. The most likely scenario is that airlines in Latin America and the Caribbean region will need to train an average of 6,250 pilots a year until 2030 while the industry is only able to train 1,945 pilots a year⁹⁹.

It is a matter of great concern that taxes on the sale or use of air transport are increasingly being imposed by Latin America and Caribbean States. There are 130 different ticket taxes and fees in place across the region¹⁰⁰, most of which are not intended to cover costs of aviation-related services and infrastructure but are a means to generate additional government revenue. The share of these taxes as a percentage of ticket price varies between 15 and 20 per cent¹⁰¹.

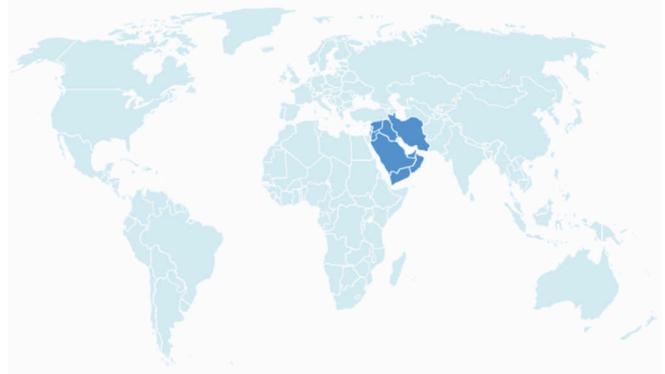
The past decade has also seen the proliferation of tourism taxes in the region, ranging from USD 1.50 to USD 55. In many cases, revenues from the tourism taxes such as Tourism Enhancement Fee and Travel Promotional levies are not being reinvested in tourism development.

States are strongly encouraged to observe ICAO's policies on charges and taxation¹⁰² because the imposition of high taxes is counterproductive. In many cases, the revenue raised is far outweighed by the economic benefits that are relinquished as a result of reduced demand for air travel and air cargo shipments.

MIDDLE EAST

The varying growth potential of different parts of the world has resulted in the steady movement of the geographic centre of gravity of air transport operations from the middle of North Atlantic to the east of Mediterranean for the last four decades. Operating at the crossroads of trade and transportation between east and west, airlines in the Middle East are well positioned to consolidate traffic connecting these regions through their hubs and to offer one-stop services between them. The rapid expansion of some Middle Eastern airlines was also spurred by a more liberal policy adopted unilaterally by some States in the region.

Middle East has been the fastest growing region for passenger and cargo traffic since 2011 and airlines in this region have posted double-digit passenger traffic growth every year since 2012. The region now ranks third in international passenger traffic, overtaking North America in 2012.



Total jobs and GDP supported by aviation in the Middle East, 2014

JOB TOTAL		GDP TOTAL
2.4 million		\$157 billion
1,200,000	Tourism catalytic	\$59.7 bn
225,000	Induced	\$19.2 bn
472,000	Indirect	\$41.5 bn
427,000	Aviation direct	\$36.8 bn

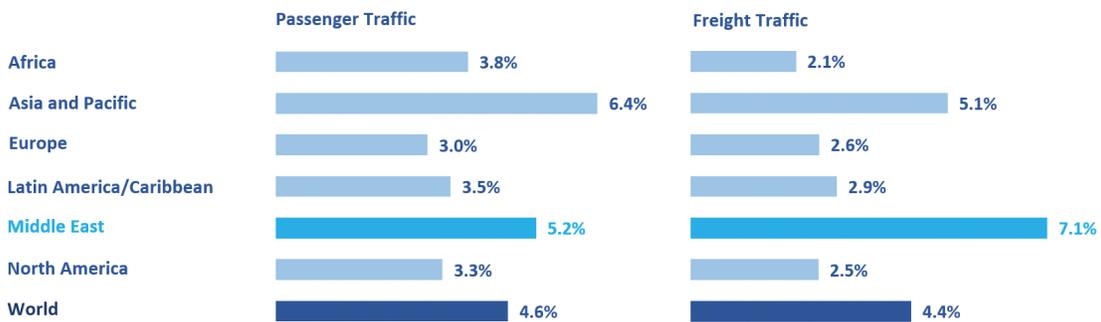
Benefits of Aviation¹⁰³

Air transport supports 2.4 million jobs and USD 157.2 billion in GDP in the Middle East.

