Aviation Benefits Report

2019

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AIRPORTS COUNCIL INTERNATIONAL

canso
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IATA

ICAO

ICCAIA

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.

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Foreword

This 2019 edition of the Industry High Level Group (IHLG)'s *Aviation Benefits* report coincides with the 75th anniversary of the *Convention on International Civil Aviation*. At this juncture, the report provides crucial insights into the realization of the vision that has underpinned the Convention and the development of the global aviation sector throughout the decades: to promote safe, secure, efficient, economically-viable and environmentally responsible air transport as a means to foster international peace and encourage worldwide development.

Today, 1,303 scheduled airlines operate over 31,717 aircraft, serving 3,759 airports thanks to the support of 170 air navigation services providers[1]. The aviation sector is distinct in that it is the only regular means of passenger and cargo transport to be covered by a global de-carbonization goal.

This report illustrates the benefits of this sector: its support of the expansion of the ability of local communities and businesses to access foreign supplies and markets; its provision of invaluable opportunities for cultural and social exchange; and its enhancement of emergency and humanitarian response capabilities during crises, and public health emergencies.

Currently forecasts indicate that air traffic volumes will more than double in the next 20 years. The industries directly supported by aviation will grow in tandem, increasing business-to-business and consumer benefits and choices, improving efficiency, spurring job creation, and sparking local and national development. This includes for the aviation sector itself: increased connectivity leads to further re-investment in aviation, creating a positive cycle of aviation development and economic prosperity in those countries and regions that set out suitable planning and investment commitments.

Aviation's global stature as an economic engine is evident in the statistics. If the global aviation sector were a country, its total contribution (direct, indirect, induced and catalytic) of USD 2.7 trillion to the gross domestic product (GDP), and the 65.5 million jobs it supports, would be comparable to the United Kingdom's economic size and population[2].

Despite the long-lasting and vital importance of air transport to global development, the expansion of aviation today faces many challenges and indeed threats. Continued political support and economic investment will be needed in aviation sector to meet its potential.

Seventy-five years after the global regulatory framework was established, innovation and audacity remain key to the future of aviation. The information in this report supports the strategies that will be needed to ensure the continued enhancement of the aviation sector.

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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 in 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 2018, airlines worldwide carried around **4.3 billion passengers** annually with **8.3 trillion revenue passenger kilometres (RPKs)**. **Fifty-eight million tonnes of freight** were transported by air, reaching **231 billion freight tonne kilometres (FTKs)**. Every day, more than 100,000 flights transport almost 12 million passengers and around USD 18 billion worth of goods[3].

4.3 BILLION
PASSENGERS
carried by airlines
(6.4% increase from 2017)

58 MILLION
TONNES OF FREIGHT
carried by airlines
(2.4% increase from 2017)

38 MILLION
SCHEDULED COMMERCIAL FLIGHTS
flown by airlines
(3.5% increase from 2017)

48,500
ROUTES WORLDWIDE
(over 2,900 new routes from 2017)

54 BILLION
KILOMETRES FLOWN
by airlines
(4.7% increase from 2017)

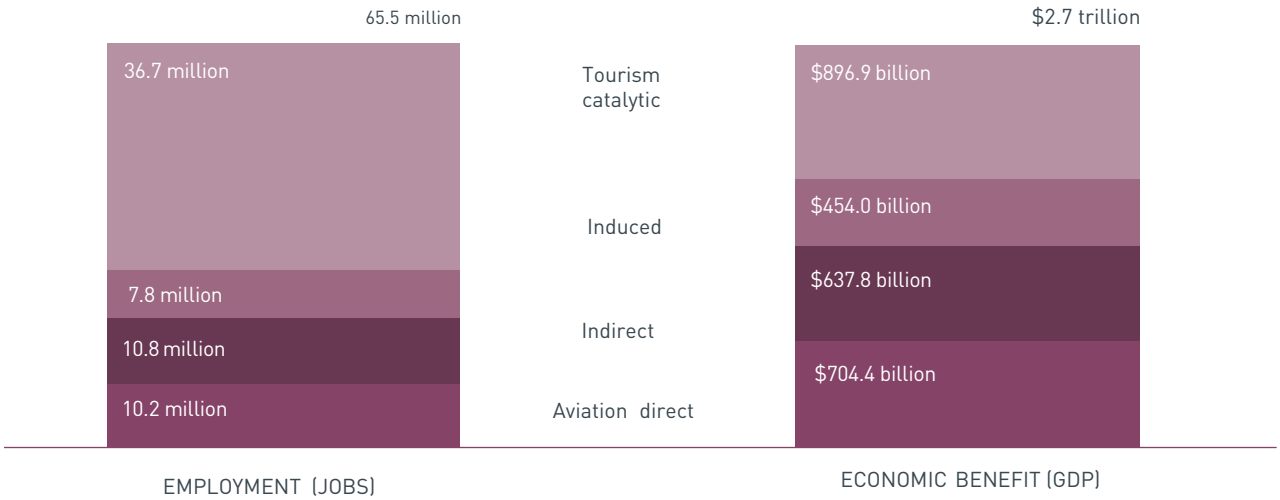
85 MILLION
HOURS FLOWN
by airlines
(4.9% increase from 2017)

65.5 MILLION
JOBS SUPPORTED

3.6 PER CENT
OF GDP SUPPORTED

USD **2.7** TRILLION
ECONOMIC IMPACT

Aviation's global employment and GDP impact[4]



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 3.6 per cent of the world's gross domestic product (GDP)** in 2016[5].

The air transport industry also supported **a total of 65.5 million jobs** globally. It provided 10.2 million direct jobs. Airlines, air navigation service providers and airports directly employed around three and a half million people. The civil aerospace sector (the manufacture of aircraft, systems and engines) employed 1.2 million people. A further 5.6 million people worked in other on-airport positions. 55.3 million indirect, induced and tourism-related jobs were supported by aviation[6].

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. They also do not include the intrinsic value that the speed and connectivity of air travel provides, or domestic tourism and trade, as well as foreign direct investment simulated by good air transport connections, which is crucial to developing productive assets for economic growth in the long term. Including these would increase the employment and global economic impact numbers several-fold.

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 **1.4 billion tourists** are crossing borders every year, over half of whom travelled to their destinations by air. In 2016, aviation supported almost 37 million jobs within the tourism sector, contributing roughly USD 897 billion a year to global GDP[7].

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 2018, USD 6.8 trillion worth of goods were expected to be transported internationally by air, representing **35 per cent of world**

trade by value, despite representing less than 1 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.

Around 90 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 88 per cent between 2010 and 2018 and is estimated to grow to 96 per cent by 2025[9].

Aviation Provides Significant Social Benefits

The availability of reliable air transport services provides people with access to what they need: better living standards, food, healthcare, education, safe communities and spaces, etc. Aviation is by far the world's **safest and most efficient** mode of long-range transportation. It often serves as the only possible means of transportation to provide **health care and food supplies** 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. In remote or peripheral regions, air transport functions as an **essential service** to provide lifeline connections that otherwise would not be available.

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 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. A number of these goals are aimed at improving the living conditions and economic prosperity of people all over the globe. 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

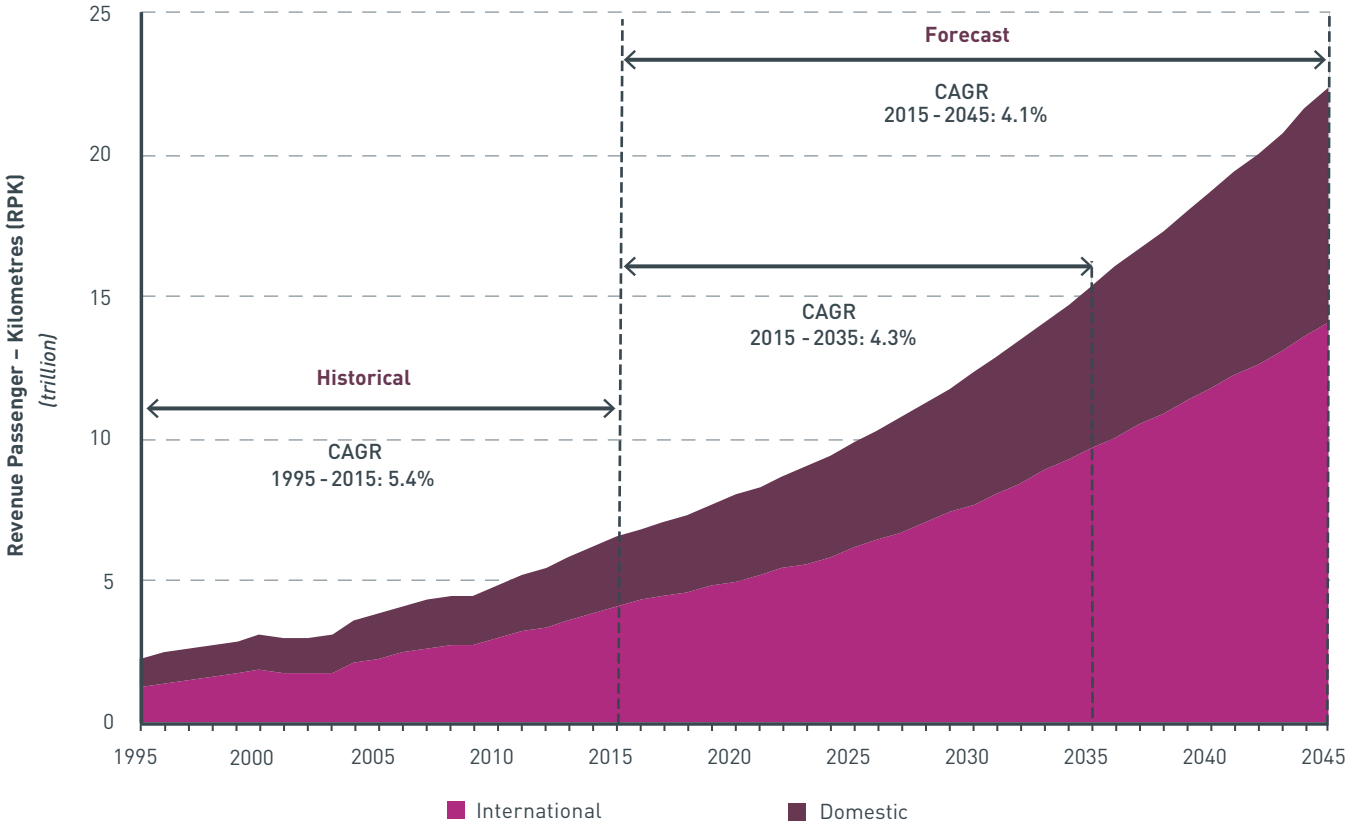
Both air passenger traffic and air freight traffic are expected to more than double in the next two decades. By 2045, passenger traffic will reach over **22 trillion RPKs** with a growth of 4.1 per cent per annum, and freight will expand by 3.6 per cent annually over the same time period, to **573 billion FTKs**[10].

This growth holds tremendous economic potential, which will support all States in achieving the UN's *2030 Agenda for Sustainable Development*. In 2036, aviation will provide **98 million jobs** and generate **USD 5.7 trillion in GDP**, a 110 per cent increase from 2016[11].

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 growth were to slow due to restrictive trade, immigration, political factors and increasing fuel price, the total number of jobs supported by the air transport sector (including air transport supported tourism) could be 12 million lower by 2036 than the base forecasts. In this scenario, the contribution

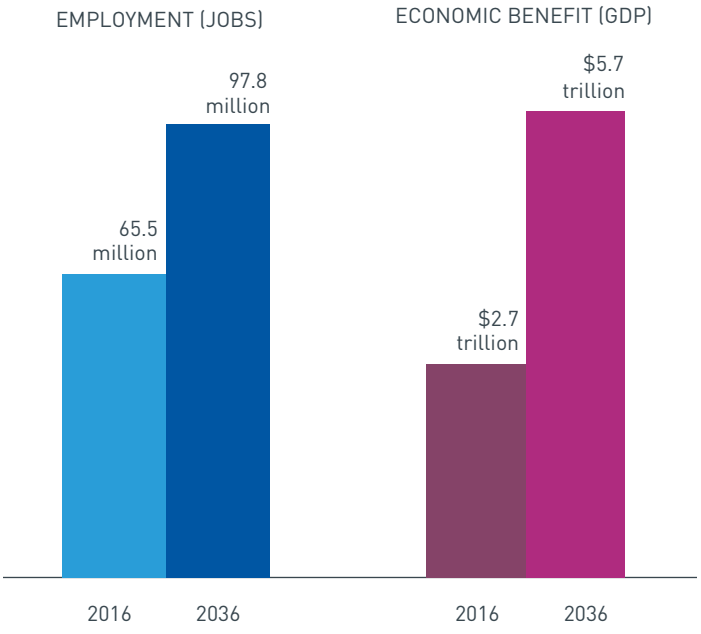
Total passenger traffic: history and forecast[12]



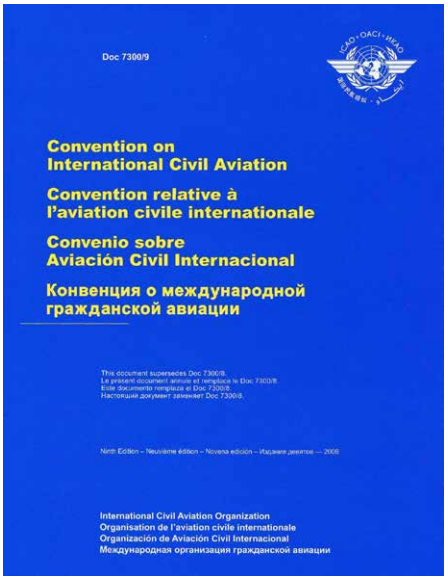
of the air transport sector to world GDP would be USD 820 billion (2016 prices) lower, with an additional USD 390 billion lost through lower tourism activity[13].

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.

Total aviation global employment and GDP impact: history and forecast[14]



Aviation Overview:
From Past to Present



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..."

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 2018, airlines worldwide carried around 4.3 billion passengers annually, logging 8.3 trillion revenue passenger-kilometres (RPKs). Fifty-eight million tonnes of freight were transported by air, reaching 231 billion freight tonne-kilometres (FTKs). Every day, aviation moves almost 12 million passengers and around USD 18 billion worth of goods on more than 100,000 flights[15].

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.

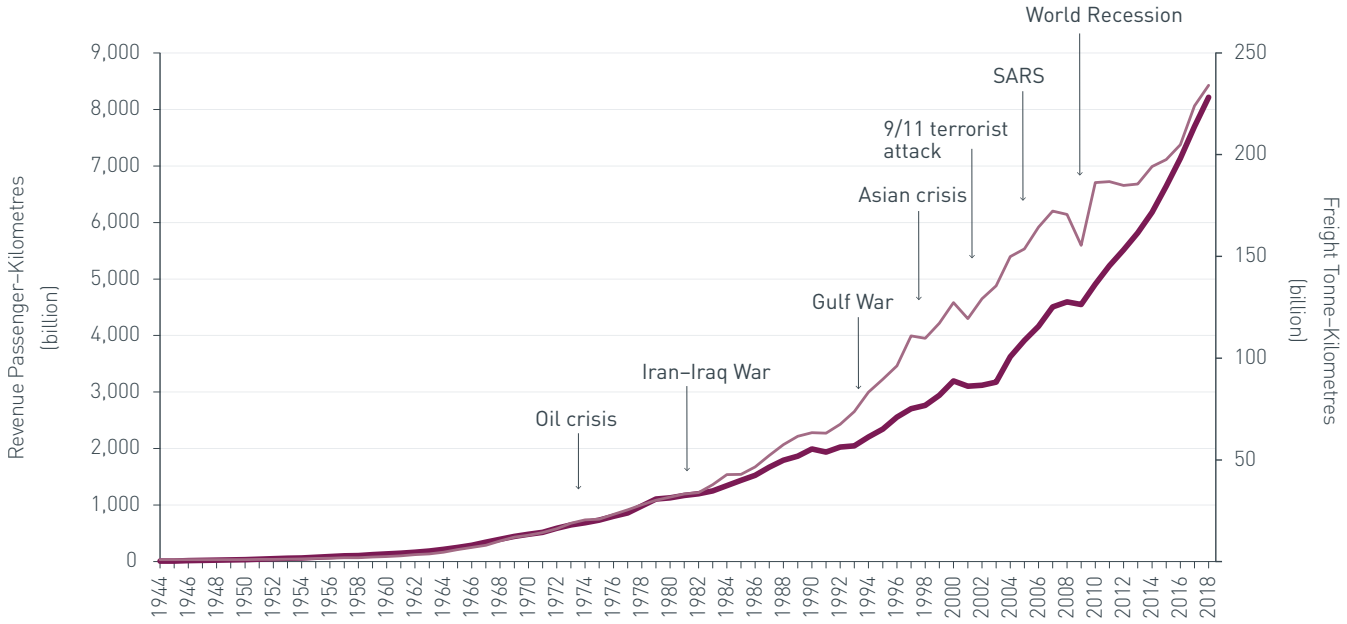
Source: EU Aviation: 25 years of reaching new heights

Asia/Pacific remained the largest region of activity with 35 per cent of world traffic measured in revenue tonne-kilometres (RTKs), followed by Europe and North America with 26 per cent and 22 per cent, respectively. Airlines in the Middle East managed 10 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 airlines[16].

