



CHALLENGE.
CREATE.
OUTPERFORM.

MARKET OUTLOOK 2021



MARKET OUTLOOK 2021

For A Different World 3
Executive Summary 4
Global Trends 7

Africa 12
CIS 15
China & Asia Pacific 18
Europe 24
Latin America 27
Middle East 30
North America 33
Extra Chapter: Cargo Market Outlook 37

FOR A DIFFERENT WORLD

“THE MIND THAT OPENS TO A NEW IDEA NEVER RETURNS TO ITS ORIGINAL SIZE”

There is light at the end of the pandemic tunnel. People all over the world are anxious to remove their masks, meet their friends, take a safe, deep breath, and return to normality. Yet, after all this time, the concept of “normal” may have changed quite a bit. Could we, or should we, ever go back to live as we did until 2019? Was Einstein right when he famously said, “The mind that opens to a new idea never returns to its original size”? How does aviation fit into this new reality, and how is it different from the previous reality?

Covid changed the way people see the world. It changed how they work, how they buy, how they trade, how they commute, where they live, how they express love and interact with others and, as a consequence, what they value. And they value time, particularly time well spent. Demand for air travel reflects that. The pandemic hit hard. Because of it, our industry will be smaller, more resilient, and focused on sustainability, connectivity, and profitability. The fallout from the pandemic has shown, once

again, that our philosophy of matching the right aircraft size with market demand is always the most efficient way to plan your fleet. The sub 150-seat segment was instrumental in speeding industry recovery throughout 2020. Airlines that flew these aircraft discovered the power of their versatility as they struggled to maintain service. This is not a temporary thing. It's an example of Einstein's

“minds opening to a new idea.” I believe this shows that commercial aviation is always evolving. I invite you to review this Market Outlook 2021 and discover why the sub 150-seat segment and the concept of rightsizing are now more essential than ever in shaping the new normal.



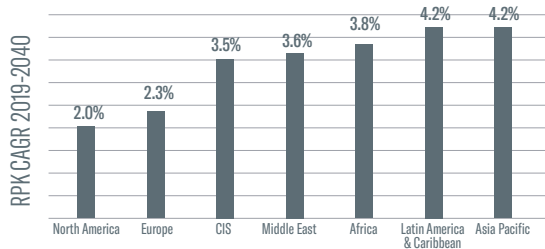
Arjan Meijer
President & CEO
Embraer Commercial Aviation

EXECUTIVE SUMMARY

AIR TRANSPORT DEMAND FORECAST: RPK GROWTH RATES BY REGION

World passenger traffic is expected to grow at an average annual rate of 3.3% (CAGR) between its pre-COVID level at the end of 2019 and 2040. Although slightly more optimistic than our previous forecast which only covered ten years, the rate is still a notable deceleration compared to pre-COVID growth rates for the next two decades. We expect global RPKs to return to 2019 levels in 2024, a result of an extended pandemic recovery period and from expected changes in industry dynamics. Over the next 20 years, Asia Pacific (including China) and Latin America will have the strongest growth rates, both increasing their RPKs by 4.2% annually. This will be followed by Africa (3.8%), the Middle East (3.6%), CIS (3.5%), Europe (2.3%) and North America (2.0%).

WORLDWIDE AIR TRANSPORT DEMAND GROWTH: 2019-2040



Source: Embraer

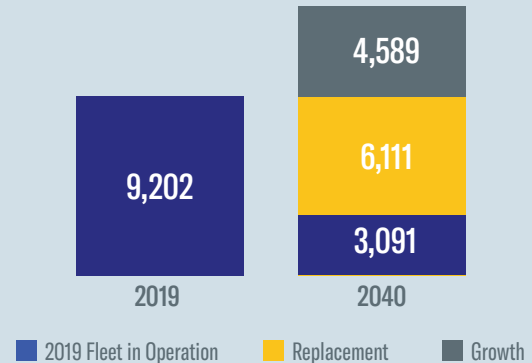
World RPKs will reach 17 trillion by 2040. Asia Pacific will be the largest market by then, with 41% of global traffic. Combined, Europe and North America will generate 36% of total air transport demand.

THE UP TO 150-SEAT MARKET

Embraer foresees world demand for 10,900 new aircraft with up to 150-seats over the next 20 years with a market value of US\$ 650 billion. Replacement of ageing aircraft will account for 57% of all new deliveries while 43% will be used to grow markets.

UPTO 150-SEAT FLEET PROFILE

#Aircraft in Operation

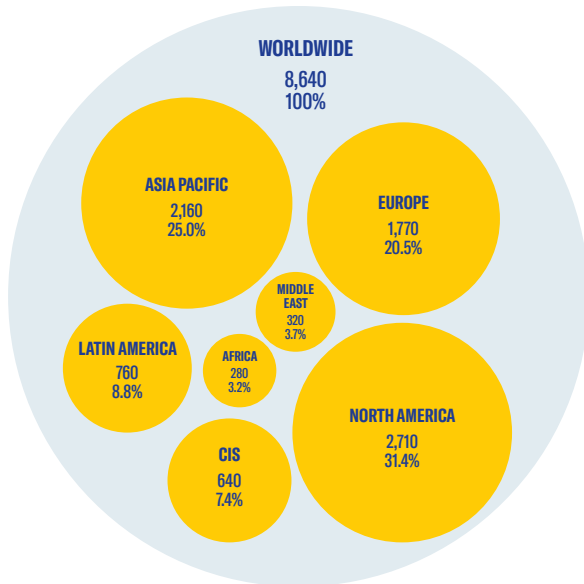


Source: Embraer

THE JET SEGMENT

Overall lower demand growth, traffic patterns favoring short-haul versus long-haul, and increasing need for flexibility, connectivity, and efficiency will drive worldwide demand for 8,640 up to 150-seat capacity jets. Of these, 42% will support market growth and 58% will replace ageing aircraft.

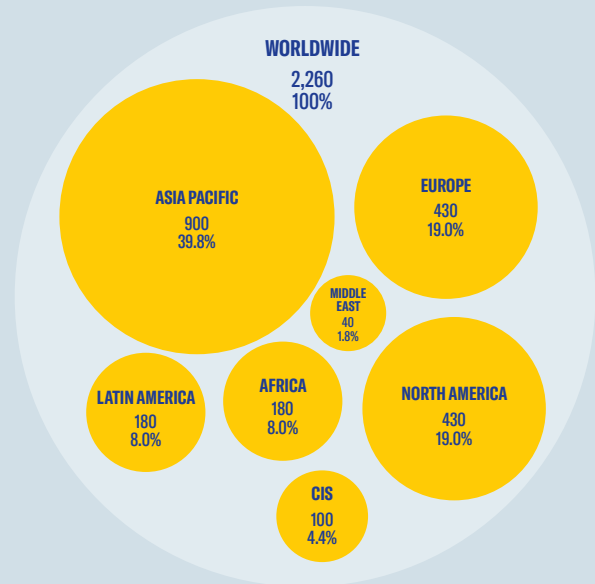
JETS UPTO 150 - NEW DELIVERIES / SHARE OF TOTAL



THE TURBOPROP SEGMENT

Short-haul operations will drive worldwide demand for 2,260 turboprops, mostly focused in Asia Pacific, Europe, and North America.

TP- NEW DELIVERIES / SHARE OF TOTAL





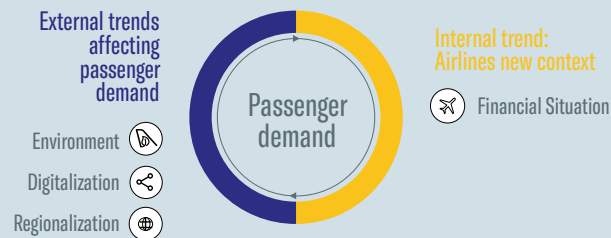
CHALLENGE.
CREATE.
OUTPERFORM.