Besides the USD 36.8 billion of direct impact in GDP, the sector impact reaches further through Middle Eastern economies. The effect of the procurement of goods and services through the supply chain has an impact of USD 41.5 billion. The benefits that arise when employees of the industry and its supply chain spend their wages in the local consumer economy account for another USD 19.2 billion. Direct, indirect and induced, respectively, contribute USD 97 billion to the GDP in the Middle East. In addition, the

spending of foreign tourists in the region accounts for USD 59.7 billion of the total economic impact.

Projected annual growth of total passenger and freight traffic by region up to 2032



Outlook

With the further movement of the air transport centre of gravity from West to East, the geographic position of the Gulf hubs will continue to offer a strategic advantage to several airlines in the region. According to ICAO long-term traffic forecasts, total passenger traffic of the Middle East region is expected to grow by around 5.2 per cent annually up to 2032, the second fastest growth among all regions after Asia and Pacific. The Middle East is expected to be the fastest growing region in terms of freight traffic growth, and is projected to grow at 7.1 per cent annually up to 2032¹⁰⁴.

This increase will, in turn, drive growth in the economic output and jobs that are supported by air transport in the next decade. By 2034, it is forecasted that the impact of air transport and the tourism it facilitates in the Middle East will have grown to support 5.2 million jobs (119 per cent more than in 2014) and a USD 489 billion contribution to GDP (a 211 per cent increase)¹⁰⁵.

Challenges

The growth in air transport activities in the Middle East region is causing significant airspace congestion. The overall efficiency of the ATM system commensurate with

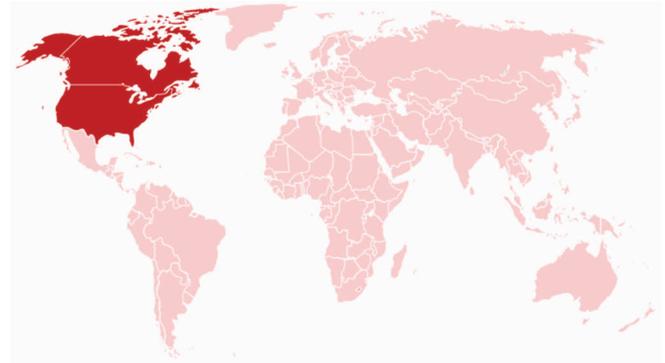
the level of predicted traffic growth should be increased through improved airspace design and organization. Moreover, individual developments in ATM and airspace capacity are not enough: harmonization, integration and collaboration among aviation stakeholders is essential to realize the full potential of national projects¹⁰⁶.

This region is in need of political commitment to market liberalization. Although the Middle East is home to some of the world's largest hub airports, the relations between States are still mostly bound by bilateral air services agreements that limit market access to each other. The Agreement on Liberalization of Air Transport between the Arab States, more commonly known as the Damascus Agreement, was accepted by only eight States since its entry into force in 2007. As States often have a direct influence in aviation projects, the functioning of market economies and business transparency may be hampered by political complexity, tight national control and restricted air services agreements¹⁰⁷.

The projected expansion of the aviation sector in the region will also bring the need for effective regulatory oversight that keeps pace with this growth, as well as the recruitment and training of the necessary skilled manpower. The most likely scenario is that airlines in the Middle East region will need to train an average of 2,458 pilots a year up till 2030 while the industry is only able to train 860 pilots a year¹⁰⁸.

NORTH AMERICA

North America is characterized by a high volume of domestic traffic: domestic passenger traffic is more than twice the international passenger traffic in terms of RPKs. It is the only region where airlines have a larger domestic than international market. Because of the maturity of the market, passenger and cargo traffic has been growing more slowly than the world average since 2011. Although the region ranked first in total RPKs in 2007, it now ranks third. Nevertheless, airlines in the region generated more than half of the total industry net profits in both 2015 and 2016, and achieved the highest load factors.



North America is, along with Europe, a fully-liberalized and very consolidated market. Much of the growth of the region is attributed to the status of North America as a manufacturing powerhouse and to the high purchasing power of consumers.

Benefits of Aviation

Air transport supports 7.6 million jobs and USD 791 billion in GDP in the North America¹⁰⁹.

Besides the USD 252 billion of direct impact in GDP, the sector impact reaches further through North American economies. The effect of the procurement of goods and services through the supply chain has an impact of USD 271.1 billion. The benefits that arise when employees of the industry and its supply chain spend their wages in the local consumer economy account for another USD 131 billion. Direct, indirect and induced, respectively, contribute USD 654 billion to the GDP in North America. In addition, the spending of foreign tourists in the region accounts for USD 136.8 billion of the total economic impact¹¹⁰.