Air Travel Affordability

A key driver in the growth of passenger traffic has been the steady decrease in the real cost of air travel — a reduction of over 70 per cent since 1970[17]. This decrease in cost has led to an increase in accessibility of air travel democratization

Air traffic evolution[18]



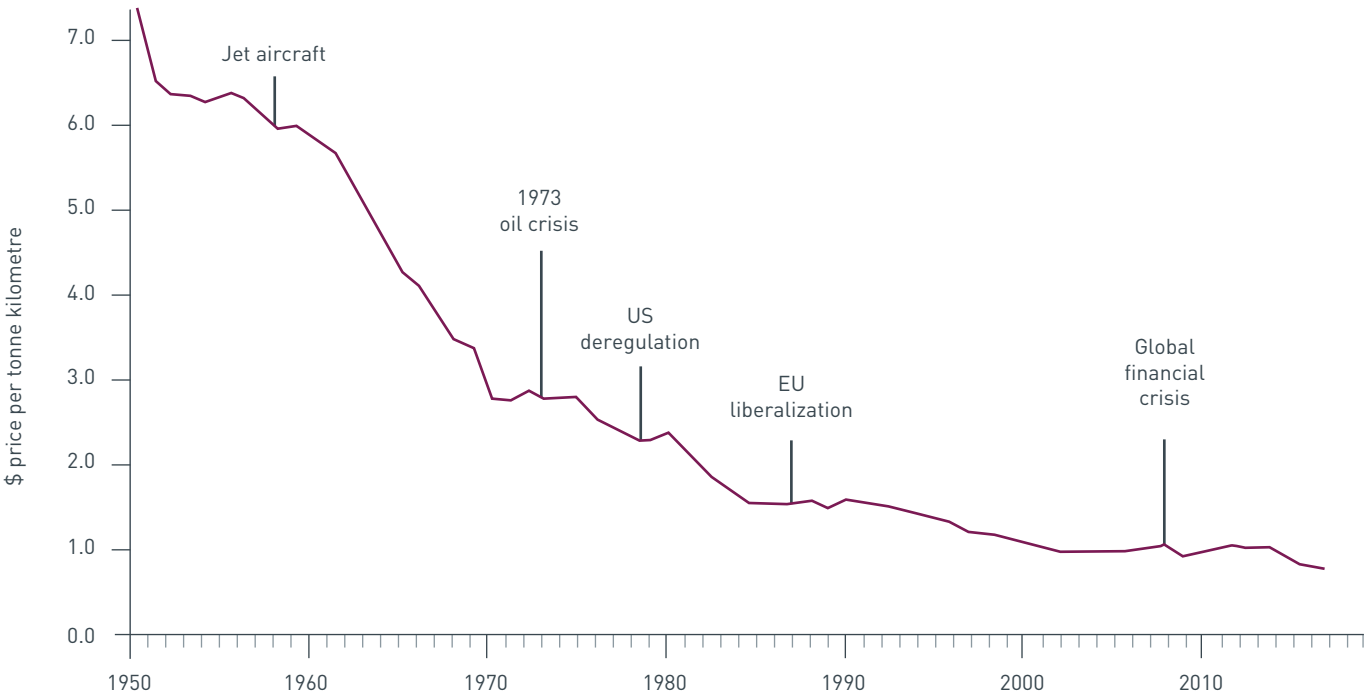
8.3 trillion RPK

↑+7.1% growth rate vs. 2017

231 billion FTK

↑+3.6% vs. 2017

Evolution of average price of air travel[19]



(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.

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 2018, LCCs carried an estimated 1.3 billion passengers, which was approximately 31 per cent of the world total scheduled passengers. This indicated an 8.7 per cent growth when compared to the number of passengers carried by LCCs in 2017, around 1.4 times the rate of the world total average passenger growth[20].

Air Connectivity

The air transport network is dynamic and constantly developing. It is composed of over 1,303 scheduled airlines, over 31,717 aircraft in service, 3,759 airports and 170 air navigation services providers[21]. It is truly a global industry connecting all parts of the world seamlessly.

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*[22].

There is increasing evidence that air connectivity growth stimulates productivity, research and development (R&D), foreign direct investment and fosters trade specialization. Many States have come to understand that air connectivity is an asset, improving the global competitiveness of cities, regions and countries. They try to include aviation projects as a priority in their development strategies and formulate policies to influence and enhance connectivity outcomes, so as to achieve a connectivity portfolio that best meets society's needs[23].

Regulatory Framework

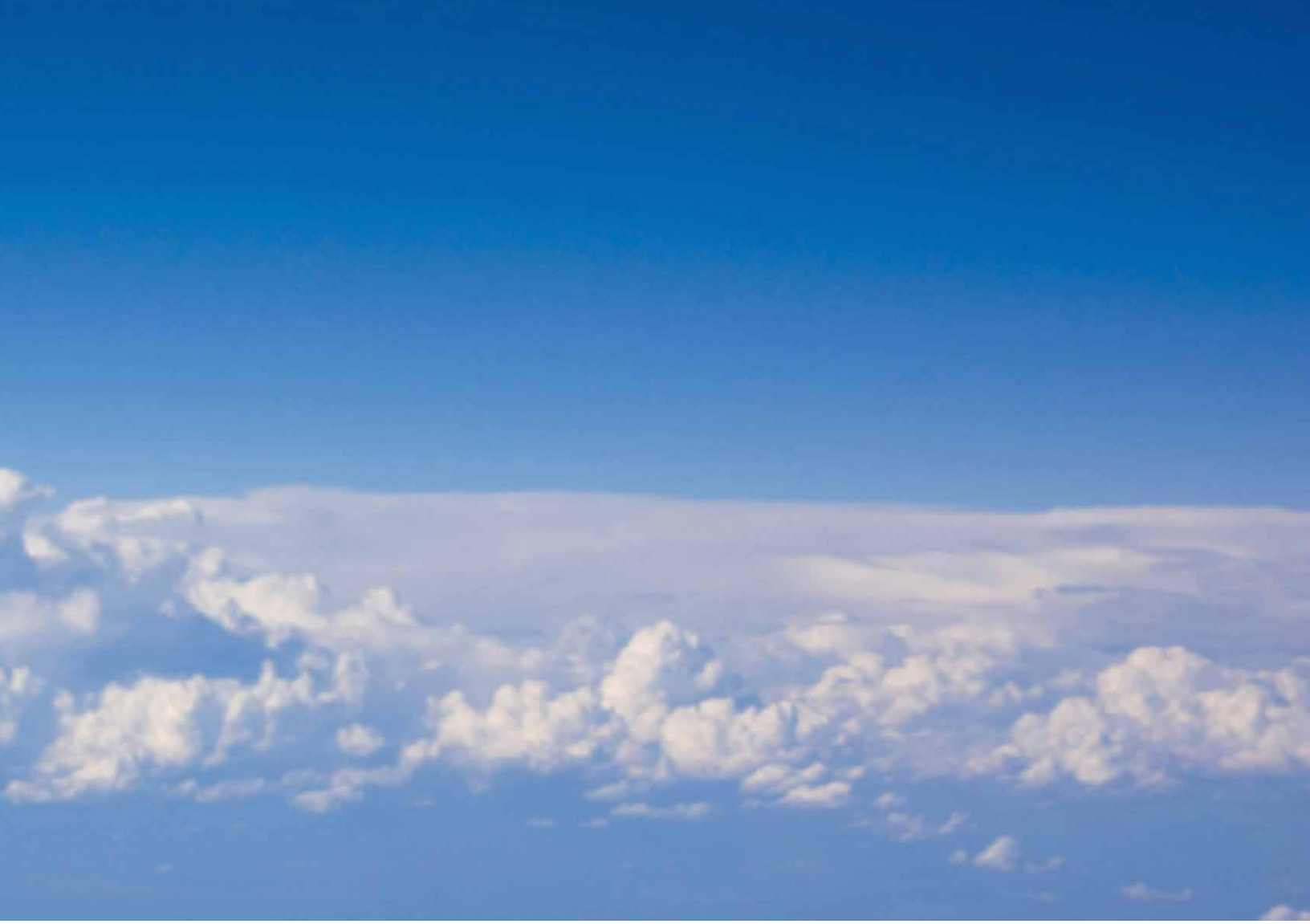
The continuous growth of air traffic and enhanced air connectivity can only be sustained with a globally harmonized regulatory framework. Modern aviation was founded upon the *Convention on International Civil Aviation* (Chicago Convention, 1944)[24], which set forth the core principles permitting international 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 practices[25], 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 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*[26]*."*



Multidimensional Connectivity

International connections include trade, foreign direct investment, migration, information and communication technologies, and transport links. A recent study by the World Bank tried to create a multidimensional connectivity (MDC) index by combining all these networks in a single functional form to measure a country's exposure to overall knowledge flows via international connections. ICAO provided data on air passenger connectivity (the number of destinations that can be easily reached from each country by air, weighted by the number of transfers involved in the journey) to the World Bank for the MDC calculation. According to the study, the United States ranked 1st in the MDC index (2nd in air transport connectivity). Germany positioned 2nd in the MDC (3rd in air transport), followed by China at 3rd (19th in air transport). The United Kingdom ranked 1st in terms of air transport connectivity but 4th in MDC. The analysis of the MDC index revealed, inter alia, that an impact on growth of any single connectivity channel is expected to decline; and thus, promoting complementary and balanced connectivity across trade, transport, foreign investment, and other channels is likely to be more beneficial than focusing on enhancing only one channel.

Source: Critical Connections: Promoting Economic Growth and Resilience in Europe and Central Asia, 2018, World Bank

Value of Aviation:
Economic Benefits

"Air transport is the business of freedom, bringing tremendous benefits to the world. With the right policy framework from governments, air connectivity can grow stronger, driving even greater social and economic progress. For that to happen, we need to ensure that borders remain open to people and trade, and that the right decisions are taken to develop sufficient, cost-efficient infrastructure. Most important of all, we must meet the sustainability challenge. Only through a shared commitment, with governments and industry working together, can we deliver on our carbon goals, giving aviation the license to grow and enhance the benefits of air connectivity."

—Alexandra de Juniac, Director General & CEO, IATA

Two decades ago, aviation's total economic impact was estimated at USD 1.36 trillion, which supported 27.7 million jobs (1998 figure)[27]. Since then, aviation's role in the modern economy has been considerably widened with the growing availability of affordable air transport worldwide. According to the most recent estimate (2016 figure)[28], the total economic impact of the aviation industry is some 3.6 per cent of the world's GDP, USD 2.7 trillion, which supports 65.5 million jobs worldwide.

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). Every person directly employed in the aviation sector and in tourism made possible by aviation supported another 6.4 jobs elsewhere worldwide. Similarly, USD 3.8 of economic activity was supported elsewhere for every USD 1 of gross value added (GVA) directly created by the air transport sector.

Direct Impacts

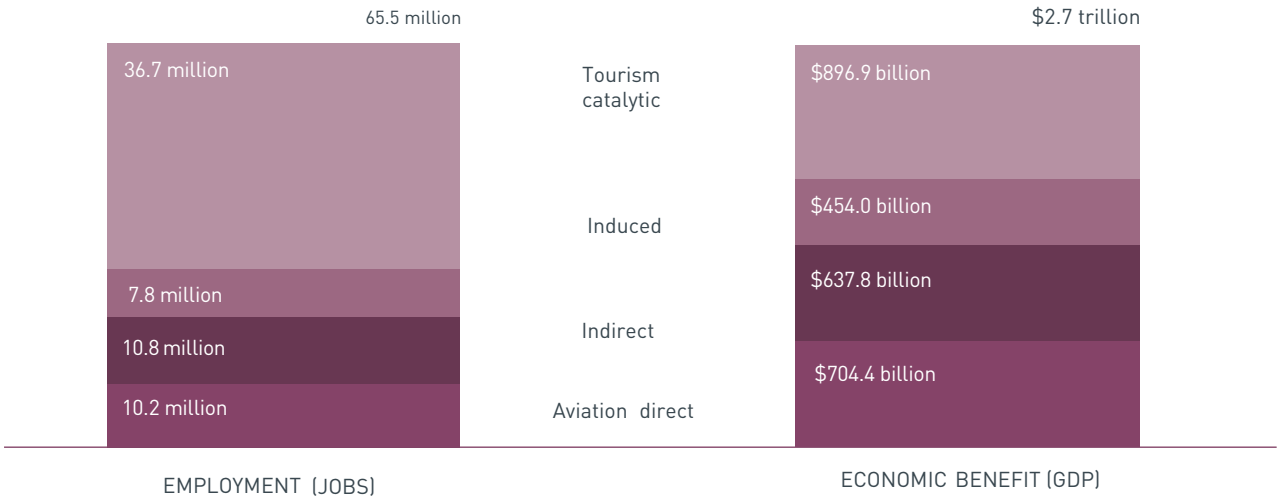
The aviation industry itself is a source of considerable economic activity, creating jobs that directly serve passengers at airlines, airports and air navigation services providers. These include check-in, baggage handling, on-site retail, cargo and catering facilities. Moreover, aviation directly enables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

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

In order to transport 4.3 billion passengers to destinations all over the globe and carry 58 million tonnes of freight[29], the aviation industry generated 10.2 million direct jobs and added USD 704.4 billion to world GDP[30]. This is about 70 per cent of the size of the automotive industry, which accounts for 1.2 per cent of global GDP[31].

Aviation is a highly productive industry, as measured in terms of GDP per worker. At an average of USD 69,000 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.

Aviation's global employment and GDP impact, 2016[32]



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).

Nearly 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 638 billion to global economic activity in 2016[33].

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, nearly eight 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. The induced contribution to global economic activity is estimated at USD 454 billion[34].

Shared Value - Ekurhuleni

Land-use around airports promotes economic activities that thrive on long-distance connectivity. A prominent example is South Africa's aerotropolis around O.R. Tambo International Airport in Ekurhuleni, adjacent to Johannesburg, which has been planned for tourism development to help improve the region's economic distress. The aim of the development plan, based on the aerotropolis model, is to diversify the Ekurhuleni economy and reposition it as an ideal destination for trade, investment and tourism. Furthermore the 30-year plan has been developed to identify projects in sectors such as retail, aerospace, advanced manufacturing, logistics and distribution, research and development, health and life sciences.

Source: ACI

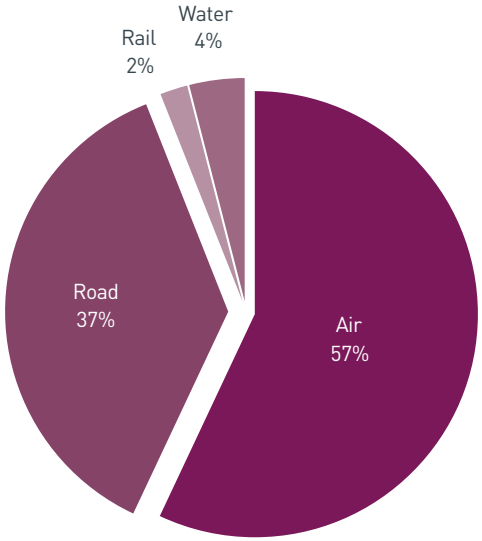
Catalytic Impacts

Furthermore, many other industries rely on effective air transport links to function. 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 are considered to be essential factors influencing where companies choose to invest. Countries need connectivity to fully participate in the worldwide economy. This encourages higher productivity, investment and innovation. Connectivity helps businesses operate efficiently and attract high-quality employees.

Aviation Supports Tourism

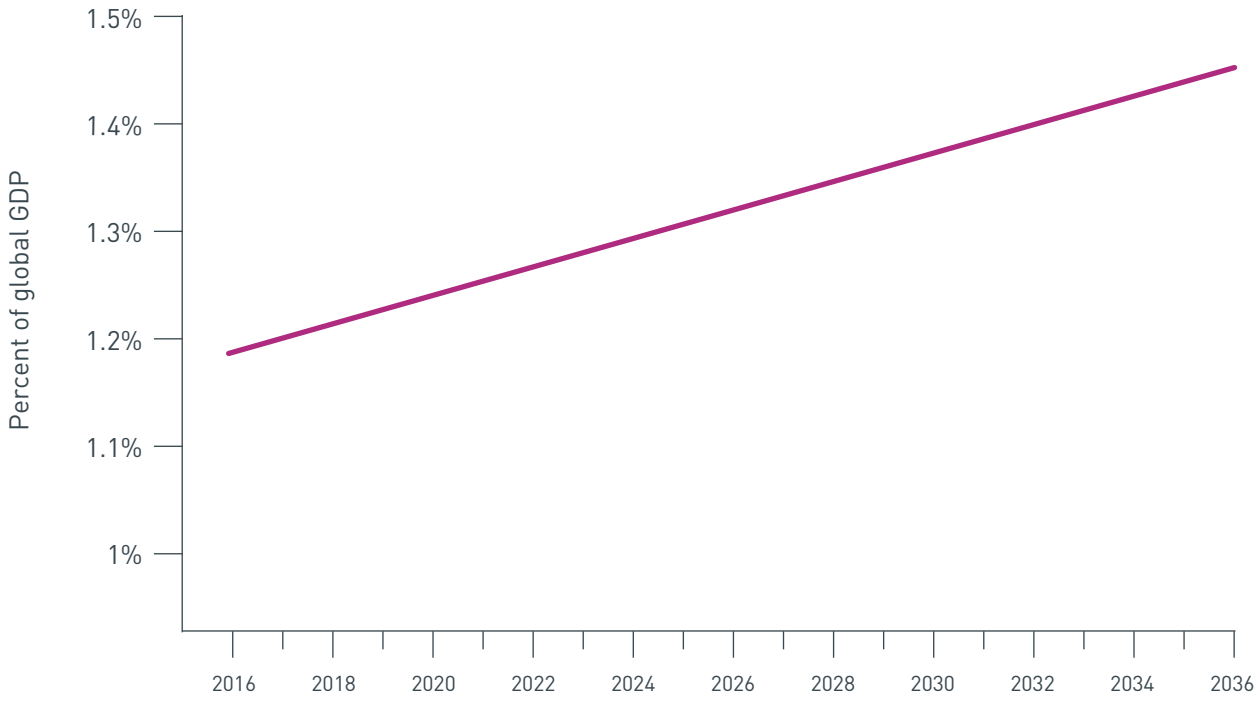
Air transport activities affect multiple sectors of the economy, especially tourism. The connectivity brought by air transport is at the heart of tourism development, providing substantial economic benefits for all those involved in the tourism value chain. Currently, approximately 1.4 billion tourists are crossing borders every year, over half of whom arrived at their destinations by air[35].