GLOBAL TRENDS

The world is changing. The pandemic shattered all long-term expectations for the industry. Ongoing inequities in national inoculation rates and travel restrictions are prolonging recovery time. The impact is profound. It is transforming the way we live, the way we consume products and services, and the way we communicate. People are more mindful of their choices. Entire industries and companies are reviewing their future paths to be on par with new demand patterns.

At the same time, many airlines are still struggling to survive. Domestic markets are recovering with some consistency yet international travel is still restricted and flight schedules remain disrupted. The pre-pandemic environment was already fragile. Even though demand was strong, margins were decreasing. As airlines emerge on the other side of the crisis, they will need to focus on building a solid foundation to be able to thrive in the coming years. The crisis will show, once again, that companies that have flexibility to adapt will be the ones most likely to prosper.

There are three structural changes under way which are affecting all aspects of society. An additional one is intrinsic to air transportation. These affect passengers and, consequently, every airline in the world.



1a) The Environmental Agenda

The move to green is gaining momentum. The consequences of climate change are now more visible. Awareness is higher than ever. The need to reduce the impact of human activity has become a priority for people, governments, and industry. Companies are factoring environmental responsibility in their future strategies. Equally, the aviation industry is focusing on setting goals and taking actions to reduce emissions.

Organizations, such as ICAO and ATAG, have established goals to substantially lower the industry emissions by 2050 with targets that are in line with the Paris Agreement. Airlines, airports, OEMs, and suppliers are establishing their own targets. Some of these are even more aggressive, including Embraer's, which is working toward net zero emissions by the same date. Achieving those decarbonization goals requires actions that will impact the aviation industry.

Disruptive propulsion technologies are not yet available. They will likely be implemented on regional aircraft platforms before seeing wider applications on larger jets. Until then, the focus will be on using Sustainable Aviation Fuel (SAF) and improving operational efficiency. SAF will need to be competitive since jet fuel taxation and CO₂ offsets will raise cost and impede growth.

Subsidies could be an option to reduce the price gap, but production scale will still create a barrier until there is price parity. Maximizing efficiency will be essential to increasing load factors and margins, and reducing emissions.

The environmental agenda includes other aspects, namely over-tourism. In some parts of the world, local communities are pushing back against mass tourism that is negatively impacting natural resources and historical sites. The rise in the number of low-budget

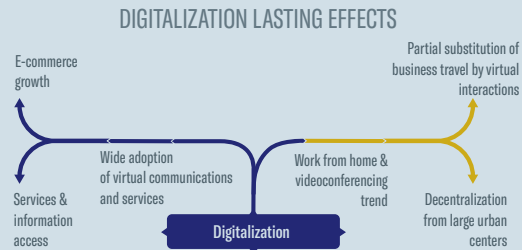
travelers on cut-price holidays often generates few economic benefits.

As travelers become more conscious of their environmental footprint, this may give rise to a future trend to visiting more exclusive destinations where the impact is less.

1b) Digitalization

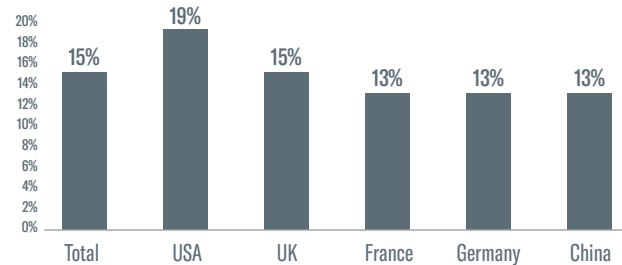
Advances in technology change the way we work, shop, consume services, information, and entertainment, and interact with others. The pandemic continues to be disruptive and, as with most global catastrophic events, is accelerating the mainstream adoption of behaviors and habits.

Two of these trends - use of videoconferencing apps and work-from-home - are related to digitalization, directly impacting demand for and patterns of air transport.



Between 15% and 20% of business travel is estimated to be replaced by virtual interaction through video conferencing. The need for face-to-face meetings will never disappear although the frequency of business travel for internal meetings and training will decline.

% OF BUSINESS TRAVELS THAT HAS BEEN SUCCESSFULLY TRANSFERRED TO VIDEO CONFERENCING TECHNOLOGY



Source: UBS, Evidence Lab (May 2021)

Although people travelling for business represent 12%-15% of the number of passengers flown, they typically generate double the revenue of non-business travelers. They pay higher ticket prices because their higher value of time prioritizes flexibility, schedules, flight frequency, and seat availability. Airlines will continue to offer these product fundamentals to ensure contribution from their high-yield customers.

Work-from-home is impacting the demand for air travel. Because they can work productively offsite, employees are relocating from big urban centers where their companies are based to outlying areas that offer a better quality of life. The switch is already happening. The population of London is expected to decline this year for the first time in the 21st century. The Government of Australia's most recent Migration Report states that "net migration has shifted in favor of regional areas during COVID-19."

As populations are less concentrated, air transport will need to adapt to connect these consumers as efficiently as possible.

1c) Regionalization

Multinationals are being challenged to change their manufacturing and development strategies to better deliver value to customers while maintaining or reducing costs. They are also working to insulate themselves from further shocks by re-shoring or near-shoring. These concepts bring production closer to home to minimize the risks associated with supply chain disruption.

The trend emerged shortly after the 2009 economic crisis. Then, companies were rethinking their offshoring strategies because of the decreasing labor cost gap between countries, which made overseas operations less attractive.

Since 2014, over 300 companies, from small business to multinationals, either fully or partially re-shored or near-shored their manufacturing operations. New flows of commerce created from China to the USA and Southern Asia, from Africa to Europe, and even between European countries impact the way people are traveling and the types of aircraft airlines will need as the trend continues.

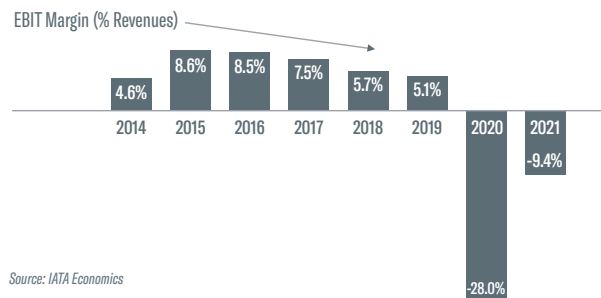
2) Aviation Industry - Internal Aspects

Beyond these broad forces influencing society and industry, financing will shape future strategies for the world's airlines. The pandemic devastated commercial aviation. It was hit harder than most other sectors of global business and industry.

The financial situation at airlines is still dire yet the pandemic itself is not solely responsible for the industry's precarious situation. Profitability and margins were already structural issues before the crisis; they were only exacerbated by the pandemic. For example,

the EBIT margin of world airlines was already declining consistently year after year since the middle of the last decade. Corrective action would have been necessary anyway. The pandemic simply made the numbers worse.

EXISTING STRUCTURAL ISSUES EXACERBATED BY THE CRISIS PROFITABILITY AS A RECURRING ISSUE



Airline debt levels increased significantly during the crisis. Carriers will need to rebuild their flight schedules quickly to generate more revenue and profits. Aircraft up to 150 seats have always been instrumental in helping airlines navigate weak-demand periods. Before the pandemic, markets that employed small regional jets and crossover aircraft delivered consistently higher yields than those dominated by the larger narrowbodies. Even during prosperous times, RJs and crossover jets produce higher margins.