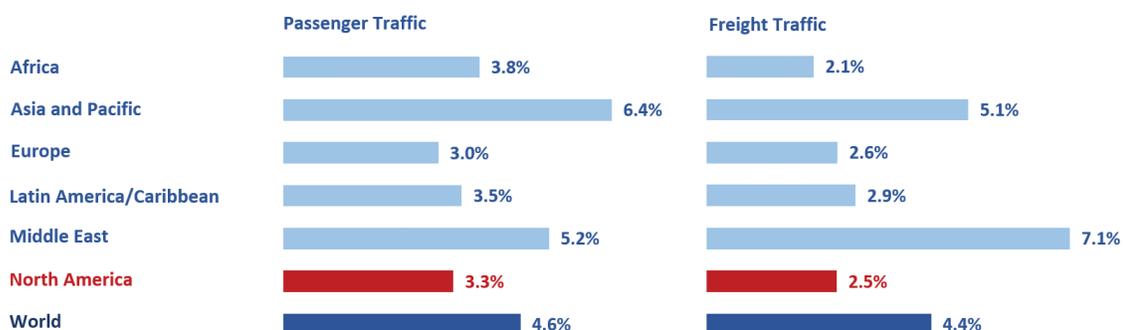
According to the estimate by the Federal Aviation Administration of the United States¹¹¹, civil aviation

Total jobs and GDP supported by aviation in North America, 2014

Category	Jobs	GDP
JOBS TOTAL	7.6 million	GDP TOTAL
Tourism catalytic	1,400,000	\$136.8 bn
Induced	1,200,000	\$131 bn
Indirect	2,500,000	\$271.1 bn
Aviation direct	2,400,000	\$252 bn

(including general aviation and the domestic tourism markets) accounted for 5.1 per cent of the United States' economy in 2014. The total output of civil aviation-related goods and services amounted to USD 1.6 trillion and generated 10.6 million jobs, with earnings of USD 447 billion.

Projected annual growth of total passenger and freight traffic by region up to 2032



Outlook

North America has been a mature market for years, with mass usage and price sensitivity. Travellers and shippers have had ample time to adjust to liberalization. Consequently, traffic stimulated by income growth and market liberalization will be lower than in other regions. According to ICAO long-term traffic forecasts, total passenger traffic of North America is expected to grow by around 3.3 per cent annually up to 2032, slower than total world growth. For freight traffic, the region is projected to grow more slowly than the world total at 2.5 per cent annually for the same period as passenger traffic¹¹².

This increase will, in turn, drive growth in the economic output and jobs that are supported by air transport in the next decade. By 2034, it is forecasted that the impact of air transport and the tourism it facilitates in North America will have grown to support 11 million jobs (43 per cent more than in 2014) and a USD 1.5 trillion contribution to GDP (a 91 per cent increase)¹¹³.

Challenges

The growth in air transport activities in North America requires improved traffic flow and reduced congestion. High airport delays hurt the aviation industry's efforts to

serve the travelling public and maintain high levels of customer service. They also hurt productivity and economic competitiveness. Unnecessary flight delays that are often the result of outdated technology and procedures cost the United States an estimated USD 25 billion in 2016 alone¹¹⁴.

NextGen is a long-term initiative in the United States, aiming to transform the current radar-based air transportation system into one that uses satellite navigation, automated aircraft position reporting, and digital communications. The total benefits of NextGen improvements will be USD 160.6 billion, at a cost of USD 35.8 billion¹¹⁵. However, there are potential issues related to NextGen implementation. For example, delays and cost increases in individual programmes that was initiated prior to NextGen and, upon which NextGen is dependent, could affect the timelines and goals for NextGen implementation¹¹⁶.

In order to further boost their air traffic and economies in general, both Canada and the United States will rely more on the potential of the travel and tourism sector. The key to maximizing the outcome is to improve marketing and branding activities, as well as to prioritize the sector more in its development strategy. According to the analysis of the World Economic Forum, Canada could further improve on this dimension by easing its visa policy, which currently ranks 120th¹¹⁷.

LDCs, LLDCs and SIDS

Least Developed Countries (LDCs) represent the poorest and weakest segment of the international community. These 48 States comprise more than 880 million people (about 12 per cent of world population) but account for less than 2 per cent of world GDP and about 1 per cent of global trade in goods¹¹⁸.