International tourist arrivals by mode of transport, 2017[36]



More than half of the international inbound tourists arrived by air

Projected growth in tourism facilitated by aviation, contribution to global GDP, 2016-2036[37]



In 2018, tourism supported a total of 319 million direct, indirect and induced jobs globally and made up 10.4 per cent of world GDP, a total of USD 8.8 trillion; and the tourism-related GDP is forecast to rise by 3.7 per cent annually over the next decade, faster than the growth of global GDP[38]. Through a synergetic relationship, aviation supports almost 37 million jobs within the tourism sector, contributing roughly USD 897 billion a year to global GDP[39].

In terms of trade, international tourism (travel and passenger transport) accounts for 29 per cent of the world's services exports and 7 per cent of overall exports of goods and services in 2018[40]. Particularly for Least Developed Countries (LDCs), Landlocked Developing Countries (LLDCs) and Small Island Developing States (SIDS), tourism is a main source of foreign exchange earnings and often one of the few activities for which their location, coupled with exceptional natural and cultural resources, is a strong competitive advantage.

If tourism is well managed with a strong support by air transport, it can reduce 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.[41]. The graduation of Cabo Verde (2007), Maldives (2011) and Samoa (2014) from LDC status was driven by the strong growth and performance of tourism[42].

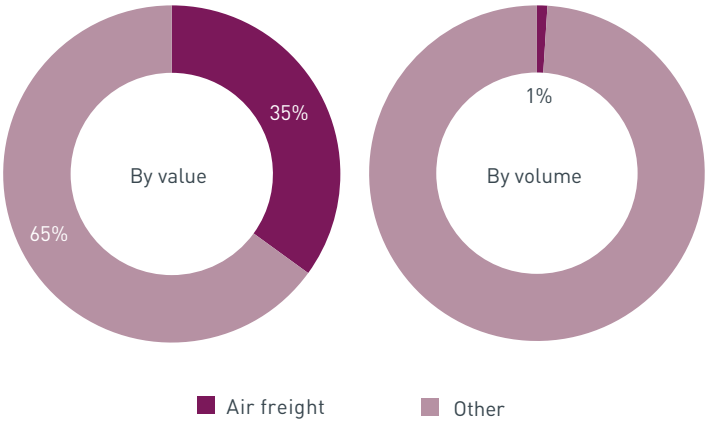
Business tourism, specifically meetings, incentives, conferences and exhibitions (MICE) activity, relies significantly on the availability of air travel and can generate a bigger economic impact because business travellers spend more, at least per day, than leisure visitors do. In addition to the expected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

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.

Air freight, as a proportion of global trade, by volume and by value, 2015[43]



Benefits of Aviation Policy Changes to the National Economy of Dominican Republic

A series of aviation reforms have taken place in Dominican Republic since 2006 to make aviation a priority sector in its national development planning and policies. To measure the impact of the policy changes on air traffic and its associated economic benefits in the country, a case study was conducted by ICAO in coordination with the Inter-American Development Bank. According to the study, an increase of approximately 23 to 27 per cent in the number of passengers between Dominican Republic and the United States were attributed to the reforms over the period 2006–2012; which in turn, resulted in a 15 per cent increase in GDP per capita (representing an increase of USD 607 in value) in Dominican Republic. Moreover, spending of foreign tourists from the United States in Dominican Republic increased from USD 836,000 to USD 1.016 million over the same period. The results of the study are intended to help attract further investments in the air transport sector, and identify potential policy options for States, i.e. whether they choose to focus on tourism, air cargo, or other sectors.

Source: ICAO

Flowers from Small Growers around the World – Kenya

In Kenya, over 100,000 jobs depend on the cut flower industry, which impacts over 2 million livelihoods. The cut flower industry supports approximately 1.06 per cent of the national economy, generating around USD 700 million in foreign exchange each year. Flower exports have grown significantly from 10,946 tons in 1988 and 86,480 tons in 2006 to 159,961 tons in 2017.

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 to 100 kilometres. Flowers picked in the morning reach markets in Amsterdam by evening. The Netherlands is the leading destination for Kenyan flowers, commanding 48 per cent of the export volume, followed by the United Kingdom at 16 per cent. About 38 per cent of all cut flower imports into the European Union come from Kenya.

The launch of direct flights between Nairobi and New York by Kenya Airways in October 2018 reduced shipping times and freight costs, opening up the North America market for Kenyan flowers. The cut flower was identified as a priority sector in the country's effort to double exports to the United States by taking advantage of duty-free market access under the African Growth and Opportunity Act (AGOA), a preferential trade act initiated by the United States.

Source: Kenya Flower Council, World Bank, and Kenya National AGOA Strategy and Action Plan (2018 – 2023)

The Aviation Satellite Account

Notwithstanding the socio-economic benefits brought by aviation, its importance to national economies appears not to be fully understood by States and the public due mainly to the acute shortage of reliable economic information related to aviation. While some research and analysis has been conducted to estimate the economic contribution of aviation, there has been no internationally-agreed standard to measure it. Consequently, the credibility, reliability, robustness and accuracy of such estimations are often questioned and challenged.

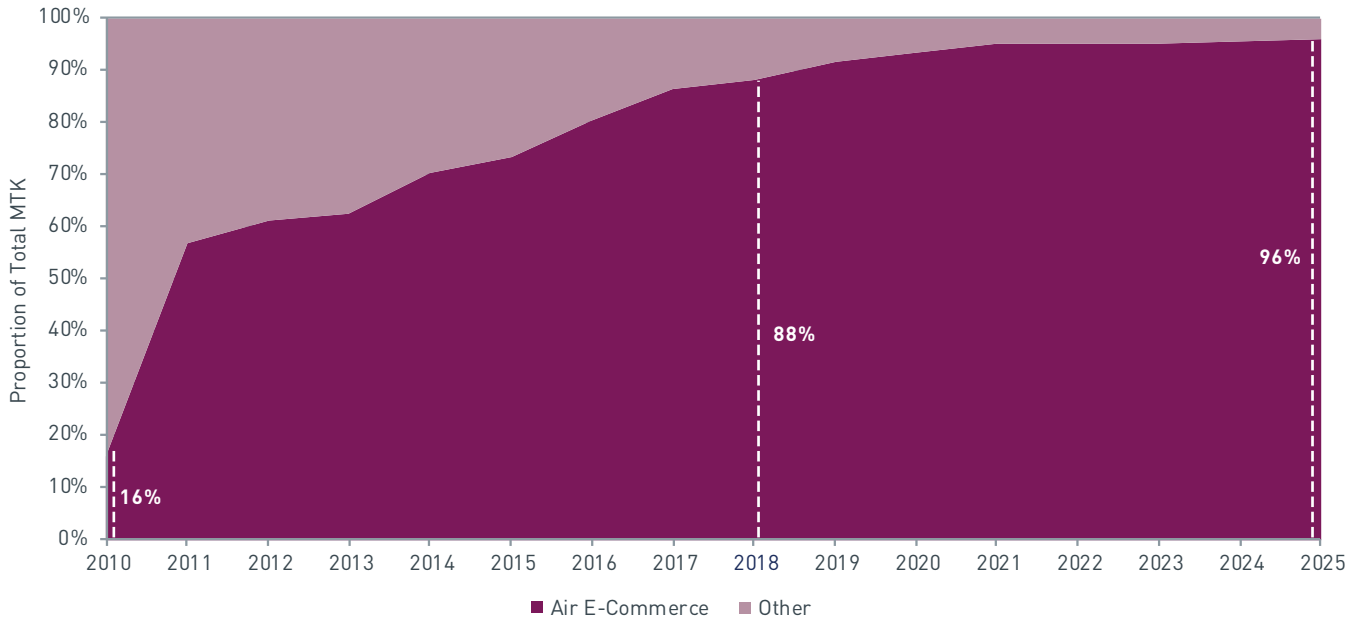
ICAO developed a methodological framework for the "Aviation Satellite Account" (ASA) to measure the direct economic impact of aviation on the national economy in line with the System of National Accounts (SNA 2008) adopted by the UN Statistical Commission – an internationally agreed statistical framework for a set of macroeconomic accounts. The term "satellite account" refers to an account that is closely linked to the SNA but is not bound to employ exactly the same concepts or restricted to data expressed in monetary terms. A satellite account covers a specific industry or sector of particular importance to the national economy. Many elements shown in a satellite account are invisible in the national accounts. Either they are explicitly estimated in the making of the national accounts but are merged for presentation in more aggregated figures, or they are only implicit components of transactions which are estimated on an aggregated basis. Common examples are satellite accounts for tourism, transport, culture, sports, and environment.

The ASA consists of a set of tables, including the Supply and Use Tables (SUTs) which are prepared to estimate aviation's direct GVA and aviation direct GDP, etc. These tables describe: a) how products (goods and services) are brought into the national economy either as a result of domestic production or imports from other countries; and b) how those same products are used (as intermediate consumption, household final consumption, non-profit institutions serving households, general government final consumption, gross capital formation and exports). Other tables in the ASA cover additional elements, both monetary and non-monetary, such as data on employment and indicators of output. States can use the ASA to improve understanding and raise awareness of aviation's importance relative to an overall economic activity, as well as to highlight the inter-dependencies of aviation with other economic sectors that are involved in the production of goods and services consumed by aviation.

ICAO plans to submit the ASA framework document to the UN Statistical Commission for its official endorsement in 2020.

Source: ICAO

Air e-commerce share of international MTKs[44]



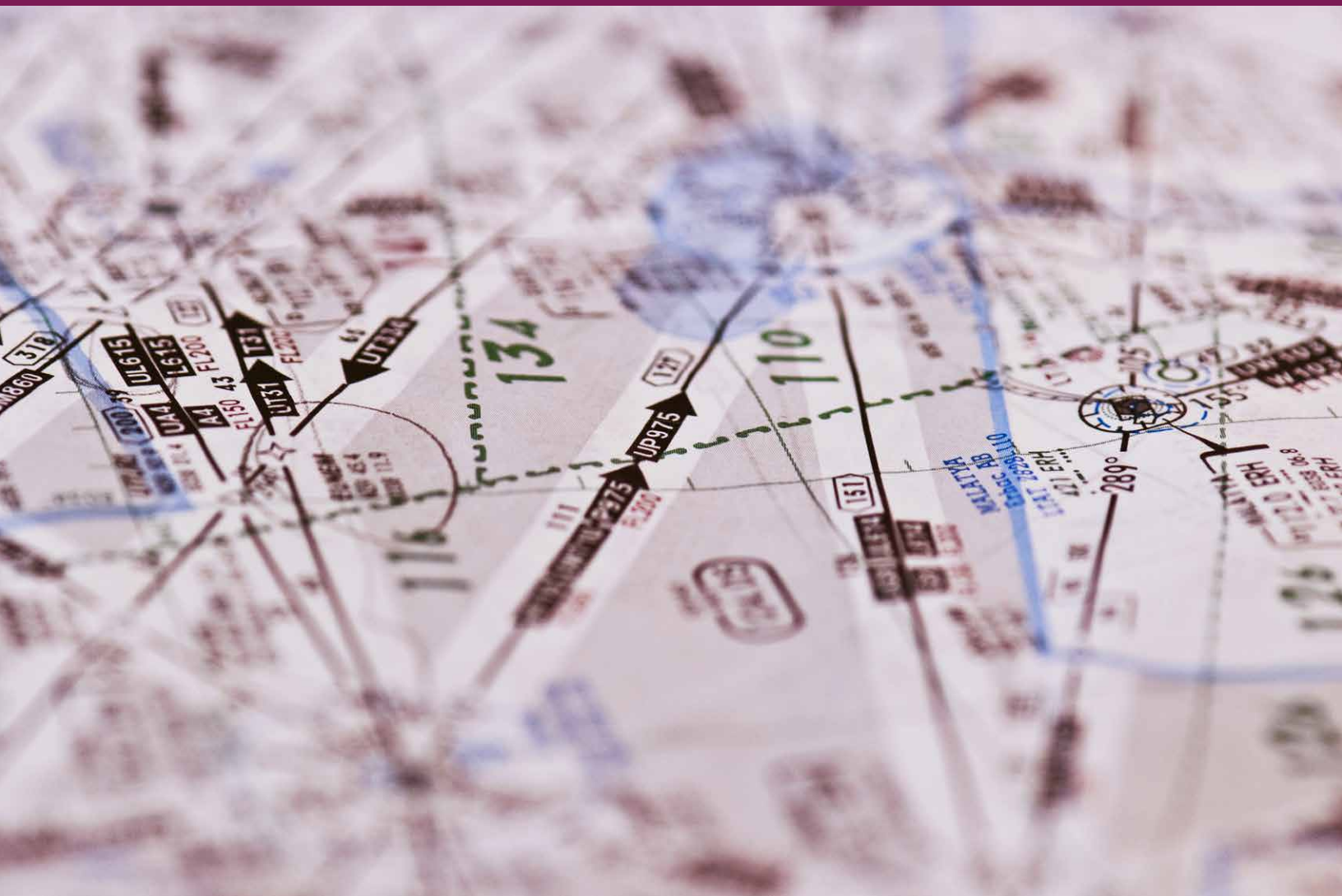
Although the demand for air freight is limited by cost, which is typically 4 to 5 times that of road transport and 12 to 16 times that of sea transport[45], the commodities shipped by air are those that have high value per unit density. Air freight constitutes around 35 per cent of world trade by value, with total value of transported goods expected to be USD 6.8 trillion, despite representing only less than 1 per cent by volume[46]. In 2018, air freight carried on scheduled services grew to 38 million tonnes internationally and 58 million tonnes overall[47].

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.

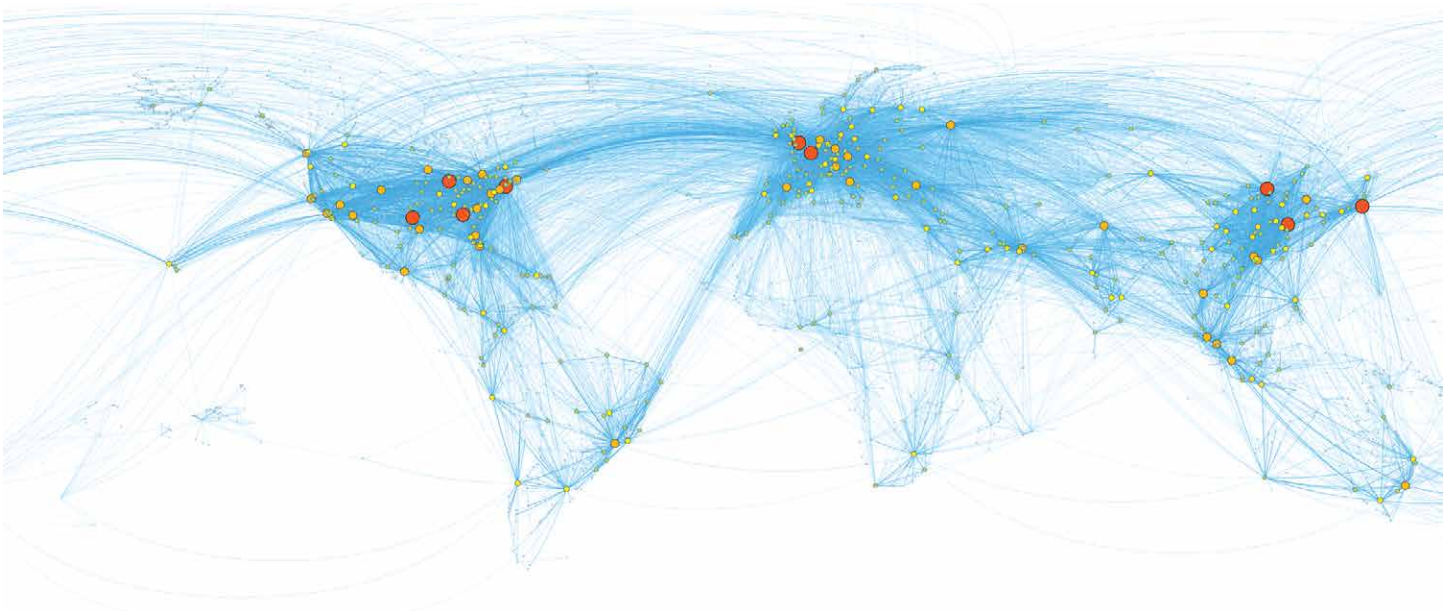
With advances in internet business, electronic commerce (e-commerce) is increasingly influencing the way enterprises interact among themselves, and with consumers and governments[48]. Global e-commerce sales amounted to USD 25.3 trillion in 2015, with the United States being the largest e-commerce market, followed by Japan and China[49]. The e-commerce share of global sales is projected to grow from approximately 10 per cent today to greater than 40 per cent in 2026, spurred by technological progress in areas such as Internet of Things (IoT), autonomous vehicles and drones, as well as artificial intelligence (AI)[50].