Airline strategies today were built in a world that no longer exists. With debt at record levels, pursuing aggressive growth at the expense of margin is not sustainable given the long road ahead to recovery. Crossover jets can help improve those margins.

The increased risk associated with airlines' financial situation is forcing banks and lessors to establish more restrictive rules in order for carriers to access liquidity. Customers will need to demonstrate they are more efficient and have robust business plans in order to secure financing for growth and fleet renewal.

Returning to 2019 demand and revenue levels is one goal. It is essential that airlines focus on returning to profitability since retained earnings will ensure their ability to survive and rebuild for the future.

Bottom Line

Passenger traffic will flow differently when volumes eventually return to pre-pandemic levels. Expect demand to be less concentrated as people move away from large cities. Business markets will remain relevant, but smaller. Airlines will need to satisfy the value-of-time needs of their high-yield customers, prioritizing ease of access to a comprehensive network of frequent flights.

The green wave is here. The industry is focused on emissions minimization through efficiency gains and new technologies.

Airlines will change their business strategies from growing at any cost to seeking higher-yield travelers and sustainable profits to expedite recovery. The new focus will ensure they are better positioned to withstand future downturns.

A fleet of right-sized aircraft is vital to rebuilding airline balance sheets. They offer a balance of capacity and demand that produces strong margins. Aircraft in the sub 150-seat segment, like Embraer's family of E-Jets, have never been more important in helping customers and the industry face the challenges of the new, uncertain environment.



AFRICA



/KEY MESSAGES

- Shaping the future: Aviation is still in its infancy – huge opportunity to build a robust, efficient foundation.
- Fundamentals of the region drive move to crossover aircraft: Demand leans towards thinner markets that are better served by smaller aircraft to efficiently increase frequencies, load factors, and yields.
- Foster intra-regional connectivity: Intra-regional connectivity is central to promoting growth but needs the right equipment and political coordination.

ECONOMIC & TRAFFIC GROWTH 2019-2040

GDP	RPK
2.9%	3.8%

NEW DELIVERIES 2021-2040

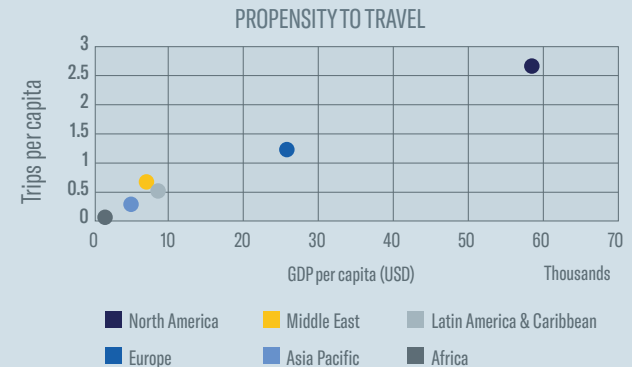
	Up to 150-Seat Jets:	TurboProps:	150-210 Seat NBs:
	280	180	310
2021-2030	120	90	140
2031-2040	160	90	170

FLEET IN SERVICE - UPTO 150

2019:	2040:
573	849

Airline profitability and network connectivity remained elusive at the onset of the pandemic. Slow vaccination rollouts, new lockdowns, ongoing travel restrictions, and overdependence on intercontinental traffic (surpassed only by the Middle East) will impede the speed of industry recovery. Carriers face continued pressure to generate revenue.

Compared to other regions, Africa is still in the early stages of developing its economy and the continent's air transportation system. The propensity to travel is the lowest among world regions yet it also shows the magnitude of untapped potential.



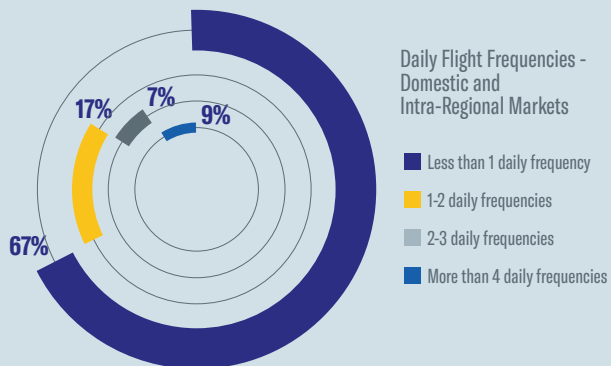
Source: Sabre, IHS Markit

Addressing these issues is a monumental task given the complexity of a multination region. There is an opportunity to rebuild and grow in a post-pandemic environment with initiatives that will require collaboration between governments and between airlines themselves.

Governments should focus on providing the right physical and policy infrastructure. Demand for more nonstop flights will be organic and will lead to further connectivity improvements within Africa, and with key economic partners in Europe, the Middle East, and Asia.

Airline restructuring should address chronic low load factors, declining yields, and market fragility. Some 70% of Africa's domestic and intra-regional markets have less than a single daily frequency. Carrier fleets are more profitable when they are right-sized and versatile. New-generation aircraft will keep airlines compliant with the more restrictive environmental standards of the future.

AFRICA THRIVES FOR CONNECTIVITY



Source: Sabre



Chefchaouen, Morocco

EMBRAER

CHALLENGE.
CREATE.
OUTPERFORM.

CIS



Khiva, Uzbekistan

/KEY MESSAGES

- / COVID driving ongoing trend: Strong domestic demand rebound opens the path for further development of regional markets.
- / Connectivity beyond main hubs: Reduced dependency on Moscow. Subsidies represent good opportunities to promote secondary route connections.
- / Room for efficient growth: Low-cost carriers wanting to enter the market can do it aggressively, efficiently, and flexibly with crossover jets.

ECONOMIC & TRAFFIC GROWTH 2019-2040

GDP	RPK
2.0%	3.5%

NEW DELIVERIES 2021-2040

	Up to 150-Seat Jets:	TurboProps:	150-210 Seat NBs:
	640	100	810
2021-2030	340	50	410
2031-2040	300	50	400

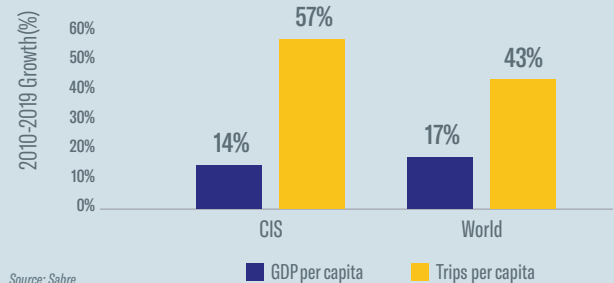
FLEET IN SERVICE - UPTO 150

2019:	2040:
648	940

The Commonwealth of Independent States is leading worldwide domestic demand recovery, matched only by China. While international traffic continues to lag around the globe, domestic traffic has returned to pre-pandemic levels in the CIS. The region's resilience signals a potential for growth, especially for regional aviation.

Despite the CIS's comparatively tepid economic growth rate over the last decade, its growth in the number of trips per capita is high, another sign of the region's untapped potential.

TRAFFIC GROWING ABOVE WHAT ECONOMIC INDICATORS WOULD PREDICT



Source: Sabre

Commercial air travelers in the CIS can travel to/from 230 airports, yet 22% of all domestic and intra-regional markets and around 55% of flights serve the three major Moscow airports. Accordingly, the proportion of secondary hubs or point-to-point flights is small which makes for limited connectivity.