Landlocked Developing Countries (LLDCs) are developing countries that are landlocked. These 32 States are at a significant economic disadvantage due to geographic remoteness, lack of direct access to the sea, higher than average transport costs for both exports and imports, and limited integration into the world economy.

Small Island Developing States (SIDS) consist of 38 maritime developing countries (and 20 non-UN Members and Associate Members) facing specific social, economic and environmental vulnerabilities.

For such countries in special situations, aviation represents an essential lifeline and air traffic from these countries has tended to grow faster than the world average. For example, the volume of passenger traffic in LLDCs rose by 58 per cent from 20.0 million in 2010 to 31.7 million in 2016, compared to the world average of 44 per cent during the same period. However, passenger traffic in LLDCs represents only a 0.83 per cent share of the world's passenger volume. Similar trends hold for freight volume, which increased for LLDCs from 340.6 thousand tonnes in 2010 to 648.2 thousand tonnes in 2016 but still account for just 1.23 per cent of global freight volume¹¹⁹.

Total jobs and GDP supported by aviation in SIDS, 2014

JOBS TOTAL		GDP TOTAL
1.4 million		\$25.3 billion
1,200,000	Tourism catalytic	\$20.9 bn
54,000	Induced	\$1.1 bn
54,000	Indirect	\$1.1 bn
74,000	Aviation direct	\$2.3 bn

Benefits of Aviation (SIDS)¹²⁰

Air transport supports 1.4 million jobs and USD 25.3 billion in GDP in SIDS.

Besides the USD 2.3 billion of direct impact in GDP, the sector impact reaches further through the SIDS economies. The effect of the procurement of goods and services through the supply chain has an impact of USD 1.1 billion. The benefits that arise when employees of the industry and its supply chain spend their wages in the local consumer economy account for another USD 1.1 billion. Direct, indirect and induced, respectively, contribute USD 4.5 billion to the GDP in SIDS. In addition, the spending of foreign tourists in the region accounts for USD 20.9 billion of the total economic impact.

Outlook (SIDS)¹²¹

Given the long distance from the main tourist-generating markets, foreign tourists mainly travel and arrive by air. According to ATAG's long-term traffic forecasts, total passenger traffic of SIDS is expected to grow by around 4.9 per cent annually up to 2034, faster than total world growth, due mainly to rapid urbanization, population growth and tourism development.

This increase will, in turn, drive growth in the economic output and jobs that are supported by air transport in the next decade. By 2034, it is forecasted that the impact of air transport and the tourism it facilitates in SIDS will have grown to support 2.3 million jobs (66 per cent more than in 2014) and a USD 51.6 billion contribution to GDP (a 104 per cent increase).

Challenges

Most airports in LDCs, LLDCs and SIDS receive only a limited number of flights a week, and costs of air travel are disproportionately high. The potential uncertainty about continuation of air services might have an adverse effect on a travel industry's inward investment and the opportunity for inbound tourism, and thus the actual loss of a service could have a much greater cost. Without reliable, attractive air services and harmonized aviation and tourism policies, the benefits of aviation and tourism simply cannot be realized or are constrained at best.

Improvements in airport infrastructure, installation of advanced air traffic control and air navigation systems,

better safety and security services, and liberalization of air transport are all important measures to be considered by LDCs, LLDCs and SIDS to break a vicious circle of economic and logistical disadvantages and enhance structural transformation¹²².

The needs, characteristics and economic vulnerabilities are different for each country. Some LDCs, LLDCs and SIDS are too small or remote to achieve structural transformation through industrialization (i.e. achieving higher levels of added value in manufacturing) but have significant unused natural and cultural tourism potential and opportunities in the area of trade in services. To open new economic development prospects, these countries are encouraged to incorporate the aviation sector into their tourism master plans.

The latest estimate indicates that tourism now represents 7 per cent of the LDCs' total exports of goods and services, and for non-oil exporters, the figure stands at 10 per cent¹²³. However, over-dependence on international tourism is not risk-free. Tourism demand is very sensitive to economics, security, political events and natural disasters, and is of a seasonal nature. A "smart product mix", i.e. the establishment of good integration between aviation and other service and commodity sectors, is required. For example, developing state-of-the-art air transport facilities would not only be a sensible move for competitiveness in international tourism; it could also serve as a powerful incentive for foreign direct investors to explore economic opportunities in other economic sectors¹²⁴.

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