Active e-commerce development, in turn, has a significant impact on air transport demand as e-commerce transactions depend fundamentally on the speed of air transport, which connects manufacturers and retailers to the world's cities and regions. Around 90 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 88 per cent between 2010 and 2018 and is estimated to grow to 96 per cent by 2025[51].

Regional Economic Impact of Aviation[52]



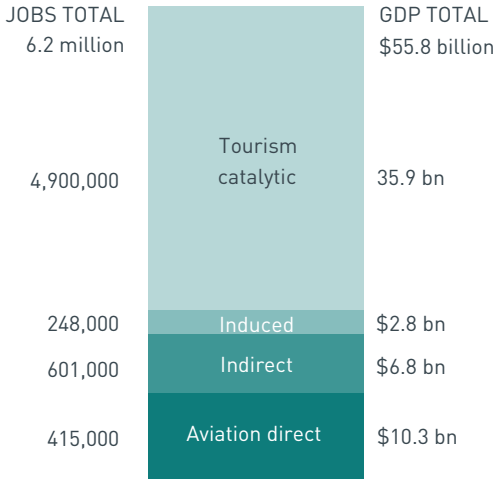
Global air transport network[53]



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.

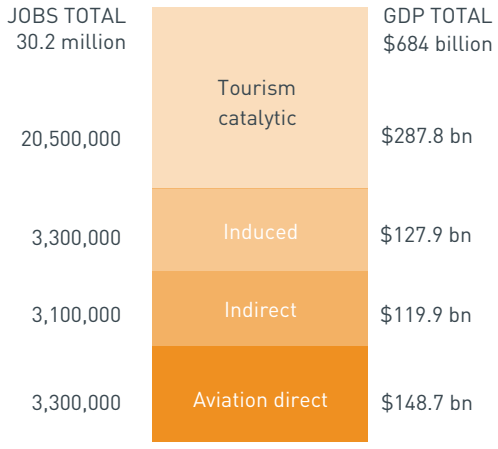
Air transport supports 6.2 million jobs and USD 55.8 billion in GDP in Africa.



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 travel demand will also be stimulated by the growing population and middle class in the region.

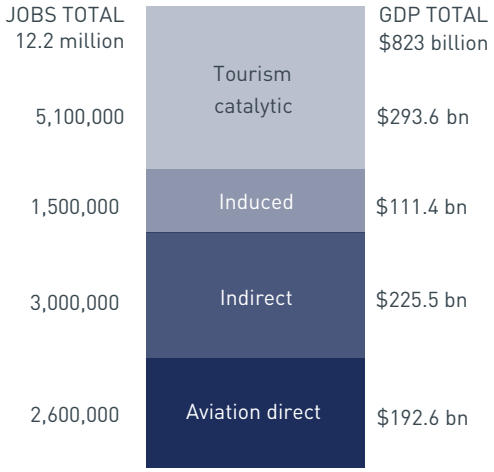
Air transport supports 30.2 million jobs and USD 684 billion in GDP in Asia and Pacific.



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). The single market revolutionized mobility, not only providing cheaper and safer air travel but also more jobs a nd economic growth.

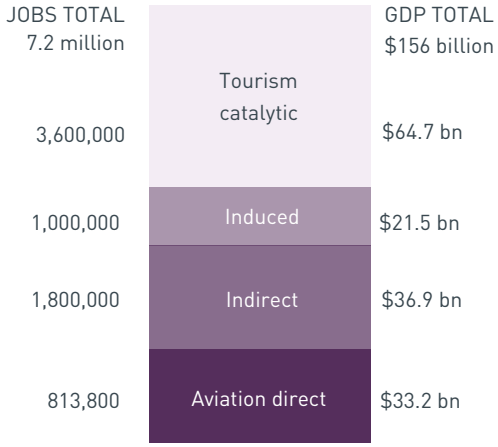
Air transport supports 12.2 million jobs and USD 823 billion in GDP in Europe.



LATIN AMERICA AND THE CARIBBEAN

The Latin America and the Caribbean aviation sector has been growing in recent years, despite economic and political difficulties in certain markets. Expansion is 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.

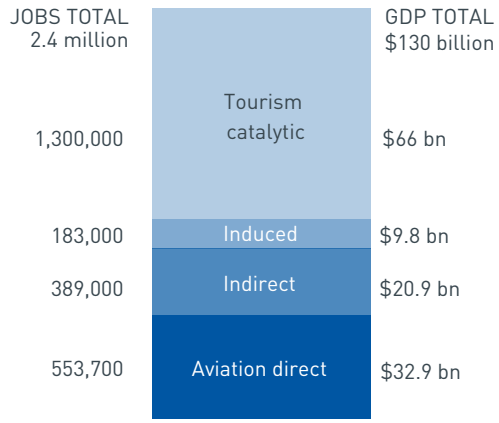
Air transport supports 7.2 million jobs and USD 156 billion in GDP in Latin America and the Caribbean.



MIDDLE EAST

The Middle East region has been, for years, at the forefront of aviation growth and reshaping the global long haul markets by elevating its hub position for connecting Europe and Asia-Pacific, in line with the west to east shift of the geographical centre of gravity of air transport operations. Growth of the region started to undergo a significant transition and slow down recently.

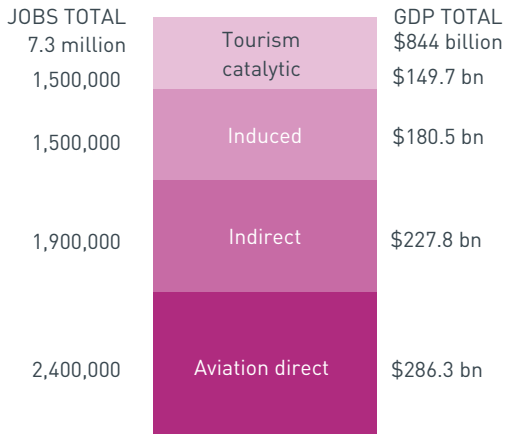
Air transport supports 2.4 million jobs and USD 130 billion in GDP in the Middle East.



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 7.3 million jobs and USD 844 billion in GDP in North America.



Value of Aviation:
Social Benefits

"Aviation connects our world, powers our economies, and expands our horizons. We stand on the edge of significant transformation, from drone deliveries to air taxis, and need to treat these new and emerging technologies as part of the aviation ecosystem so they are safely and efficiently integrated into our airspace. While manufacturers work to develop and build these vehicles, we need a close partnership with governments and regulatory bodies to ensure the proper air traffic management and infrastructure are in place, so that all States can reap the benefits these technologies will bring."

—Eric Fanning, Chairman of the Board, ICCAIA

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 inclusion[54].

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.

The safety performance of the world's commercial aviation industry continues to improve, with an accident rate of 1.35 accidents per million sectors in 2018, compared to 1.79 for the 5-year period average from 2013-2017[55]. 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 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 air transport. In 2017, the World Food Programme (WFP) delivered more than 111,000 tonnes of food and commodities by air to relieve victims of floods, conflict and disease, and the UN Humanitarian Air Service transported over 300,000 passengers, mostly aid workers to the areas of the world most in need of assistance[56].

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

Response to the Sunda Strait Tsunami in Indonesia

On 22 December 2018, a tsunami that followed an eruption and partial collapse of the Anak Krakatau volcano in the Sunda Strait struck several coastal regions of Banten in Java and Lampung in Sumatra, Indonesia. At least 430 people were killed, 1,485 were injured, and more than 16,000 were displaced. In the days following the disaster, Airlink, a rapid-response humanitarian relief organization, worked with Cathay Pacific, United Airlines and other non-profit organizations to provide transportation for response personnel and material aid. This assistance included, in addition to six responders transported, delivery of clean water to 500 people, solar lights to 10,000, and hot meals to more than 100,000 people in need across 19 villages and 10 schools in Banten.

Source: Airlink

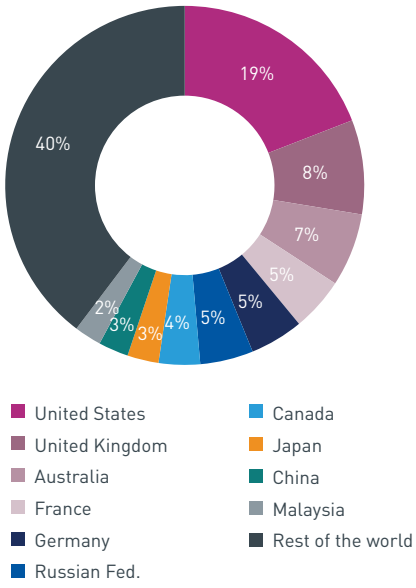
Aviation provides vital lifelines and connections to remote or peripheral destinations that otherwise would not be available, for example, in the Arctic, across vast stretches of wilderness and to small island States all around the world. It offers accessibility to these destinations without the need for expensive and challenging road and port infrastructure development.

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, 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 the different economic, social, political and cultural characteristics of 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.

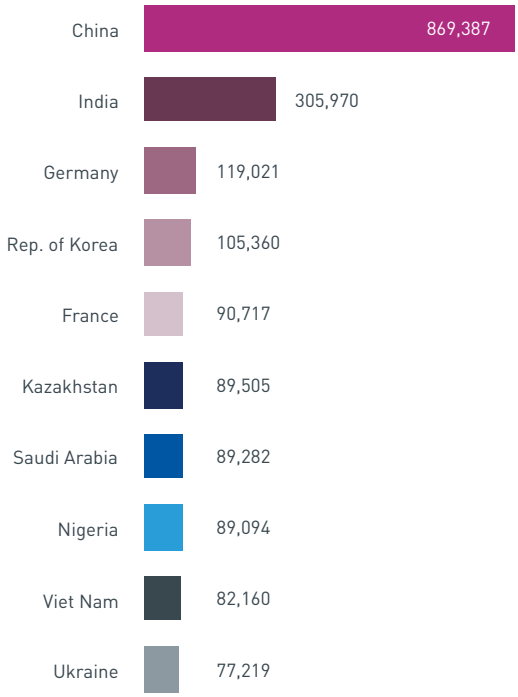
Ensuring inclusive and equitable **Educational Opportunities** and promoting lifelong learning are fundamental needs in a society. The number of students who chose to study abroad increased from 2.1 million in 2000 to 5.1 million in 2017, indicating a new generation of mobile young people eager to learn and expand their horizons[57].

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 economy[58].

Top 10 destination countries for international students, 2017 [59]



Top 10 origin countries of international students, 2017[60]



Essential Service and Tourism Development

Since many air services to remote or peripheral destinations may not be commercially viable (i.e. rendering any operation unprofitable), mainly due to 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 a 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 help alleviate poverty. 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

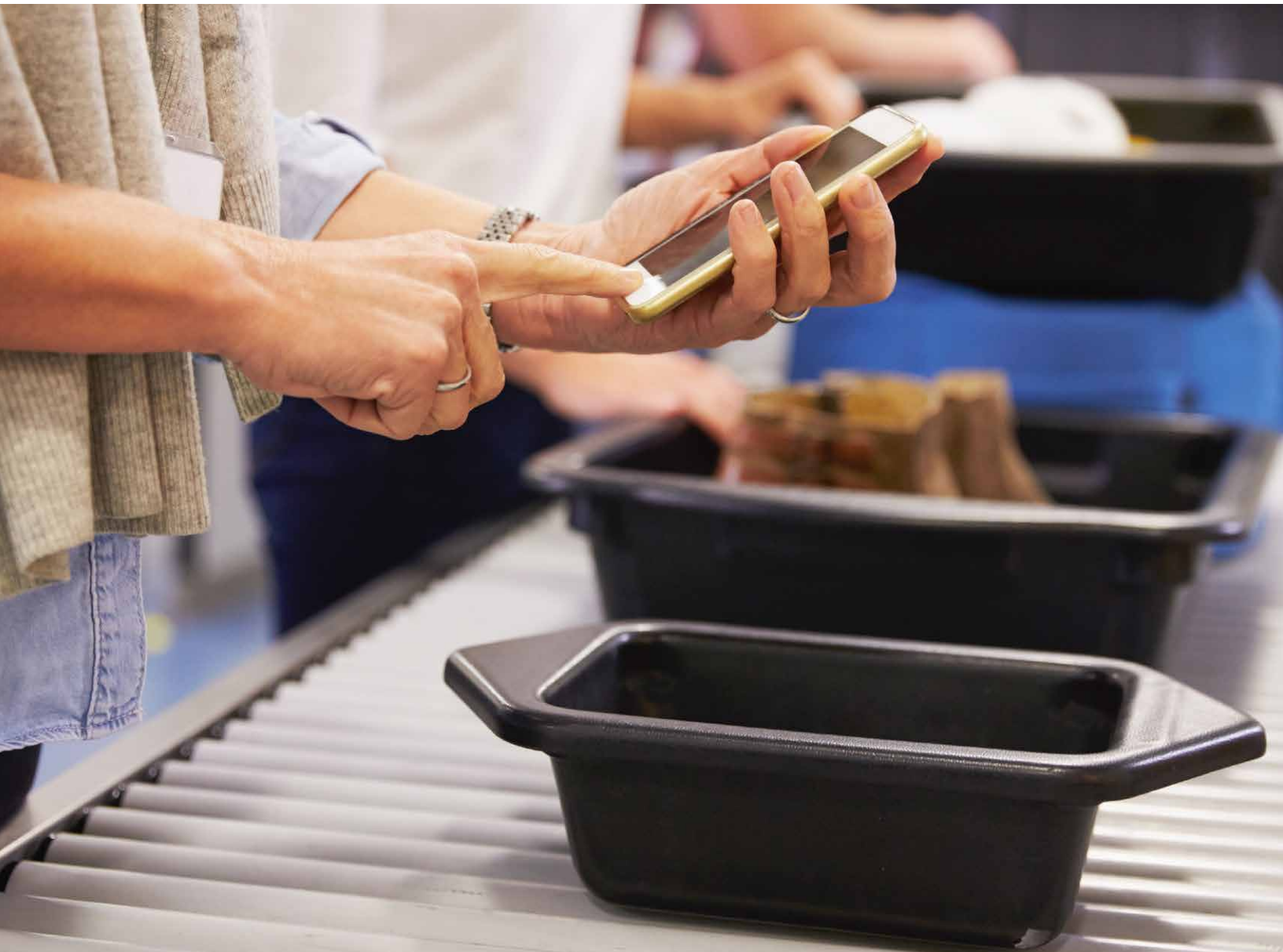
The aviation industry itself also champions quality education for its own employees in areas such as engineering, air traffic management and pilot training. The manufacturing sector, in particular, is working hard to promote education in science, technology, engineering and mathematics. ICAO launched 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.

IMPROVING QUALITY OF LIFE

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 country[61]. 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.

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.

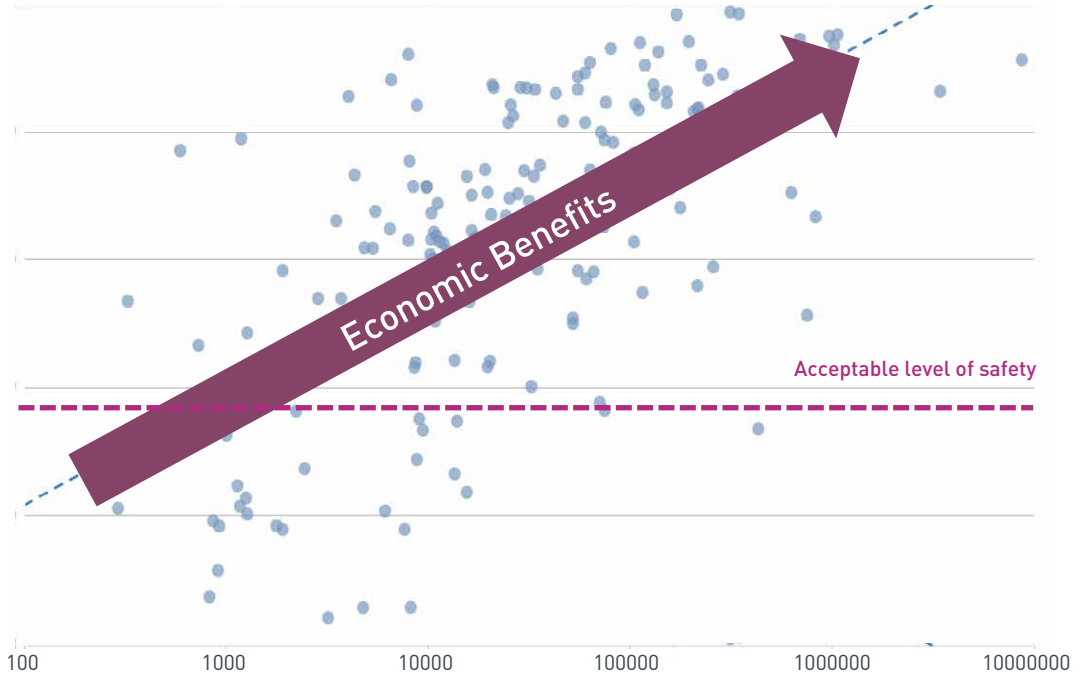


How Safety Affects Air Traffic

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' choices of destinations and airlines. Accidents and incidents 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



Sustainable Air Transport Development

"ICAO is committed to taking all necessary actions to maximize the benefits of aviation in a sustainable manner that is safe, secure, efficient, economically-viable and environmentally responsible; and seek new, innovative, sustainable air transport solutions to accelerate the implementation of the ICAO *No Country Left Behind* (NCLB) initiative and in support of the SDGs of the UN *Transforming our World: 2030 Agenda for Sustainable Development*. Together with all stakeholders, we continue to promote aviation's crucial role through improved air connectivity at the national, regional and international levels in order to ensure that aviation's benefits are maximized for all."