CIS
STRONG DEPENDENCY ON MOSCOW



Source: Sabre

The Russian government is targeting to reduce this dependency on Moscow airports by offering subsidies to connect secondary routes. Low-cost carriers are already starting to tap into the potential of point-to-point routes and secondary hubs. As new post-pandemic trends gain momentum, crossover jets make sense for their low-risk, low-operating costs in new route development.





CHALLENGE.
CREATE.
OUTPERFORM.

CHINA & ASIA PACIFIC

Zhouzhuang, China

/KEY MESSAGES

- Restoring networks and schedules: Focus on domestic markets to weather the uncertainties of international traffic rebound. Rethink the business strategy towards a fleet able to withstand cyclical variations in supply and demand.
- Finding new opportunities and pockets of growth to expand the network: New point-to-point, secondary cities, hub-feeding, regional aviation development. Diversify business & fleet flexibility – “Don’t put all your eggs in one basket.”
- Achieving sustainable and green growth will require aircraft versatility and efficiency regardless of demand.

ECONOMIC & TRAFFIC GROWTH 2019-2040

GDP	RPK
2.9%	4.2%

NEW DELIVERIES 2021-2040

	Up to 150-Seat Jets:	TurboProps:	150-210 Seat NBs:
	2,160	900	6,350
2021-2030	1,130	420	3,120
2031-2040	1,030	480	3,230

FLEET IN SERVICE - UPTO 150

2019:	2040:
1,573	4,473

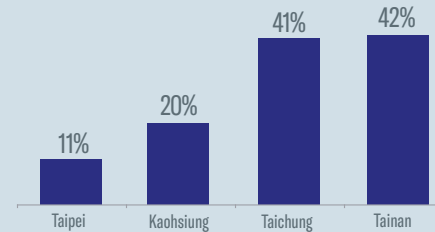
CHALLENGING THE DYNAMICS OF PASSENGER FLOWS

The acquisition of smaller jets is key to establishing greater network connectivity. The aircraft develop regional hubs, provide air travel to secondary cities, and improve the quality of service through more frequencies.

Northeast Asia

Competition for international connecting passengers around Southeast Asia is intense. An effective way to capture a share of them is through well-developed networks with high-frequency flights. Travelers living in or destined to Taiwan, for example, often connect in Hong Kong because it serves more destinations than Taipei.

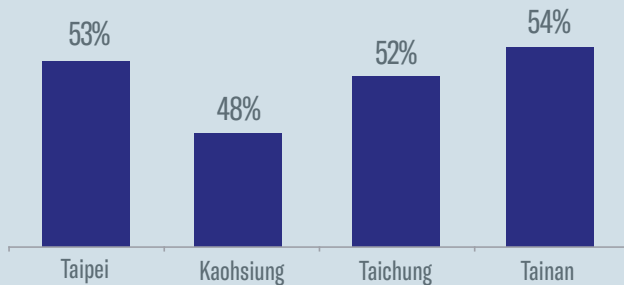
SHARE OF FLIGHTS (%) TO/FROM HKG - REGIONAL AIRPORTS IN TAIWAN



Source: CAA International flights traffic report 2019

About half (52%) of Taiwan-originating travelers connecting in Hong Kong are flying to cities in Mainland China. The top Asian destinations for the other half are Thailand, Vietnam, Japan, Korea, Malaysia, the Philippines, and Indonesia.

SHARE(% OF PASSENGERS TOWARDS CHINA
AFTER STOP-OVER AT HONG KONG



Source: Sabre

Today, passengers in Taiwan can often choose more convenient routings via Hong Kong than via Taipei, and often pay a premium. Taipei has the potential to be a competitive hub if it would offer more frequent flights to more cities. Smaller aircraft are ideal to provide new, low-risk capacity both for international-to-international connections and Taiwan originating and destined passengers.

Amsterdam is a good example of how high-frequency flights with small aircraft serve a vast network that captures a huge share of international connecting traffic. The Netherlands has a smaller population than Taiwan, yet Amsterdam connects more international airline passengers and links more cities than Taipei.

	Population	International Passengers	International Sectors Served	International Daily Departures
Netherlands	17 Million	72 Million	335	660
Taiwan	24 Million	48 Million	180	420
Taiwan network and traffic comparison		-33%	-46%	-36%

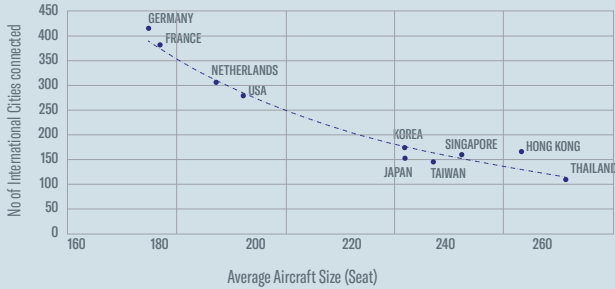
Source: Cirium, Sabre MI, 2019 *SAR are considered international traffic for Taiwan.

Future growth, especially to secondary cities, is often limited at airports that are not served by small-capacity jets. Smaller aircraft can access low and medium-density markets more profitably than larger aircraft. Regional airports attract more passengers when they offer frequent flights that link more cities.

The number of markets that can be served is indirectly proportional to aircraft size. Airports in Germany and the Netherlands, for example, link more international cities than countries in Asia.

Airlines in European countries deploy fleets of small-capacity aircraft across vast networks that connect their hubs with markets of varying densities. Even travelers living in tertiary cities have one-stop access to the world, a characteristic of the power of connectivity.

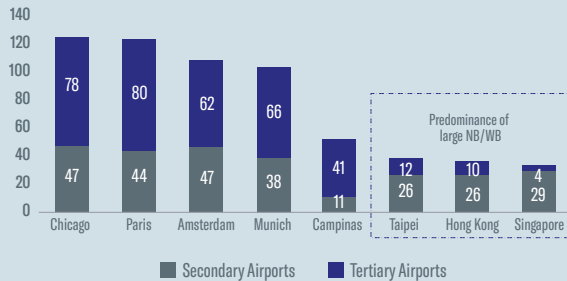
CORRELATION BETWEEN AIRCRAFT SIZE AND INTERNATIONAL CITY-PAIRS



Source: Cirium

Secondary and tertiary airports without small-jet service face limited growth prospects.

NUMBER OF UNIQUE INTERNATIONAL CITY PAIRS

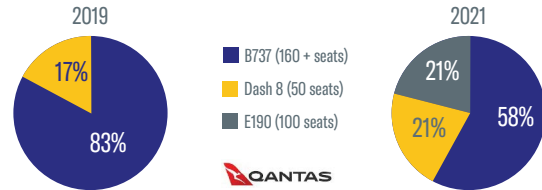


Source: Cirium

Australia

Airlines in Australia are eager to increase connectivity. The recent acquisition of more 100-seat jets promotes the introduction of nonstop flights on new routes, especially to secondary airports.

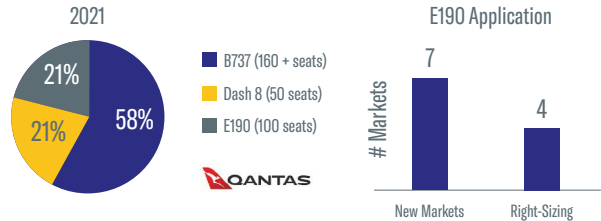
SHARE BY AIRCRAFT TYPE (# MARKETS)



Source: Sabre, May

In Adelaide, E190s are opening new markets, complementing and replacing large-capacity aircraft (right-sizing).