—Dr. Fang Liu, Secretary General, ICAO

In September 2015, world leaders gathered at the UN and adopted the *Transforming our World: 2030 Agenda for Sustainable Development*[62]. This Agenda is a plan of action that aims to achieve sustainable development in areas of critical importance to humanity and the planet, touching upon matters related to economic, social and environmental responsible and durable progress while ensuring that no one is left behind.

The 17 Sustainable Development Goals (SDGs) and 169 targets under the 2030 Agenda can be used as a compass for aligning countries' plans with their global commitments by 2030. Due to the interlinked nature of these goals and targets, a global partnership is required in order to bring together governments, the private sector, civil society, the UN system and other actors to mobilize all available resources in the pursuit of a better and more sustainable future for all.

Attainment of the SDGs relies on advances in sustainable air transport and mobility, 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"*[63].

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. 74.4 per cent of the world's over 7.5 billion people have access to an international airport within 100 kilometres radius[64]. 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 SDGs[65] 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 infrastructure[66].

- **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 links[67].

- **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 CO_2 emissions produced by human activity; international aviation is responsible for approximately 1.3 per cent of global CO_2 emissions[68].

Progress towards the goals needs to be monitored and evaluated by adequate and quality data. The SDGs are backed up by 232 statistical global indicators. 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*[69]. This global indicator helps States to take a data-driven approach to addressing infrastructure gaps through appropriate policy and financing interventions.

National-level progress and challenges on implementation towards the achievement of the SDGs are reported annually by States to the UN High Level Political Forum on Sustainable Development in the form of the Voluntary National Reviews (VNRs). By including aviation within the VNR reporting, States recognize the strong link between aviation and development.

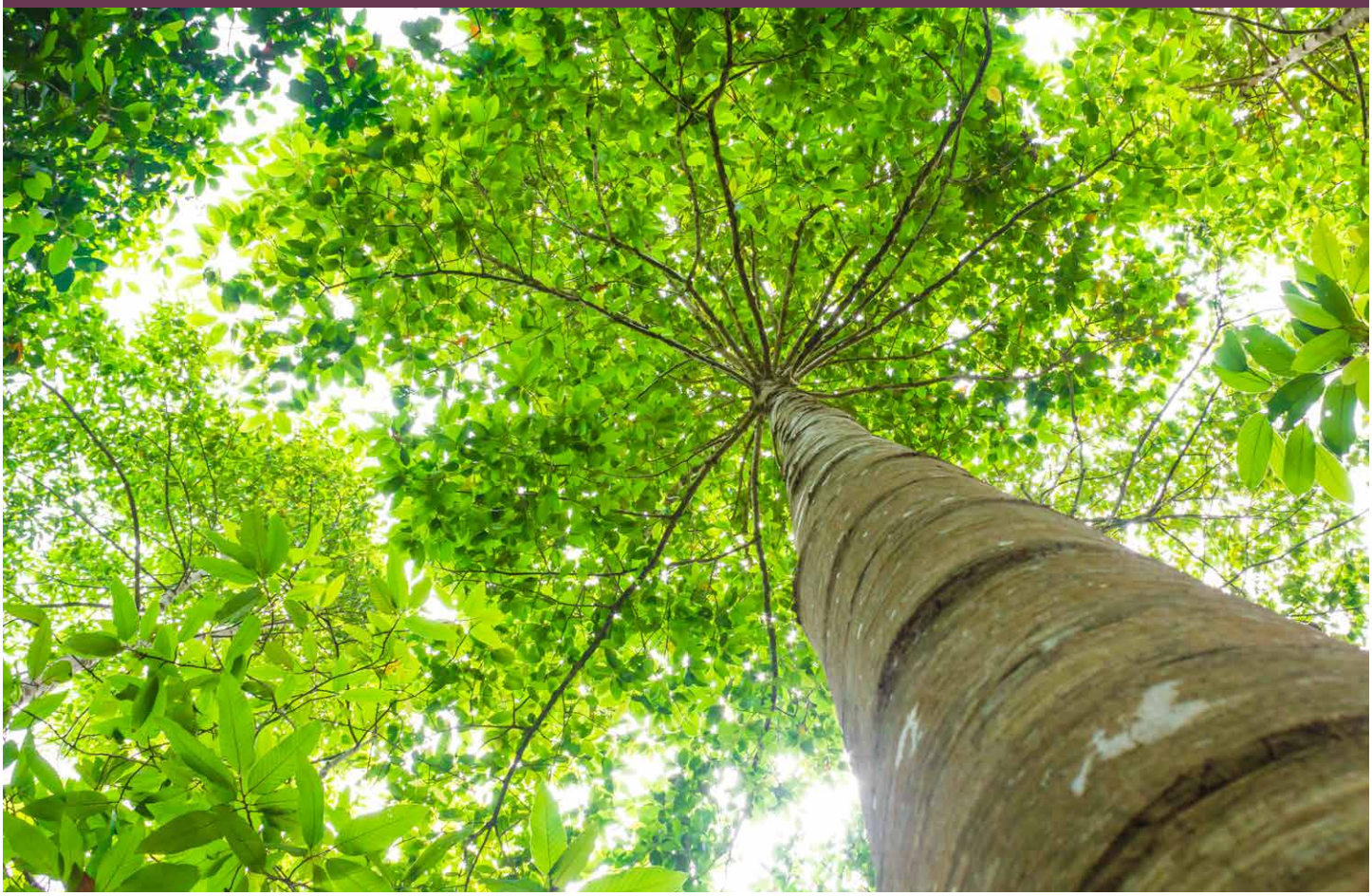
The awareness that aviation serves as the enabler in achieving the SDGs has been consciously raised among States. Between 2016 and 2018, 98 UN Member States submitted a total of 107 VNR reports. Among them, 66 reports included a reference to aviation. The number of reports referencing aviation has more than tripled during this period (from 25% in 2016 to 63% in 2017 and 77% in 2018) with the correspondent increase in the number of States referencing aviation in their reports from five in 2016 to 62 in 2018. A growing number of States also connect aviation to a wider range of SDGs, up from four (SDGs 8, 9, 11 and 16) in 2016 to eight (SDGs 4, 8, 9, 11, 13, 14, 16 and 17) in 2018[70].

Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)

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 CO_2 emissions from international aviation, referred to as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). This agreed scheme is the first GMBM that addresses CO_2 emissions from any industry sector. It complements the many other efforts to mitigate CO_2 emissions, including driving greater innovation in aircraft technologies, more streamlined operational procedures and sustainable aviation fuels.

To accommodate the special circumstances and respective capabilities of States, the implementation of CORSIA 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. As of July 2019, 81 States, representing 76.63 per cent of international aviation activity, intend to voluntarily participate in CORSIA from its outset.



Modernizing Aviation to Maximize its Benefits

"Regardless of ownership model, stakeholders across the industry are in broad agreement that investment in airport infrastructure is critical to the global economy and to global connectivity, especially in achieving the UN SDGs. ACI supports the development of quality airport infrastructure commensurate with the level of projected growth and the interest of the traveling public, and encourages airports to use this common understanding with their regulators, investment banks and aid agencies as they seek to invest in sustainable economic development projects."

—Angela Gittens, Director General, ACI

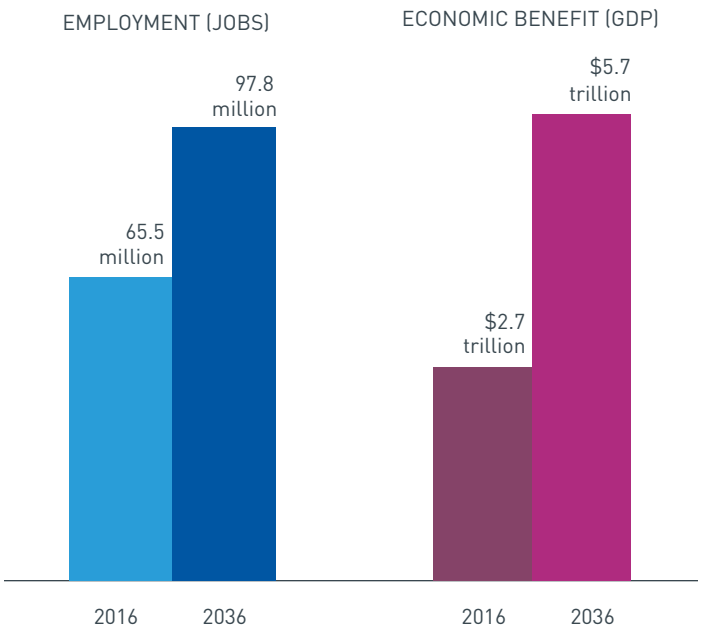
According to ICAO's latest long-term traffic forecasts, both air passenger traffic and air freight traffic are expected to more than double in the next two decades. By 2045, passenger traffic will be over 22 trillion RPKs with a growth of 4.1 per cent per annum, and freight will expand by 3.6 per cent annually over the same time period, reaching 573 billion FTKs[71].

If this projected growth is achieved, then in 2036, aviation will provide a total of 97.8 million jobs and generate a total of USD 5.7 trillion in GDP, a 110 per cent increase from 2016. However, if growth were to slow, the total number of jobs supported by aviation could be 12 million lower by 2036 than the base forecasts, and the contribution of aviation to world GDP would be USD 820 billion (2016 prices) lower, with an additional USD 390 billion lost through lower tourism activity[72].

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 2030[73]. 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

Total aviation global employment and GDP impact: history and forecast[74]

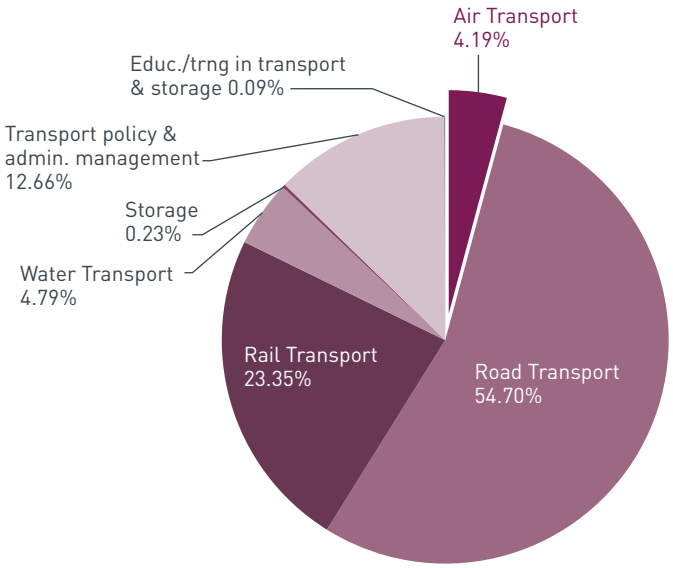


reliability; and, at the same time, maintain public confidence that aviation is safe, secure and environmentally responsible.

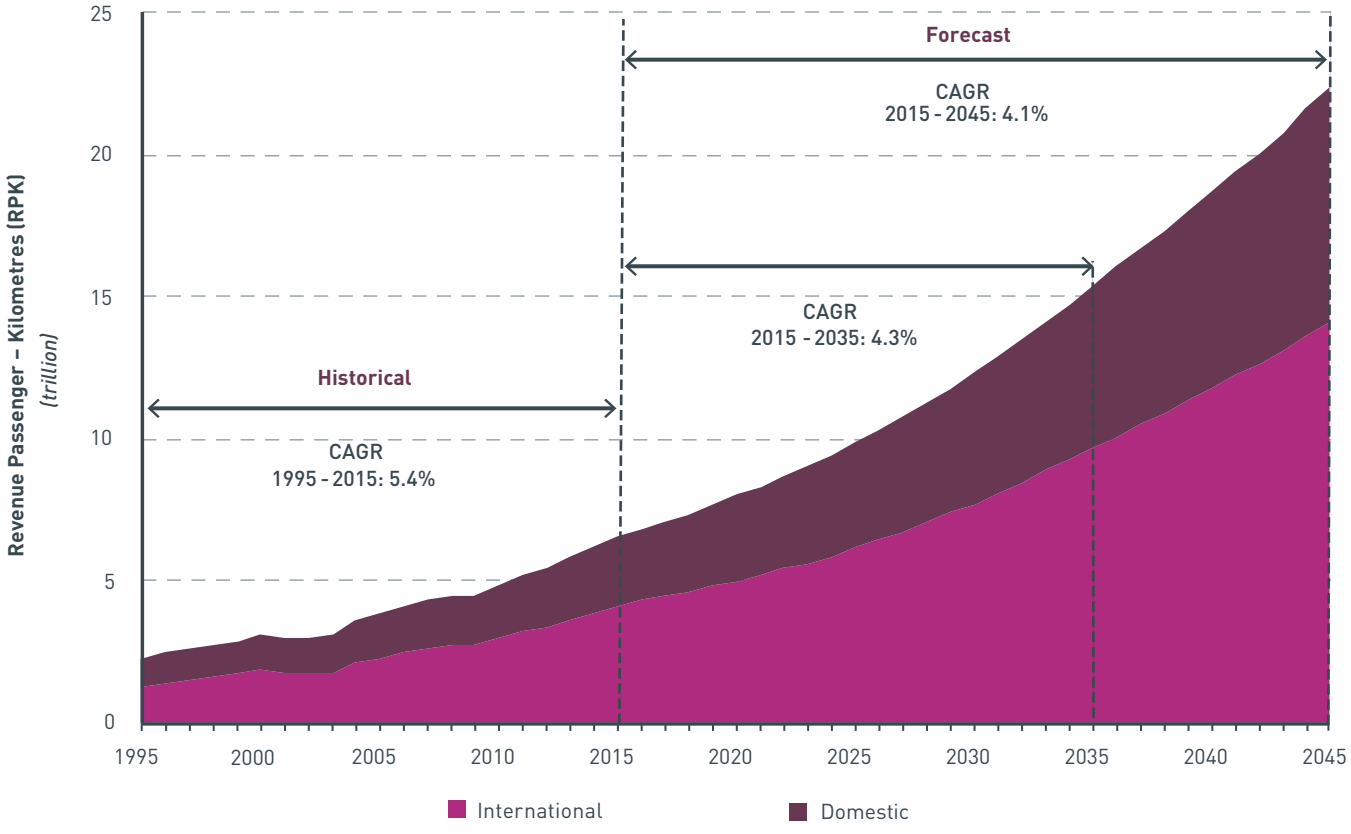
Although aviation's socio-economic benefits, its cross-cutting nature and multiple links to other economic sectors are widely recognized, this has rarely translated into the level of investment which is necessary to truly derive these benefits. It is noteworthy that air transport received a mere 4.2 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 billion[75].

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, as well as other revenue sources. In addition, airlines and their customers are forecast to generate USD 136 billion in tax revenues in 2018, which is equivalent to 45 per cent of the industry's GVA (firm-level equivalent to GDP) [78],

ODA donors contribution to transport sector 2005 – 2013[76]



Total passenger traffic: history and forecast[77]



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 (PPPs) and various incentive schemes. Where private capital is required, appropriate and targeted oversight delivering the right incentives needs to be put in place to guarantee capital injection into much needed infrastructure while safeguarding consumer interests and increasing efficiency in the use of infrastructure. Such policy decisions will not only affect an infrastructure operator's bottom line but also the overall services and choices that are offered to the travelling public.

Airport Development and Expansion

Airports welcome future growth prospects, but the investment needed outpaces the investment planned. According to the G20's Global Infrastructure Outlook, a sample of the airport investment plans in 50 countries alone totals approximately USD 356 billion in the 2018 to 2022 period to meet the global traffic demand at 10.7 billion passengers by 2022. However, their actual investment needs are more than USD 433 billion, creating a gap of USD 78 billion[79].

There is no one-size fits all approach to ownership in the airport industry. A range of ownership and operation models can meet the investment requirements, and the options of airport ownership need to be properly assessed to help governments selecting the best solution. The type of ownership, and any participation of private capital, varies from airport to airport depending on local circumstances and government objectives. Many States find themselves in a predicament where a surge in air transport demand is outstripping the infrastructure available to accommodate growing markets in their jurisdictions.

Globally, airport privatization has become an important investment vehicle for the development of airport infrastructure to accommodate air service demand, contribute to community and national economic vitality, and enhance the customer passenger experience. It has been applied globally in major aviation markets, including Europe, Australia, Brazil, China and India. Airports with private sector participation account for an estimated 14 per cent of airports worldwide, handling over 40 per cent of global traffic and investing 44 per cent of global capital expenditure to develop both the aeronautical and non-aeronautical sides of the business[80].

Airport development projects are very large in scope and have a long time horizon from planning to completion. They also usually have multiple adjustments to the original plan along the way to ensure that cost-efficient facilities balance capacity with demand while delivering the functionality, levels of service and operational efficiency required to support the investments being made. This requires strong collaboration among a wide variety of stakeholders.

The key consideration is whether value is created both for investors, relative to overall airport costs, and for passengers, airlines 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 stellar customer experiences, which can be best achieved by aligning the airport strategy with passenger needs and adopting an airline business strategy to strive for continuous and effective service improvements.