SHARE BY AIRCRAFT TYPE (# MARKETS)

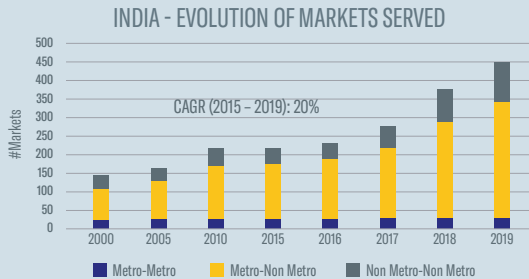


Source: Sabre

SAARC

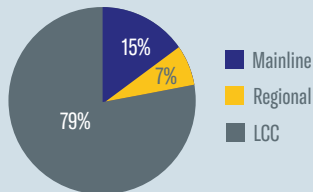
Domestic airline traffic in India has increased steadily since 2005 with the expansion of LCCs. In the four years prior to the onset of the pandemic, the number of markets grew by an average of 20% annually.

LCCs have focused on serving high-density (metro-non metro) markets. Growth in other markets has not kept pace.



Source: Sabre MI

DISTRIBUTION BY AIRLINE TYPE - INDIA (2019)



Source: Sabre MI

India's Ministry of Civil Aviation started introducing incentives to promote more regional air service in 2015 with limited success. Domestic ticket prices remain among the lowest among Asian countries. The weak value of the Rupee in relation to the US Dollar, taxation, and the price of jet fuel have limited the viability of small jets.

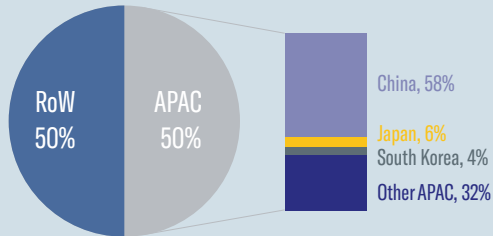
Despite the limitations, there are opportunities to tap into the potential of the vast number of non metro markets with sub 150-seat aircraft that will broaden access beyond key markets.

Sustainability

Asia emits half the world's carbon dioxide. It is intensifying its ESG-related efforts to keep up with Europe's reduction targets. China, Japan, and South Korea, which account for 66% of Asia Pacific's emissions, have set net-zero carbon goals.

The ING Group estimates that achieving that goal for those countries will cost USD 12.4 trillion just for their transportation sectors. The ambitious goals come at a huge cost - slightly higher than 90% of China's 2020 GDP. Amortizing the expense over time would equate to 1.8% of China's GDP over 40 years, and 0.6% of the GDPs of Japan and Korea over 30 years.

ASIA'S EMISSIONS OF CARBON DIOXIDE AS A PROPORTION OF THE GLOBAL TOTAL



Source: Global Carbon Atlas

The Association of Asia Pacific Airlines (AAPA) and its 14 members - All Nippon Airways, Cathay Pacific, Japan Airlines, Malaysia Airlines, Singapore Airlines, Air Astana, Asiana Airlines, Bangkok Airways, China Airlines, EVA Air, Garuda Indonesia, Philippine Airlines, Royal Brunei, and Thai Airways International - supports the initiatives of CORSIA to generate net-zero carbon emissions by 2050.

The commitment of the AAPA member airlines is more aggressive than other Asian carriers who have only pledged to reduce their carbon emissions by 50%.

Asian carriers fly mostly medium and long-haul routes which complicates the drive to net-zero using new, disruptive technologies. Those advances will likely be adopted first on smaller aircraft flying shorter distances. One way to reach the goal would be to acquire smaller, more right-sized aircraft that consume fuel more efficiently. The region could cut some of the estimated USD 12.4 trillion expense and reduce AAPA's forecast for the construction of 2,500 new SAF facilities.



Nagano, Japan

← EMBRAER

CHALLENGE.
CREATE.
OUTPERFORM.

EUROPE



Nouvelle-Aquitaine, France

/KEY MESSAGES

- / Small aircraft are vital in maintaining sustainable mobility in Europe.
- / Addressing the path to greener operations: higher operating costs, higher airfares, and lower growth require focus on supply & demand adjustment. The increasingly high-cost industry must prioritize efficiency.
- / Transition to greater fleet flexibility: protect airport positions and avoid route cancellations. Hubs downgauging expected to keep the same level of efficiency.
- / Enabling the next level of connectivity: new opportunities are in OD markets with lower demand. A mixed fleet will be a competitive advantage in growing point-to-point markets.

ECONOMIC & TRAFFIC GROWTH 2019-2040

GDP	RPK
1.3%	2.3%

NEW DELIVERIES 2021-2040

	Up to 150-Seat Jets:	TurboProps:	150-210 Seat NBs:
	1,770	430	3,590
2021-2030	840	190	1,690
2031-2040	930	240	1,900

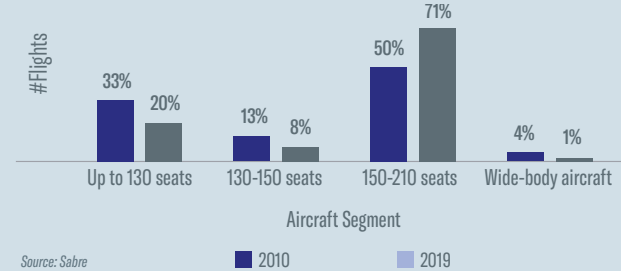
FLEET IN SERVICE - UPTO 150

2019:	2040:
2,023	2,822

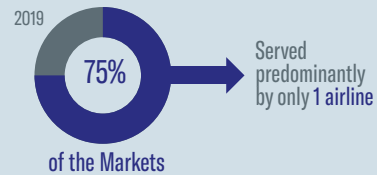
Connectivity is essential to a robust European commercial airline network and its ability to become more environmentally sustainable and resilient to future crises. The region's diversity of market size, distances, and multiple hubs suggest a diversity of aircraft types.

Yet the intra-Europe fleet of 150 to 210-seat NB jets has grown from 50% to 71% in the past decade.

EVOLUTION OF INTRA-EUROPEAN FLEET



As a result, 62% of markets are served with less than a single daily frequency.

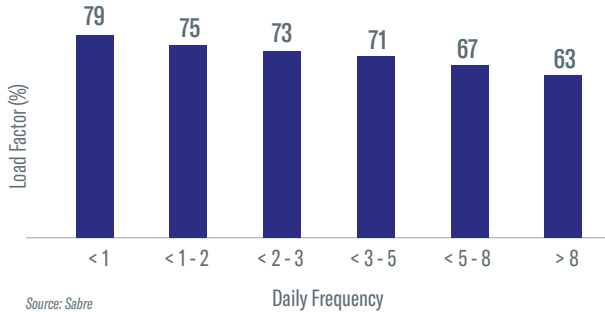


Source: Sabre

These markets are potentially at risk of cancellation or further frequency reduction in a post-pandemic environment. Adjusting the network to reduced demand from business and leisure passengers is an airline's first step to minimize cash burn, keeping competitive, and avoiding route suspensions.

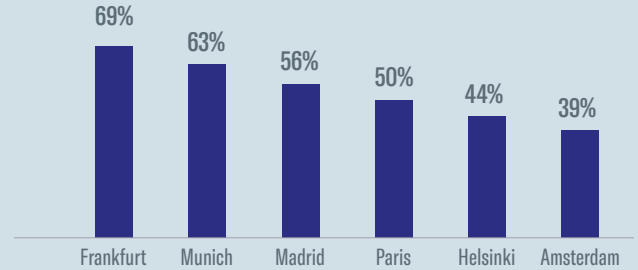
The load factor profile chart shows averages by daily frequency for all European routes in 2019. Any fall in demand will reduce the average load factor for all daily frequencies. The degree of network connectivity will suffer unless more small aircraft are added to European airline fleets to ensure efficient service to all markets.