In addition, through their community outreach efforts, airports continue to foster closer links to local residents and neighbourhoods, on which their license to operate and grow depends. 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. Many of the world's busiest airport operators have become important environmental stewards as they contribute to reducing carbon emissions as they invest in their infrastructure. This is closely aligned with the UN SDGs, especially Goal 9 "Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation."

Integrated Transport Planning

The work of the UN Secretary-General's High-Level Advisory Group on Sustainable Transport (2016)[81] and the Global Sustainable Transport Conference (Ashgabat, 2016)[82] highlighted the need to integrate all sustainable transport planning efforts with 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 making aviation, urban and last-mile transportation more seamless, efficient and affordable.

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 possible[83].

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

It is vital that air traffic management (ATM) is upgraded and modernized in the face of dramatic traffic growth projections and the pressing need for more determined and effective climate related stewardship. In many regions of the world, mid-20th century technology is still being used to direct air

New Experience Travel Technologies (NEXTT)

NEXTT is a joint IATA and ACI initiative that defines a vision for the future of air transport that seeks to improve efficiency, customer experience and operational effectiveness by leveraging the latest technology and innovative processes. The NEXTT vision examines the elements that will likely transform the complete end-to-end journey over the next 20 years. Planning ahead for the seamless, multimodal door-to-door journey of the future, the focus is on three emerging concepts:

- off-airport activities – flexibility in what can happen before and beyond the airport;
- advance processing – increasing use of digital identity management, automation and robotics; and
- interactive decision making – linking everything together and using predictive modelling and AI to optimize operations with trusted, real-time data.

NEXTT includes partnerships with airlines, airports, service providers, and manufacturers to learn from individual concepts and trials, and to identify ways to integrate systems and improve operations in the most secure, effective and sustainable manner. It will help to identify areas where best practices can be defined, where further research is needed, and where regulatory development is required.

Source: ACI and IATA

traffic, with aircraft needing to zig-zag between ground-based radar posts throughout their journey. Technology can help ATM be more efficient, resulting in increased airspace capacity with the reduction of congestion and delays, improvement in safety, and reduction in aviation's environmental impact.

Satellite-based surveillance and tracking of aircraft, for example, will enable surveillance in oceanic and remote areas not currently covered and allow the safe reduction of separation distances between aircraft. Automation in ATM will also enable planes to fly closer together safely and increase capacity. By using an array of new navigational technologies and procedures, which are collectively referred to as performance-based navigation (PBN), aircraft can follow an optimised, more direct route with greater accuracy. PBN relies on global navigation satellite systems and computerized on-board systems rather than conventional ground-based navigation aids.

Investment in ATM infrastructure requires a long-term planning horizon, considering the long lead-times for procuring new equipment such as air traffic control centers and the latest surveillance equipment. It is the role of States to ensure that improvements to ATM infrastructure are properly financed in collaboration with airports, airlines and air navigation services providers.

In Europe, a collaborative project is underway called Single European Sky Air Traffic Management Research (SESAR), which is part of the vision to consolidate fragmented European airspace into a single zone. Single European Sky will enable far more efficient routing for civil aircraft, resulting in a 12 per cent reduction in environmental impact alone through savings of between 8 and 14 minutes of flight time, 300 to 500 kilograms of fuel, and 948 to 1,576 kilograms of CO_2 per flight. The implementation of the SESAR project requires a total investment of € 3.7 billion from 2008 to 2024[84].

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-1[85]. 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 2030[86].

The *ICAO Global Air Navigation Plan* (GANP)[87] 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

Remote Tower Revolutionizes Air Traffic Control

In a small airport, air traffic control accounts for 30 to 40 per cent of its operating costs. Digitisation of air traffic control towers provides one of the solutions to reduce operating costs without any loss of service or reduction in safety. Örnsköldsvik Airport in northern Sweden is the world's first airport with remote air traffic control. Since April 2015, air traffic services to and from the airport has been controlled from a remote tower in Sundsvall, 150 km away from the airport. This technology is much cheaper than building a tower; all that is needed are a series of cameras and sensors to record what is happening instead. A data network is used to digitally transfer images and data to Sundsvall. The data traffic can take several routes to ensure that the data arrives even if an interruption occurs.

Developing countries can leapfrog to these latest, cheaper technologies to keep remote aerodromes open and viable, and buy surveillance "as a service" from a satellite-based surveillance supplier, rather than building costly air traffic control towers, radar and other ground-based infrastructure. Economies of scale also exist, with air traffic control at one central tower managing multiple airports.

Source: LSV, SaaB and CANSO

Humanitarian Drone Corridor in Malawi

In July 2017, the Government of Malawi and the UN Children's Fund (UNICEF) launched the first "drone testing corridor" to test potential humanitarian use of drones. This initiative aims to help the poorest and hardest-to-reach communities access aid and information, as well as support immediate search and rescue efforts. The drone corridor covers a 40-kilometre perimeter around Kasungu Aerodrome in central Malawi, with a maximum altitude of 500 metres for drone flights. It is a testing ground for the application of drone technology for transport uses, imagery, and data transmission. Seven entities were vetted to operate drones in the corridor, including companies, universities and non-profits under the condition that they share their findings. One collaborative effort by the participating stakeholders, for instance, resulted in the first long-distance flight of a drone charged with two separate tasks: delivering medical supplies to remote areas and mapping road quality, flooding and housing density. All findings on drone use that come from the trial programme are shared with the Malawi authorities, providing policy makers with cutting edge insights that allow them to keep pace with fast-changing drone technology.

Source: UNICEF and ITF-OECD

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

The last decade has witnessed an acceleration in technological innovation such as the "mobility revolution" and the "sharing economy" which created disruptive effects on the market and people's daily lives. In the air transport sector, just as in any other area of modern society, new technologies bring about new ideas, promises, expectations, ambitions and dreams.

Today's aerospace and aircraft manufacturing industry seeks to produce more efficient aircraft which safely accommodate increasing demand for the long term. 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.

Civil aerospace manufacturers are research and development (R&D) intensive, spending an estimated USD 15 billion each year on R&D globally[88]. For example, Canadian aerospace manufacturers generated close to 30 per cent of overall Canadian manufacturing R&D and the industry was five times as R&D intensive (16%) as the manufacturing industry average[89].

The outlook for growth is very strong, with Airbus and Boeing predicting demand for about 40,000 airliners in the next twenty years, worth around $6 trillion. The Asia-Pacific region is expected to make up about half of this demand.

Source: ICCAIA

Aviation's focus on technological innovation generates consequential benefits for wider society. The benefits to society of R&D 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 year[90]. Aerospace also drives the development of technologies that can be used in other sectors.

While substantial R&D expenses continued to be needed in the aerospace industry, some of the new technologies can involve relatively low development costs, allowing small and medium-sized "start-ups" to be on the forefront of digitalization and automation in transport. The application of blockchain, IoT, AI, machine learning, big data analytics, and 3D printing, just to name a few, are poised to revolutionize the way business operates. Regardless of breakthrough inventions or simply small-scale, incremental improvements, financial and regulatory frameworks should adapt to the new reality as the process of innovation progresses from research to uptake.

Use Fintech to Make Aviation More Accessible

Radical, technology-driven innovation is commonly associated with the developed economies of the "Global North". In the "Global South", i.e. low- and middle-income countries in Asia, Africa, Latin America and the Caribbean, technologies born out of need in the Global North have not been blindly adopted. Rather, they are reconfigured, remodelled and reshaped into new transport solutions.

One of the examples is a "mobile payment" system to buy airline tickets. Mobile payment requires some sort of "e-wallet" function on a smart phone, which can then be charged with actual money and used to purchase information, services or goods. In Africa and the Middle East, over 61 per cent of the population is excluded from traditional financial services but mobile phone subscriptions are ubiquitous. There are over 172 million active mobile money account owners across the Global South. Offering a mobile payment option to people who have no bank account, therefore, can make air travel more accessible to residents of the Global South.

In 2010, Ethiopian Airlines began to offer the option to buy air travel tickets through mobile payment systems in Kenya, Nigeria, Uganda and Ghana. Subsequently, this option has become available in Ethiopia and Zimbabwe; and a partnership with China's AliPay enabled Ethiopian Airlines to reach its Chinese customers in the same way. Some European airlines also started to experiment with mobile payment for in-flight services after realizing that 65 per cent of the 100 million Chinese tourists travelling abroad every year use mobile payment. Mobile payment can generate new business models for urban mobility in the Global North such as the pay-as-you-go model and ride-sourcing platforms.

Source: Expanding Innovation Horizons, 2019, ITF-OECD

Leading Aviation for a Better Future

"In order to accommodate innovation in aviation and ATM systems in particular, it is important to recognize ATM as a pillar of air transport and invest in its infrastructure accordingly. Good regulatory practices are also essential; there is no 'one size fits all' solution for ATM regulation. Different stages of evolution amongst regulators as well as specific air traffic scenarios, require tailored solutions. States with a well-evolved (albeit prescriptive) regulatory regime, would benefit from moving to performance-based regulation (PBR) and the adoption of Better Regulation principles. Those at an earlier stage of development need to work on improving their oversight capabilities. Achieving this requires support for capacity building initiatives that are both innovative and effective."

—Simon Hocquard, Director General, CANSO

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 development[91].

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 2036, aviation will provide 97.8 million jobs and generate USD 5.7 trillion in GDP, a 110 per cent increase from 2016. By any measure, these numbers are impressive. However, if growth were to slow due to restrictive trade, immigration, political factors and increasing fuel price, the total number of jobs supported by the air transport sector (including air transport supported tourism) could be 12 million lower by 2036 than the base forecasts. In this scenario, the contribution of the air transport sector to world GDP would be USD 860 billion (2016 prices) lower, with an additional USD 390 billion lost through lower tourism activity[92].

Can we say that the current air transport system is sustainable? The answer is not yet. 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.

Air transport suffers from a fragmented regulatory system, which has proven its value in the past but needs to be profoundly adapted to 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. They should be formulated with an aspirational goal of "access to air

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.

transport for all people, to transport them to their destinations in minimum time, with maximum satisfaction and minimum costs". 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 CO_2 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 the environmental integrity that 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, a regulatory approach should be transparent and consistent over the long term, reflect the new playing field and help facilitate the closing of the infrastructure gap. 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;

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

- 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.

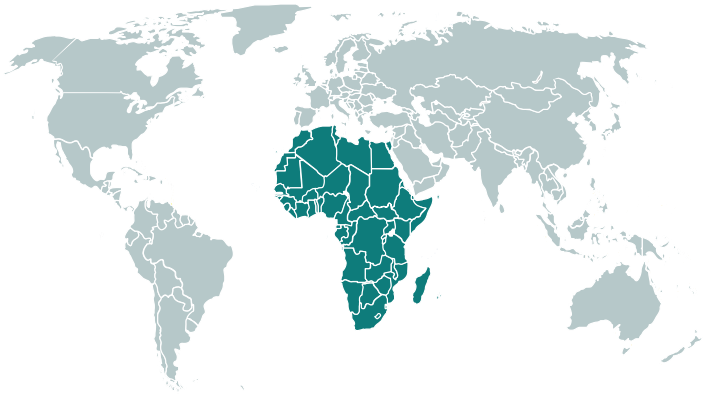
- ✔ **Economic Development Planning** → Mainstream the priorities of the aviation sector in States' economic development planning so that aviation can be used as an economic development driver.
- ✔ **Air Transport Regulatory Framework** → Establish and apply good governance for air transport, i.e. the 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)) of the region improved in recent years and has been faster than the world average pace. The load factors achieved by African airlines, however, have 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).



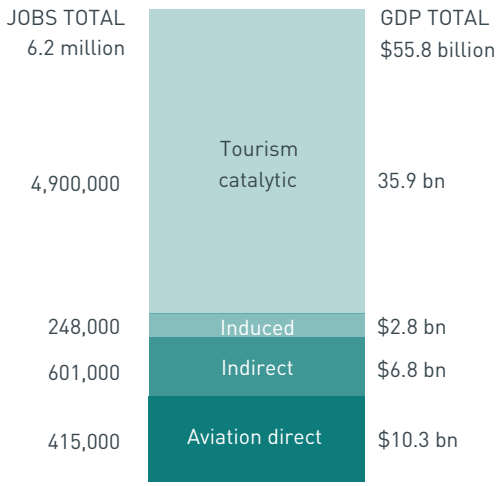
Benefits of Aviation[93]

Air transport supports 6.2 million jobs and USD 55.8 billion in gross domestic product (GDP) in Africa.

Every person directly employed in the aviation sector and in tourism made possible by aviation supported another 14.8 jobs elsewhere in Africa. Similarly, USD 5.4 of economic activity was supported elsewhere in Africa for every USD 1 of gross value added (GVA) directly created by the air transport sector. The aviation sector in Africa directly employed over 415,000 people in 2016.

Besides the USD 10.3 billion of direct impact in GDP, the sector impact reaches further through African economies. The effect of the procurement of goods and services through the supply chain has an impact of USD 6.8 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 2.8 billion of economic impact. Direct, indirect and induced, in total, contribute USD 19.9 billion to the African GDP. In addition, the spending by foreign tourists arriving by air in the region accounts for USD 35.9 billion of the total economic impact.

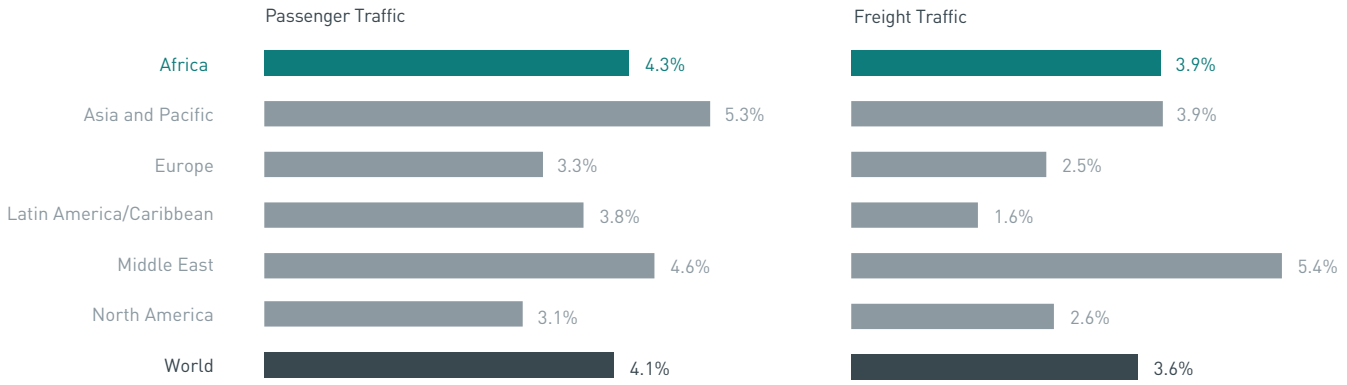
Total jobs and GDP supported by aviation in Africa, 2016



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 4.3 per cent annually up to 2045, slightly faster than world total growth. Similarly, for freight traffic, the region is

Projected annual growth of total passenger and freight traffic by region up to 2045



projected to grow faster than the world average, at 3.9 per cent annually for the same period[94].

This increase will, in turn, drive growth in the economic output and jobs that are supported by air transport in the next decade. By 2036, it is forecasted that the impact of air transport and the tourism it facilitates in Africa will have grown to support 9.8 million jobs (60 per cent more than in 2016) and a USD 159 billion contribution to GDP (an increase of 184 per cent)[95].

Challenges

The first and most obvious pre-condition to realizing aviation's benefits and, consequently, supporting the attainment of the AU Agenda 2063 is to improve the effective implementation of ICAO's global standards and policies. 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 quality 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 (AU Development Agency – NEPAD), including the Move Africa initiative. Of the over 50 projects under the PIDA, no more than three projects involve civil aviation, despite the prediction that 17 airports on the African continent will be saturated by 2020[96].

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. For States with limited access to investment finance, therefore, it is critical to include major aviation infrastructure projects in the priority list of international public finance and assistance.

The shortage of financial resources, in turn, is partly attributed to the uncertainty of local markets. While a variety of tools, resources and agreements for undertaking the necessary reforms already exist, they do not translate easily to reality. 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. As at July 2019, 28 African States committed to implementing the Single African Air Transport Market (SAATM) established in the framework of the Yamoussoukro Decision.

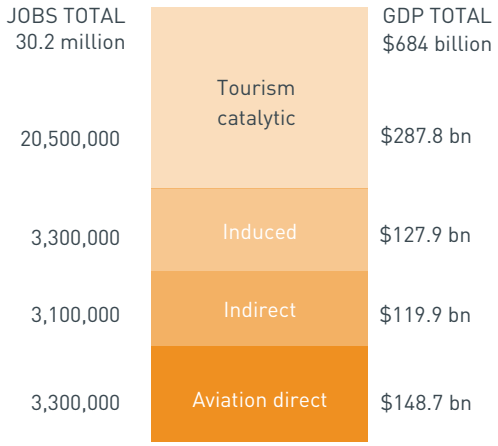
In the region, skills shortages are also posing a considerable short-term obstacle to growth, with a lack of adequately trained pilots, air traffic controllers, engineers, as well as tourism industry personnel. Africa needs more and better trained personnel to meet not only current requirements but also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

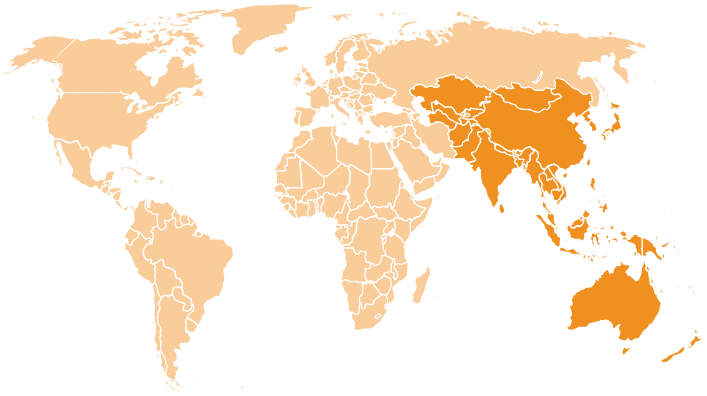
ASIA AND PACIFIC

In recent decades, Asia and Pacific has emerged as a centre of growth in aviation, and has consistently recorded faster passenger traffic growth than the world average pace since 2009. In 2010, Asia and Pacific overtook North America and became the world's largest region in terms of RPKs. Today, more than one third of worldwide RPKs are performed by airlines registered in the region. Five out of the top twenty countries in terms of international tourism by number of arrivals are located in Asia and Pacific. The region also carries the largest share of freight traffic with 38 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 has 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, 2016





Benefits of Aviation[97]

Air transport supports 30.2 million jobs and USD 684 billion in GDP in Asia and Pacific.

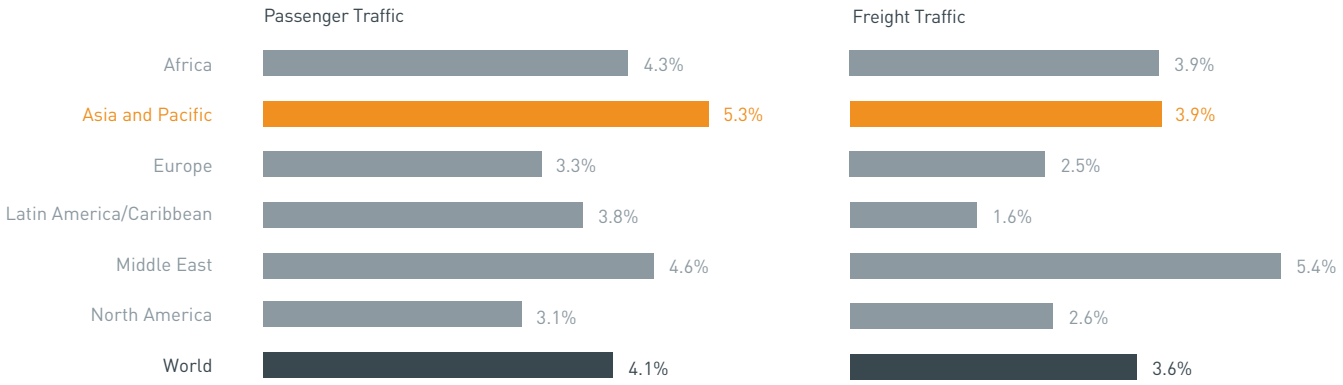
Every person directly employed in the aviation sector and in tourism made possible by aviation supported another nine jobs elsewhere in Asia and Pacific. Similarly, USD 4.6 of economic activity was supported elsewhere in Asia and Pacific for every USD 1 of GVA directly created by the air transport sector. The aviation sector in Asia and Pacific directly employed 3.3 million people in 2016.

Besides the USD 148.7 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 119.9 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 127.9 billion of economic impact. Direct, indirect and induced, in total, contribute USD 396.5 billion to the Asia and Pacific GDP. In addition, the spending of foreign tourists arriving by air in the region accounts for USD 287.8 billion of the total economic impact.

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. The increasing population and expanding middle class will also contribute to the surge in air travel demand. 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

Projected annual growth of total passenger and freight traffic by region up to 2045



rate of 5.3 per cent up to 2045. For freight traffic, the region is projected to grow 3.9 per cent annually for the same period as passenger traffic, the second highest growth rate among all regions[98].

This increase will, in turn, drive growth in the economic output and jobs that are supported by air transport in the next decade. By 2036, it is forecasted that the impact of air transport and the tourism it facilitates in Asia and Pacific will have grown to support 44 million jobs (46 per cent more than in 2016) and a USD 1.7 trillion contribution to GDP (an increase of 151 per cent)[99].

Challenges

Being the engine of global growth, Asia and Pacific faces challenges during this phase of aviation development. In particular, it is proving difficult to make aviation infrastructure improvements in the region fast enough to keep pace with the accelerated growth in demand. Among the world top 25 busiest airports by passenger numbers in 2018, ten are from Asia and Pacific and their traffic levels continue to increase[100]. Although some major hubs in the region are moving forward with robust expansion plans, many are already operating above their planned capacity, resulting in an escalation of delays. In addition, due to airport capacity constraints, it is estimated that in 2030 around 33 per cent of traffic at the region's 22 busiest airports will be lost or redirected to less attractive airports[101].

Massive investment is required to close infrastructure gaps and to adequately maintain and upgrade infrastructure already in place. The investment needs for airport expansion and construction in the region are estimated at USD 6.51 billion per year to 2020[102].

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 region[103]. To attract investors, the legal and regulatory framework needs to be improved in terms of transparency and certainty.

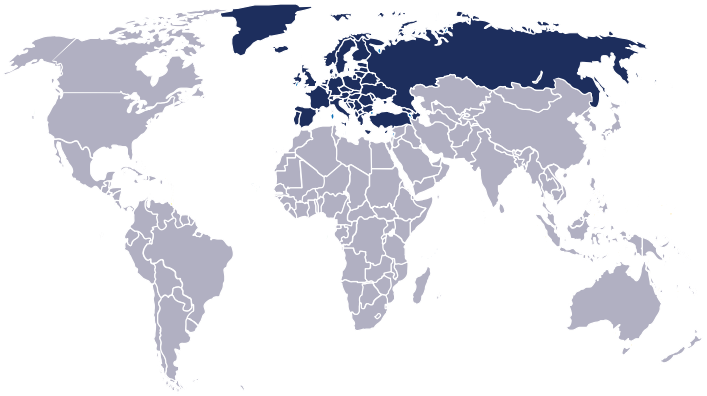
The projected expansion of the aviation sector in the region will also bring the need for effective regulatory oversight that keeps pace with this growth, as well as the recruitment and training of the necessary skilled manpower. The most likely scenario is that airlines in the Asia and Pacific region will need to train an average of 12,249 new pilots, 2,537 new air traffic controllers, 14,779 new maintenance technicians and 20,142 new cabin crews a year until 2037[104].

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 countries[105].

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, almost 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

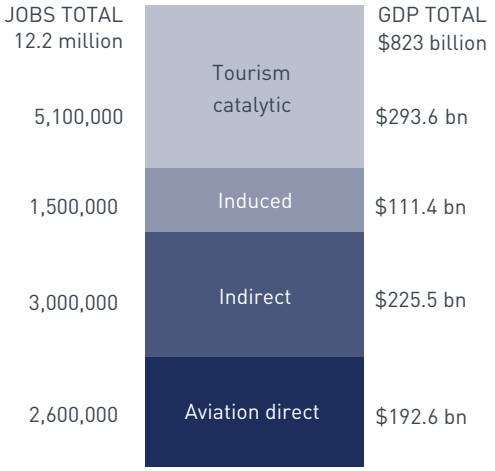
Air transport supports 12.2 million jobs and USD 823 billion in GDP in Europe[106].

Every person directly employed in the aviation sector and in tourism made possible by aviation supported another 4.7 jobs elsewhere in Europe. Similarly, USD 4.3 of economic activity was supported elsewhere in Europe for every USD 1 of GVA directly created by the air transport sector. The aviation sector in Europe directly employed 2.6 million people in 2016[107].

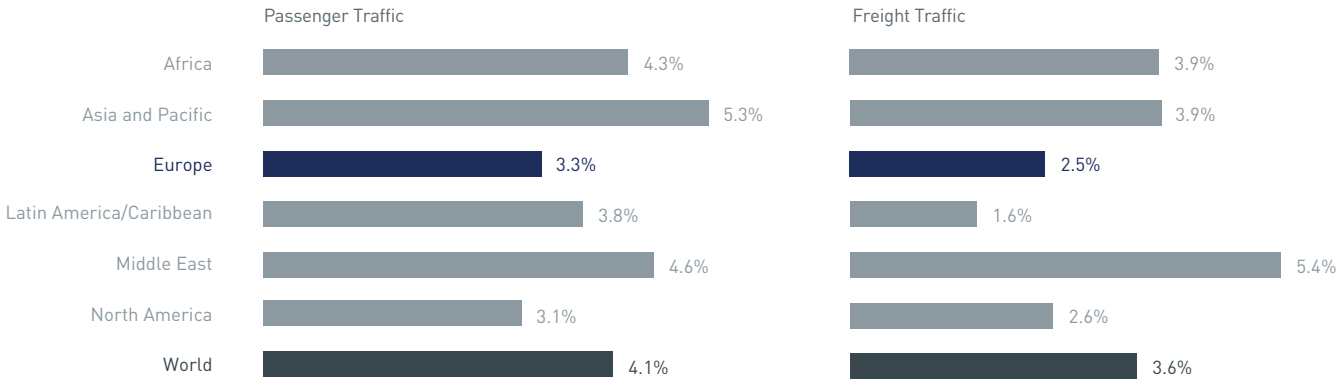
Besides the USD 192.6 billion of direct impact in GDP, the sector impact reaches further through European economies. The effect of the procurement of goods and services through the supply chain has an impact of USD 225.5 billion. The benefits that arise when employees of the industry and its supply chain spend their wages in the local consumer economy account for another USD 111.4 billion of economic impact. Direct, indirect and induced, in total, contribute USD 529.5 billion to the GDP in Europe. In addition, the spending of foreign tourists arriving by air in the region accounts for USD 293.6 billion of the total economic impact[108].

According to the estimate by the ACI-Europe study[109], European airports directly contributed to the employment 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.

Total jobs and GDP supported by aviation in Europe, 2016



Projected annual growth of total passenger and freight traffic by region up to 2045



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, the growth of both passenger traffic and freight traffic of Europe are expected to be the second slowest among all regions, at 3.3 per cent and 2.5 per cent annually up to 2045, respectively[110].

This increase will, in turn, drive growth in the economic output and jobs that are supported by air transport in the next decade. By 2036, it is forecasted that the impact of air transport and the tourism it facilitates in Europe will have grown to support 18 million jobs (49 per cent more than in 2016) and a USD 1.6 trillion contribution to GDP (an increase of 90 per cent)[111].

Challenges

The restrictions of infrastructure development across the continent are leading to capacity shortfalls. Many airports in the region are already operating at close to capacity with the network becoming increasingly congested and less resilient, resulting in more delays, less efficient trajectories and a much-degraded passenger experience. The average en-route delay increased by 94.7 per cent in 2018, compared to a year ago. During the summer period, nearly half a million passengers per day are delayed by one to two hours. Delivering ongoing airport capacity plans is a challenge; and by 2040 there will be a demand for 1.5 million flights more than can be accommodated, with between 16 and 28 airports operating at maximum capacity[112].

The economic impact associated with the gap between capacity and demand is estimated to be USD 103 billion (€ 88.1 billion) in GDP in 2040, 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 sector[113].

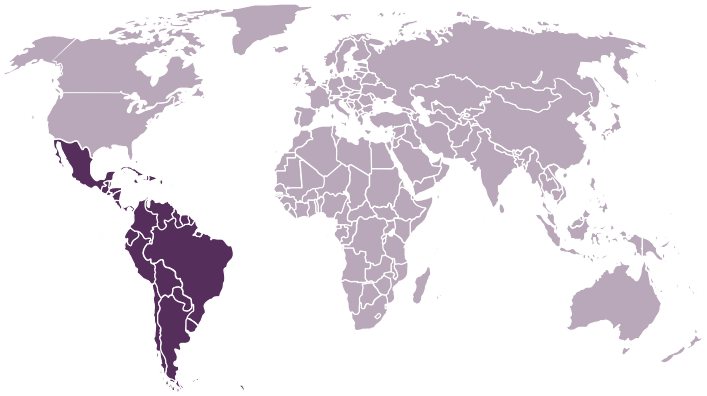
Slower growth is a threat to aviation's long-term ability to provide mobility in the region. For example, competition with hubs in the Middle East region for connecting traffic between West and East will result in slower growth of transferring passengers at European hubs on the long-haul traffic flows. Capability to continually improve cost efficiency will be restrained in a market with slower rates of growth[114].

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 faster[115].

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.

Air traffic in Latin America and the Caribbean has been affected by political and economic developments in key economies of the region in recent years. Solid growth in passenger traffic was observed in 2018 at a slightly faster pace than the world average.



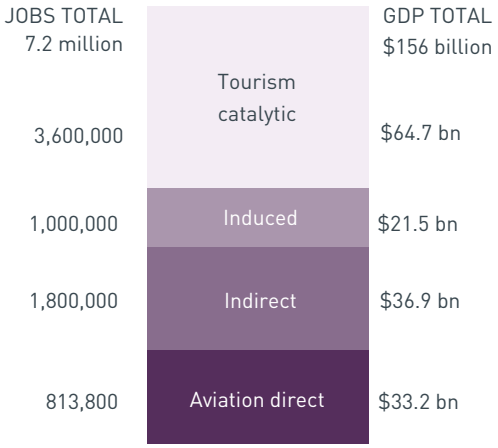
Benefits of Aviation[116]

Air transport supports 7.2 million jobs and USD 156 billion in GDP in Latin America and the Caribbean.

Every person directly employed in the aviation sector and in tourism made possible by aviation supported another 8.8 jobs elsewhere in Latin American and the Caribbean. Similarly, USD 4.7 of economic activity was supported elsewhere in Latin America and the Caribbean for every USD 1 of GVA directly created by the air transport sector. The aviation sector in Latin America and the Caribbean directly employed 813,800 people in 2016.

Besides the USD 33.2 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 36.9 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 21.5 billion. Direct, indirect and induced, in total, contribute USD 91.6 billion to the GDP in Latin America and the Caribbean. In addition, the spending of foreign tourists arriving by air in the region accounts for USD 64.7 billion of the total economic impact.

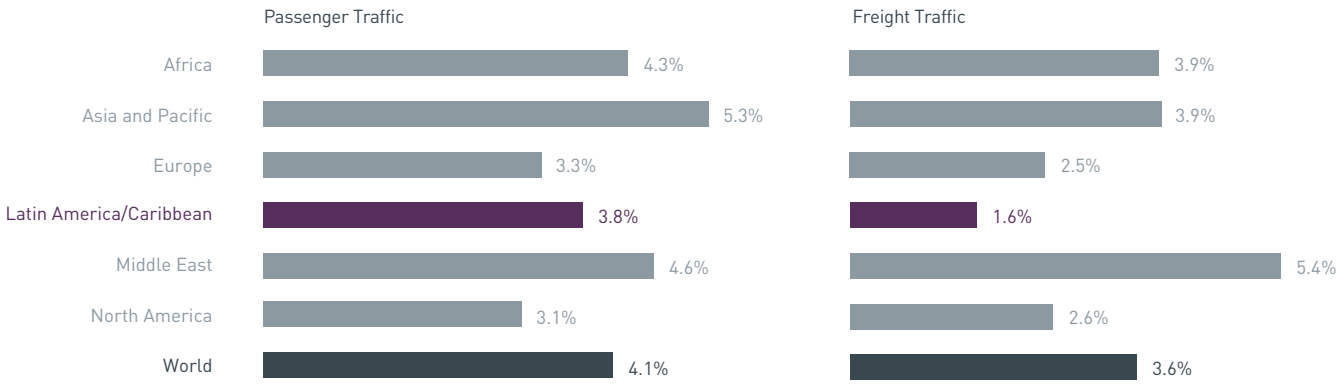
Total jobs and GDP supported by aviation in Latin America/Caribbean, 2016



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 3.8 per cent annually up to 2045, slower than world total growth. For freight traffic, the region

Projected annual growth of total passenger and freight traffic by region up to 2045



is projected to grow 1.6 per cent annually for the same period as passenger traffic, the slowest pace among all regions[117].

This increase will, in turn, drive growth in the economic output and jobs that are supported by air transport in the next decade. By 2036, it is forecasted that the impact of air transport and the tourism it facilitates in Latin America/Caribbean will have grown to support 11 million jobs (54 per cent more than in 2016) and a USD 353 billion contribution to GDP (an increase of 126 per cent)[118].

Challenges

Notable challenges are restricting traffic growth in the Latin America and the Caribbean such as insufficient infrastructure and air traffic management, excessive costs and taxation.

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 average[119]. 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 1,819 new pilots, 571 new air traffic controllers, 2,237 new maintenance technicians and 2,836 new cabin crews a year until 2037[120].

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 region[121], 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 cent[122].

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 taxation[123] 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 word 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.

The Middle East had been the fastest growing region for passenger and cargo traffic since 2011, and airlines in this region had posted annual double-digit passenger traffic growth since 2012. After years of being the focus of growth, traffic in the region suddenly started to move sideways in 2017, and moderated to the slowest growing region in 2018, lagging behind others.