INTRA EUROPE LOAD FACTOR PROFILE



Main hubs will also be impacted by the new passenger demand curve. Average load factors will decline. The graph shows the share of flights operated by NBs on a typical day at European hubs. Fleet downgauging will be necessary to keep the same level of efficiency prior to the pandemic.

% OF NB FLIGHTS IN EUROPEAN HUBS



Source: Sabre





CHALLENGE.
CREATE.
OUTPERFORM.

LATIN AMERICA

Itamogi, Brazil

/KEY MESSAGES

- / Robust domestic markets across an unconnected continent: leads to an opportunity to introduce new aircraft types for greater fleet versatility.
- / Rethink business strategy: adopt aircraft that can better weather demand and supply cycles.
- / Underserved markets represent new opportunities: low & medium density cities with poor or no air service are too small for large NBs.
- / New cities with proper flight frequencies promote trade: new technology aircraft are ideally suited for new markets and meet future carbon emissions standards.

ECONOMIC & TRAFFIC GROWTH 2019-2040

GDP	RPK
2.6%	4.2%

NEW DELIVERIES 2021-2040

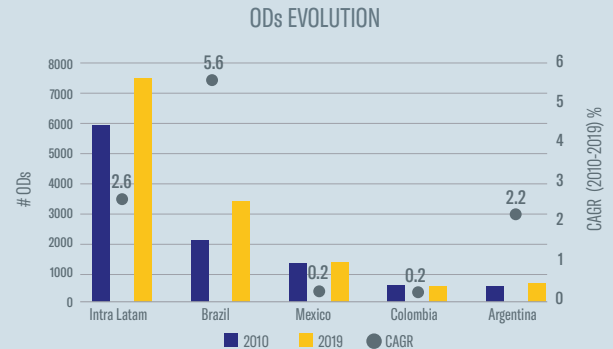
	Up to 150-Seat Jets:	TurboProps:	150-210 Seat NBs:
	760	180	1,490
2021-2030	385	90	740
2031-2040	375	90	750

FLEET IN SERVICE - UPTO 150

2019:	2040:
567	1,160

The failure to adequately develop air travel connectivity throughout Latin America has impeded economic prosperity in the region for decades. The need for more cohesive commercial airline networks will become more urgent post-pandemic.

The graph of the evolution of the number of ODs shows how the development of connectivity has been slow and even flat over the last 10 years.

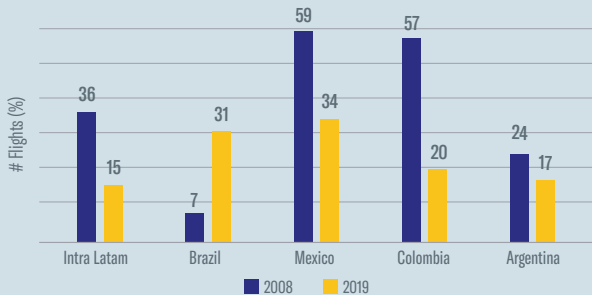


Source: Sabre MI

The number of ODs grew the most in Brazil, the largest market in the region. The key to its growth was in providing more reliable, convenient and affordable air service to medium and small communities. Those markets were eager to attract economic development but their size did not justify large NB service. The answer was the introduction of smaller-capacity jets.

The number of aircraft up to 120 seats in Brazil's national airline fleets grew from 7% in 2008 to 31% in 2019.

EVOLUTION OF JETS UPTO 120 SEATS – FLEET IN SERVICE

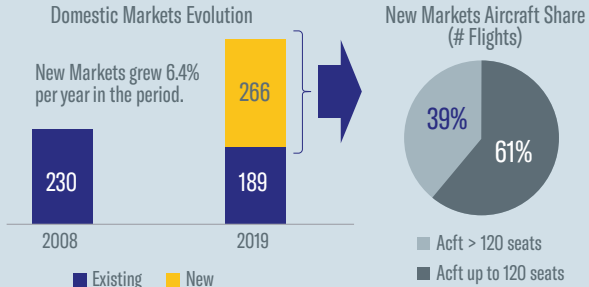


Source: Sabre MI

LCCs have been expanding quickly during the pandemic. New entrants will increase competition in the main markets however there are opportunities for growth in underserved markets, and in connecting small and medium density markets.

In order to maximize Latin American connectivity, carriers will most profitably serve the untapped markets with aircraft that offer the most versatility.

Of new markets, 61% were launched with up to 120-seat jets.



Source: Sabre MI



Guanajuato, Mexico



CHALLENGE.
CREATE.
OUTPERFORM.

MIDDLE EAST

Trabzon, Turkey

/KEY MESSAGES

- / Slowdown of global hub strategy was already an issue, the pandemic further weakened demand and is prompting development of new strategies.
- / Future growth lies within: Over-exposure to long-haul, intercontinental traffic is a liability for the future. Fleet flexibility will be essential to explore underserved short-to-medium haul markets.
- / Diversify the mega-hub concept: Mega-hubs transport many passengers but are not equally well connected. Opening new markets should facilitate intra-regional movement and economic diversification.

ECONOMIC & TRAFFIC GROWTH 2019-2040

GDP	RPK
2.6%	3.6%

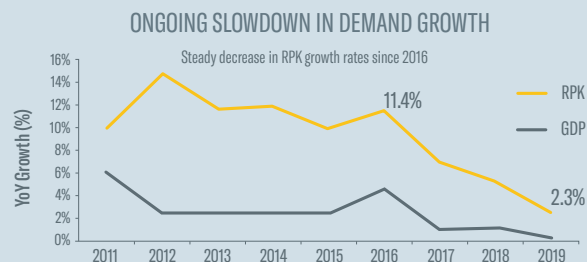
NEW DELIVERIES 2021-2040

	Up to 150-Seat Jets:	TurboProps:	150-210 Seat NBs:
	320	40	1,830
2021-2030	140	20	800
2031-2040	180	20	1,030

FLEET IN SERVICE - UPTO 150

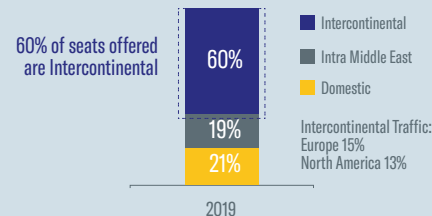
2019:	2040:
189	389

The slow recovery of demand for international travel hit the Dubai, Abu Dhabi and Doha mega-hubs hard. Prior to the pandemic, growth was already slowing in the region. The advent of ultra-long haul flights that can bypass hubs, a dependence on international connections, a preference for nonstop flights where frequency of passenger health testing is not as onerous, and the ongoing exposure to changing entry regulations by different countries make the current mega-hub strategy risky, at least until 2024.



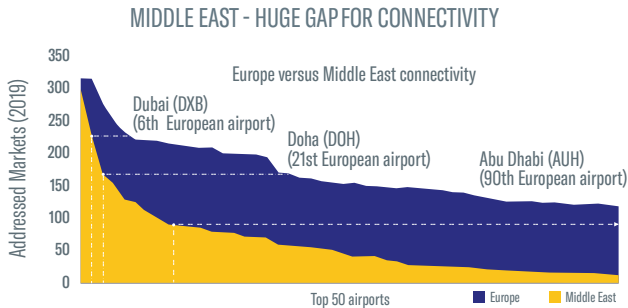
Source: IATA, IHS Markit

MARKET SEGMENTATION BY REGION (IN NUMBER OF SEATS OFFERED)



Source: Sabre

Future growth lies in the untapped potential of the Middle East's domestic and intra-regional markets which are still mostly underserved and unconnected. The mega-hubs may have enormous passenger throughput compared to most European airports, but Dubai would rank 6th in number of destinations served if it was located in Europe. Similarly, Abu Dhabi would rank 21st and Doha 90th.