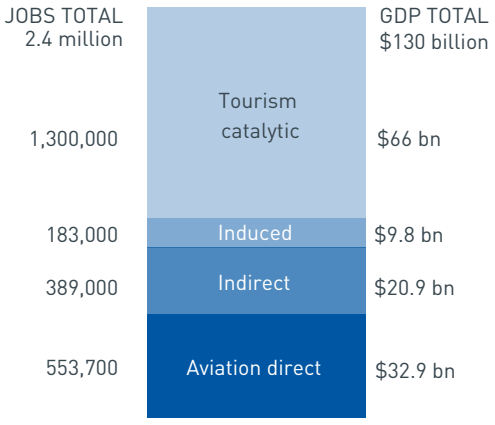
Benefits of Aviation[124]

Air transport supports 2.4 million jobs and USD 130 billion in GDP in the Middle East.

Every person directly employed in the aviation sector and in tourism made possible by aviation supported another 4.3 jobs elsewhere in the Middle East. Similarly, USD 3.9 of economic activity was supported elsewhere in the Middle East for every USD 1 of GVA directly created by the air transport sector. The aviation sector in the Middle East directly employed 553,700 people in 2016.

Besides the USD 32.9 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 20.9 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 9.8 billion. Direct, indirect and induced, in total, contribute USD 63.6 billion to the GDP in the Middle East. In addition, the spending of foreign tourists arriving by air in the region accounts for USD 66 billion of the total economic impact.

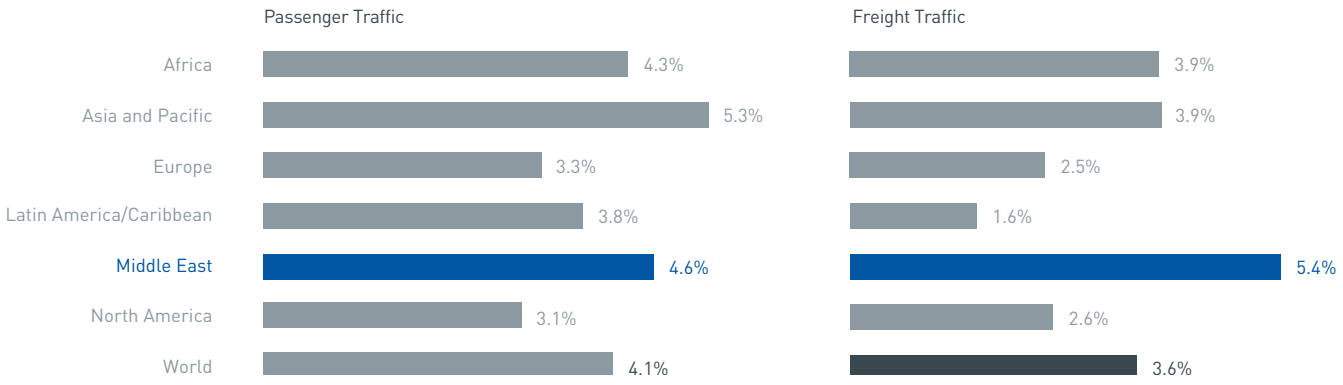
Total jobs and GDP supported by aviation in the Middle East, 2016



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 4.6 per cent annually up to 2045, the second fastest growth among all regions after Asia and Pacific. The Middle East is expected to be the fastest growing

Projected annual growth of total passenger and freight traffic by region up to 2045



region in terms of freight traffic growth, and is projected to grow at 5.4 per cent annually up to 2045[125].

This increase will, in turn, drive growth in the economic output and jobs that are supported by air transport in the next decade. By 2036, it is forecasted that the impact of air transport and the tourism it facilitates in the Middle East will have grown to support 4.3 million jobs (78 per cent more than in 2016) and a USD 345 billion contribution to GDP (an increase of 166 per cent)[126].

Challenges

The Middle East has to contend with situations unique to the region such as fluctuating oil revenues, regional conflict and overcrowded air space. In addition, airlines in this region are now facing challenges to their business models, i.e. hub-and-spoke operation using large-capacity aircraft, which relies heavily on connecting passenger traffic (70 to 80% share of their total traffic)[127].

The growth of air transport requires a high-performing aviation system including airlines, airports and ATM. 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 projects[128].

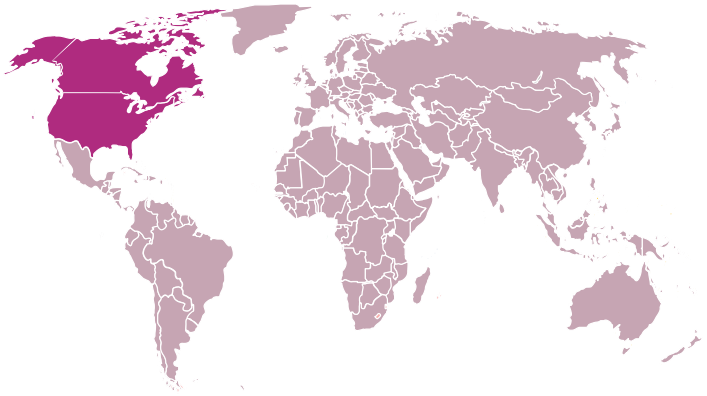
This region is in need of political commitment to market liberalization. Although the Middle East is home to some of the world's largest hub airports, the relations between States are still mostly bound by bilateral air services agreements that limit market access to each other. The Agreement on Liberalization 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 agreements[129].

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 2,235 new pilots, 203 new air traffic controllers, 2,388 new maintenance technicians and 4,672 new cabin crews a year up till 2037[130].

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, growth of passenger and cargo traffic has been steady and slower than the world average since 2011 while load factor has been higher. Although the region ranked first in total RPKs in 2007, it now ranks third. Nevertheless, airlines in the region generated around half of the total industry net profits since 2015.

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

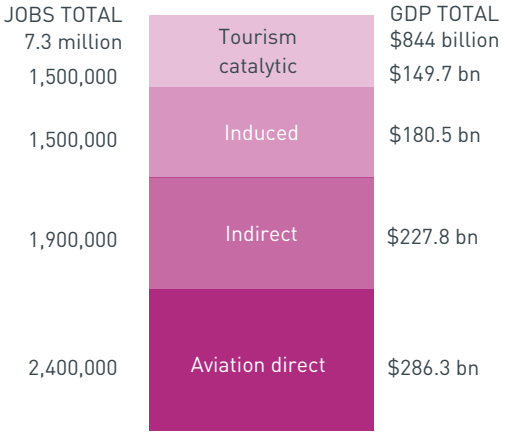
Air transport supports 7.3 million jobs and USD 844 billion in GDP in North America[131].

Every person directly employed in the aviation sector and in tourism made possible by aviation supported another three jobs elsewhere in North America. Similarly, USD 2.9 of economic activity was supported elsewhere in North America for every USD 1 of GVA directly created by the air transport sector. The aviation sector in North America directly employed 2.4 million people in 2016[132].

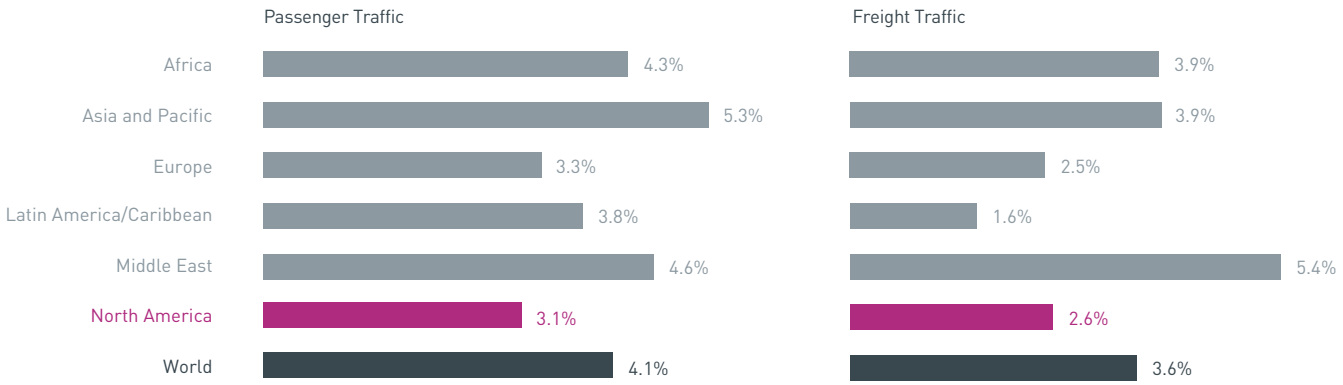
Besides the USD 286.3 billion of direct impact in GDP, the sector impact reaches further through North American economies. The effect of the procurement of goods and services through the supply chain has an impact of USD 227.8 billion. The benefits that arise when employees of the industry and its supply chain spend their wages in the local consumer economy account for another USD 180.5 billion. Direct, indirect and induced, in total, contribute USD 694.6 billion to the GDP in North America. In addition, the spending of foreign tourists arriving by air in the region accounts for USD 149.7 billion of the total economic impact[133].

According to the estimate by the Federal Aviation Administration of the United States[134], civil aviation (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.

Total jobs and GDP supported by aviation in North America, 2016



Projected annual growth of total passenger and freight traffic by region up to 2045



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 3.1 per cent annually up to 2045, the slowest pace among all regions. For freight traffic, the region is projected to grow more slowly than the world total at 2.6 per cent annually for the same period as passenger traffic[135].

This increase will, in turn, drive growth in the economic output and jobs that are supported by air transport in the next decade. By 2036, it is forecasted that the impact of air transport and the tourism it facilitates in North America will have grown to support 10.4 million jobs (42 per cent more than in 2016) and a USD 1.5 trillion contribution to GDP (an increase of 80 per cent)[136].

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 alone[137].

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 billion[138]. However, there are potential issues related to NextGen implementation. For example, delays and cost increases in individual programmes that were initiated prior to NextGen and, upon which NextGen is dependent, could affect the timelines and goals for NextGen implementation[139].

The need for more skilled manpower to support aviation development is also a challenge. According to ICAO forecasts, North America will need to train an average of 4,679 new pilots, 643 new air traffic controllers, 5,842 new maintenance technicians and 7,244 new cabin crews a year up to 2037[140].

Historically, the aerospace industry has been the preeminent and preferred destination for the types of talent the industry needed most, such as aerospace, mechanical and electrical engineers. However, as the skill mix required by the aerospace industry shifts in response to technological progress, there will be intense resource competition with other industries that may be more enticing for the types of talent that the aerospace industry is looking to attract (for example, data scientists and computer scientists). The aerospace industry will need to refine its approach to recruiting, incentives, career progression and more to make the industry attractive to a different talent pool, for whom the industry may not be the default choice[141].

LDCs, LLDCs and SIDS

Least Developed Countries (LDCs) represent the poorest and weakest segment of the international community. These 47 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 goods[142].

Landlocked Developing Countries (LLDCs) are developing countries that are landlocked. These 32 States (17 are classified also as LDCs) 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 counties 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 numbers carried by airlines in LLDCs more than doubled from 20.0 million in 2010 to 42.5 million in 2018, compared to the world average of 60 per cent increase during the same period. However, passenger traffic in LLDCs represents merely a 1 per cent share of the world's passenger volume. Freight volume of LLDCs increased from 340.6 thousand tonnes in 2010 to 566.5 thousand tonnes in 2018 while accounting for just 0.98 per cent of global freight volume. Similar trends hold for passenger numbers of LDCs, which doubled from 18.1 million in 2010 to 37.8 million in 2018[143].

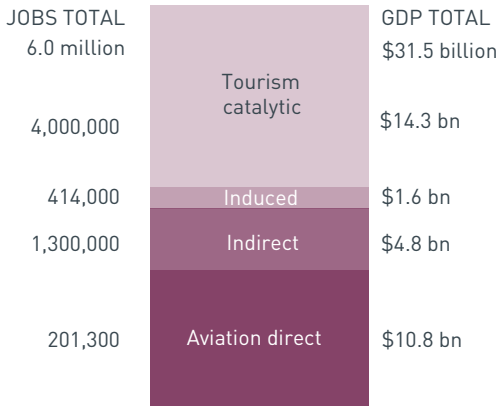
Benefits of Aviation: (LDCs)[144]

Air transport supports 6.0 million jobs and USD 31.5 billion in GDP in LDCs.

Every person directly employed in the aviation sector and in tourism made possible by aviation supported another 29.6 jobs elsewhere in LDCs. Similarly, USD 2.9 of economic activity was supported elsewhere in LDCs for every USD 1 of GVA directly created by the air transport sector. The aviation sector in LDCs directly employed 201,300 people in 2016.

Besides the USD 10.8 billion of direct impact in GDP, the sector impact reaches further through the LDCs economies. The effect of the procurement of goods and services through the supply chain has an impact of USD 4.8 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 1.6 billion. Direct, indirect and induced, in total, contribute USD 17.2 billion to the GDP in LDCs. In addition, the spending of foreign tourists arriving by air in the LDCs accounts for USD 14.3 billion of the total economic impact.

Total jobs and GDP supported by aviation in LDCs, 2016



Outlook (LDCs)

According to ICAO's long-term traffic forecasts, total passenger traffic of LDCs is expected to grow by around 5.0 per cent annually up to 2045, faster than total world growth[145].

This increase will, in turn, drive growth in the economic output and jobs that are supported by air transport in the next decade. By 2036, it is forecasted that the impact of air transport and the tourism it facilitates in LDCs will have grown to support 8.7 million jobs (46 per cent more than in 2016) and a USD 88.2 billion contribution to GDP (an increase of 180 per cent) [146].

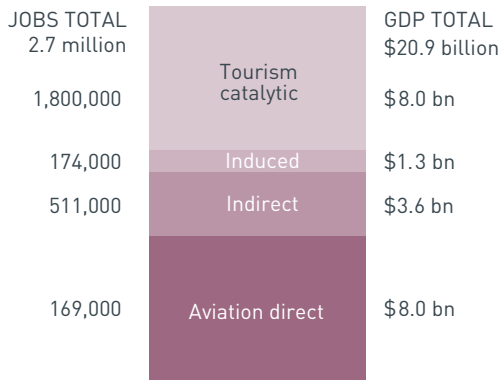
Benefits of Aviation (LLDCs)[147]

Air transport supports 2.7 million jobs and USD 20.9 billion in GDP in LLDCs.

Every person directly employed in the aviation sector and in tourism made possible by aviation supported another 16 jobs elsewhere in LLDCs. Similarly, USD 2.6 of economic activity was supported elsewhere in LLDCs for every USD 1 of GVA directly created by the air transport sector. The aviation sector in LLDCs directly employed 169,100 people in 2016.

Besides the USD 8.0 billion of direct impact in GDP, the sector impact reaches further through the LLDCs economies. The effect of the procurement of goods and services through the supply chain has an impact of USD 3.6 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 1.3 billion. Direct, indirect and induced, in total, contribute USD 12.9 billion to the GDP in LLDCs. In addition, the spending of foreign tourists arriving by air in the LLDCs accounts for USD 8.0 billion of the total economic impact.

Total jobs and GDP supported by aviation in LLDCs, 2016



Outlook (LLDCs)

According to ICAO's long-term traffic forecasts, total passenger traffic of LLDCs is expected to grow by around 5.0 per cent annually up to 2045, faster than total world growth[148].

This increase will, in turn, drive growth in the economic output and jobs that are supported by air transport in the next decade. By 2036, it is forecasted that the impact of air transport and the tourism it facilitates in LLDCs will have grown to support 3.6 million jobs (33 per cent more than in 2016) and a USD 54.7 billion contribution to GDP (an increase of 162 per cent)[149].

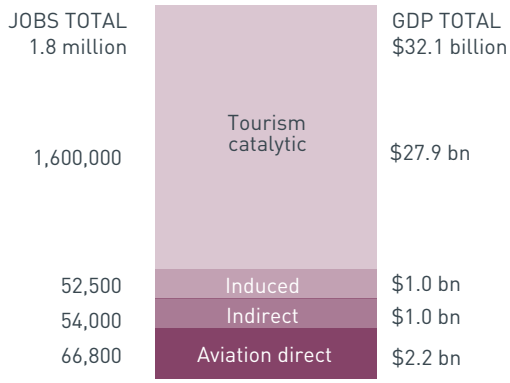
Benefits of Aviation (SIDS)[150]

Air transport supports 1.8 million jobs and USD 32.1 billion in GDP in SIDS.

Every person directly employed in the aviation sector and in tourism made possible by aviation supported another 26.3 jobs elsewhere in SIDS. Similarly, USD 14.6 of economic activity was supported elsewhere in SIDS for every USD 1 of GVA directly created by the air transport sector. The aviation sector in SIDS directly employed 66,800 people in 2016.

Besides the USD 2.2 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 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 billion. Direct, indirect and induced, in total, contribute USD 4.2 billion to the GDP in SIDS. In addition, the spending of foreign tourists arriving by air in SIDS accounts for USD 27.9 billion of the total economic impact.

Total jobs and GDP supported by aviation in SIDS, 2016



Outlook (SIDS)

Given the long distance from the main tourist-generating markets, foreign tourists mainly travel and arrive by air. According to ICAO's long-term traffic forecasts, total passenger traffic of SIDS is expected to grow by around 4.8 per cent annually up to 2045, faster than total world growth, due mainly to rapid urbanization, population growth and tourism development[151].

This increase will, in turn, drive growth in the economic output and jobs that are supported by air transport in the next decade. By 2036, it is forecasted that the impact of air transport and the tourism it facilitates in SIDS will have grown to support 2.4 million jobs (39 per cent more than in 2016) and a USD 74 billion contribution to GDP (an increase of 129 per cent)[152].

Challenges

Most airports in LDCs, LLDCs and SIDS receive only a limited number of flights a week, and the costs of air travel are disproportionally 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 transformation[153].

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 cent[154]. 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 sectors[155].

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