The region's fleet, however, is comprised of large aircraft which is not conducive to serving small markets or withstanding the cyclical downturns in demand. The pandemic has highlighted the importance of fleet flexibility in the region.

Crossover aircraft promote better network connectivity, new point-to-point markets, more efficient hub feed for international travel, the creation of secondary hubs, and incentivize trade and cargo transport.



Nizwa, Oman



CHALLENGE.
CREATE.
OUTPERFORM.

NORTH AMERICA



Alberta, Canada

/KEY MESSAGES

- / **Connectivity at the core:** Regional aircraft are the backbone of the region's network. Their relevance will grow with the need to serve more routes as future demand decentralizes.
- / **The 50-seater conundrum:** RJs are essential to domestic connectivity yet there are no new 50-seat jets on the market to replace North America's ageing fleet. There is an opportunity to introduce a new-generation turboprop.
- / **The rise of J100-150:** The segment will be central in filling the gap between RJs and NBs, complementing those types, providing right-size capacity in both weak and prosperous periods.

ECONOMIC & TRAFFIC GROWTH 2019-2040

GDP	RPK
2.1%	2.0%

NEW DELIVERIES 2021-2040

	Up to 150-Seat Jets:	TurboProps:	150-210 Seat NBs:
	2,710	430	3,160
2021-2030	1,330	130	1,480
2031-2040	1,380	300	1,680

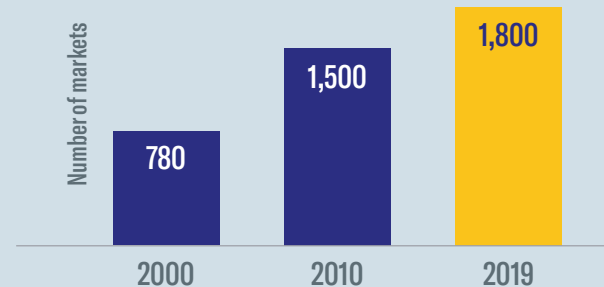
FLEET IN SERVICE - UPTO 150

2019:	2040:
3,629	3,345

CONNECTIVITY AT THE CORE

Connectivity is the most valuable attribute of the North American market and explains why airlines in the region consistently record the highest profit margins in the world. Over the past 20 years, the fleet of regional aircraft has grown steadily and represented nearly half of all commercial airline departures in the USA in 2019. In that year, regional aircraft served 65% of all U.S. airports.

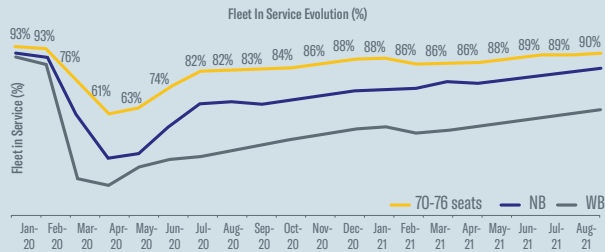
TOTAL NUMBER MARKETS WITH <90-SEAT JETS



Source: Sabre

Regional aircraft were essential in maintaining vital links during the onset of the pandemic. Deployment of the fleet contributed to quick recovery of domestic service across the region. By mid-2021, 90% of all 70 to 76-seat jets were back in service.

NORTH AMERICAN FLEET RECOVERY



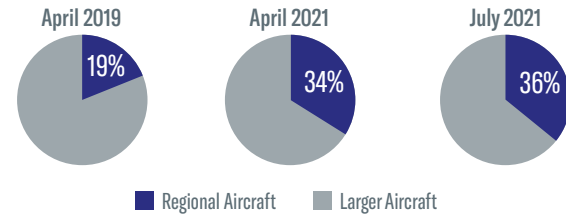
Source: Cirium Fleet Analyzer

The emerging work-from-home trend will raise the importance of regional aircraft in a post-pandemic environment. Decentralized home offices and population migration away from big cities will renew the need for greater regional connectivity, and more regional aircraft.

The impact on business travel is difficult to measure. A percentage of high-fare travelers will reduce their frequency of flying yet airlines will still need to maintain flight schedules and network cities to serve the remaining business travel segment.

Airlines can achieve this through aircraft rightsizing. Carriers are already deploying smaller-capacity jets in the top 10 U.S. business markets. The frequency share of regional aircraft has almost doubled compared to 2019, even with domestic markets still in recovery mode.

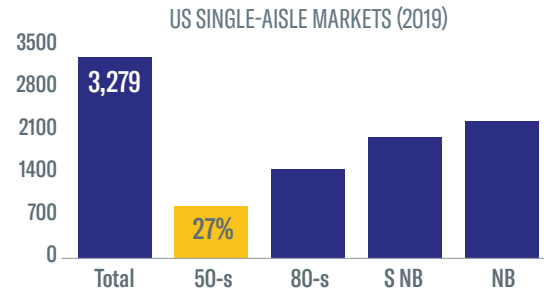
TOP10 US BUSINESS MARKETS - FREQUENCY SHARE



Source: Sabre

THE 50-SEATER CONUNDRUM

50-seat aircraft are present in more than a quarter of all domestic markets operated by single-aisle jets in the USA. They are particularly important in connecting smaller cities to hubs.

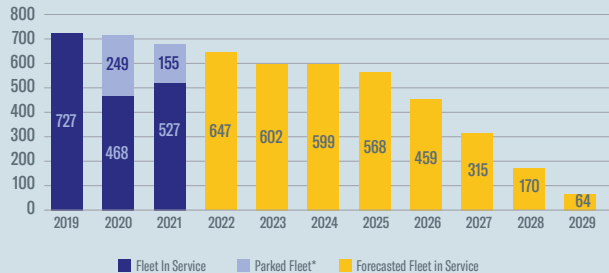


Source: Sabre

There were more than 700 50-seat aircraft in service in the USA in 2019. Most of those aircraft will reach 25 years of age by the end of the decade. That high retirement age reflects the absence of a new aircraft type to replace them. Airlines are pushing those jets to the end of their operational lives. Since no manufacturer has a new 50-seat jet to replace them, we expect the fleet to be gone by 2030.

The 50-seat jet segment is still viable to serve small markets. Demand for the aircraft will continue after the current-generation jets are retired. There is an opportunity to introduce a new generation aircraft, such as a state-of-the-art turboprop. Technological and engineering advancements would provide a cost-effective platform with jet-like comfort.

50-SEAT FLEET FORECAST

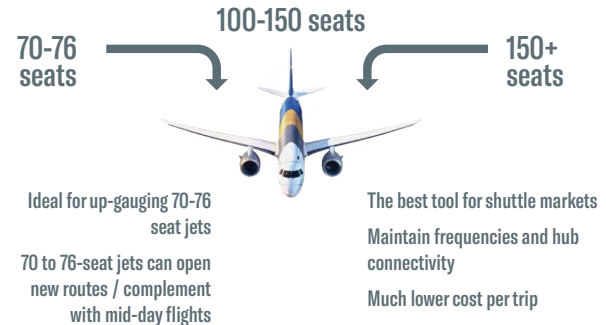


Source: Cirium Fleet Analyzer. * Parked fleet in 2020 and 2021 is related to the aircraft put on storage due to COVID that may or may not return to service in the future. 2021 FIS as of August 31st, 2021. Retirement age premise: 25y.

THE RISE OF THE 100 TO 150-SEAT SEGMENT

Airlines will need to develop flexible strategies to address volatility in demand in the near term and implications affecting longer term growth arising from the pandemic. They can expect changes in weekly and annual demand.

100 to 150-seat jets, such as Embraer’s E195-E2, satisfy these demand variations. They are ideally suited to up-gauge 70 to 76-seat jets and can replace or complement larger narrowbodies in shuttle markets to maintain high-frequency flights at a lower trip cost.



Source: Embraer Analysis.

EXTRA CHAPTER: CARGO MARKET OUTLOOK



/KEY MESSAGES

- The rise of e-commerce:** The trend to online shopping and home delivery was already growing over the last decade. The pandemic triggered a strong uptick that will push the demand curve even higher.
- The new logistic requisites:** Logistics providers, including air cargo carriers, will need to address new conditions in order to play in the e-commerce arena: faster deliveries, a more extensive network, reliability.
- Changing fleet profile:** Small and crossover standard-body aircraft will facilitate success in the new landscape.

ECONOMIC & TRAFFIC GROWTH 2019-2040

GDP	RTK
2.6%	4.2%

NEW DELIVERIES

Small and Crossover Standard Body Aircraft

2021-2040	700
-----------	------------

FLEET IN SERVICE

2019:	2040:
296	727

The demand for air cargo has grown an average of 4% annually since 1990. That steady, consistent increase reversed suddenly in 2020 when IATA recorded a 10.6% decrease over 2019.

The belly space in the world fleet of passenger aircraft was no longer available when airlines grounded their airplanes. Demand for cargo space did not drop – house-bound consumers were still purchasing products that required delivery. The need for replacement cargo capacity was a windfall for operators of freight aircraft who tried to satisfy the spike in demand.

Supply chain disruptions raised the demand for space on dedicated freighters even further. Worldwide, yields increased an average of 80% and load factors were 25% higher in 2020. Cargo operators saw healthy gains in revenue. The year signaled a renaissance for the air freight industry.

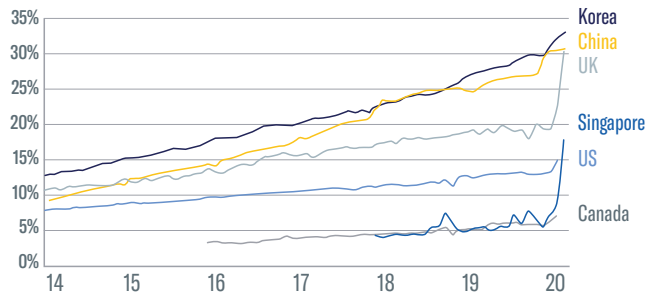
NEW REQUIREMENTS FOR THE INDUSTRY

The explosive growth of e-commerce reflects a huge migration of consumers from brick-and-mortar retail purchases to online transactions. After a decade of steady increases, the share of worldwide e-commerce skyrocketed.

In China, for example, online shopping accounted for 10% of all retail sales in 2014, and grew to 25% in 2019. During the worst months of the pandemic in 2020, the share of e-commerce spiked sharply.

E-COMMERCE DISRUPTION THE NEW CONSUMER: NEW HABIT FORMATION

Share of e-commerce in total retail sales in major countries

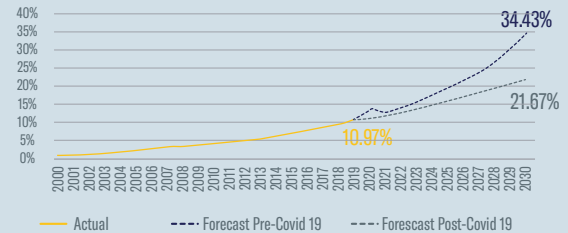


Source: Haver, UBS. Note: US and Canada data is to March 2020; Korea, China, Singapore, UK data is to April 2020.

The sudden rise was not exclusively pandemic related but an acceleration of a previous trend of consumer online purchase of products and services. Pre- and post-pandemic e-commerce forecasts for advanced economies, like the USA, and emerging markets, such as Latin America, indicate the jump was not isolated.

The sudden and prolonged withdrawal of vital passenger aircraft cargo space from the market was a disruptive and defining event. The potential for even more e-commerce transactions is enormous given the pronounced change in consumer buying habits, and concerns over future supply chain stability.

U.S. E-COMMERCE PENETRATION: PRE-COVID19 VS. POST-COVID19 ESTIMATES



Note: Forecasted figures starting in 2020 based on Bass Model and annualized e-commerce sales figures from confirmed first half of 2020 (\$368.8 billion first half 2020 - Adobe).

Source: Nasdaq (US), Global X ETFs, US Census Bureau, Adobe.

LATAM ECOMMERCE (US\$BN)

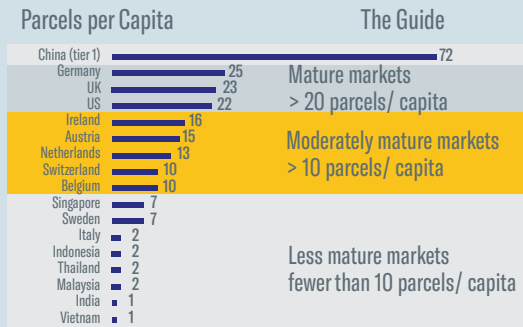


Source: Euromonitor, Morgan Stanley research estimates

China is a good example of e-commerce potential. Consumers in that country received 72 parcels per capita in 2019, nearly triple the 25 per capita of Germany.

Morgan Stanley analysts estimate between 25% and 45% of retail mall square footage in the USA will likely close in the next 5-10 years. If their forecast proves accurate, then the downward trend for in-person shopping may spread to other mature economies, like the United Kingdom and Germany.

China could prove to be representative of the enormous potential for e-commerce. The country's high number of parcels-per-capita success is the result of infrastructure investments by e-commerce companies. Their target delivery standard is same-day or next-day delivery since consumers demand speed. A 2020 survey by UPS found that 46% of buyers deleted shopping cart contents because shipping time was too long. Another 34% of respondents named long delivery time as a key reason to shop in person rather than online.



Source: McKinsey (2017), adjusted to 2019 by Embraer, Domestic B2C

Retailers in China discovered that decentralization is fundamental in order to meet the same-day/next-day delivery standard. Companies set up vast, interconnected logistics networks to serve mass markets. McKinsey analysts note that Amazon is investing in decentralized warehouses in the USA so that it can expedite parcel delivery, even offering an option for same-day service.

As e-commerce spreads globally, logistics companies will likely find vertical integration a way to ensure delivery speed and reliable service. The pandemic demonstrated how quickly demand soared, especially for aircraft with capacity that is ideal for low and medium-density markets.

LOGISTIC SOLUTION PROVIDER

1
Fast Delivery

Ability for the Next Day or Shorter Delivery

1. Delivery-speed in the network;
2. Wide national next-day coverage

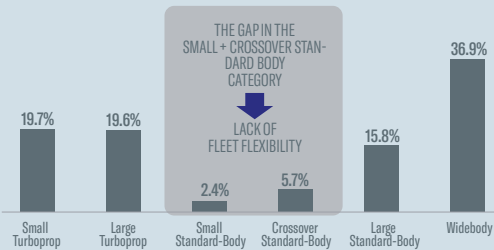
2
Increase Number of

Different Destinations

1. Flexibility to adapt quickly to changing market trends;
2. Adequate capacity to volume development

Today's global cargo fleet lacks a supply of aircraft sized between turboprops and widebodies. Bridging the gap with more regional and crossover standard-body jets would address the growing need to decentralize delivery in secondary markets. Those new airplanes would ensure e-retailers meet the speed and reliability requirements that are the cornerstones of e-commerce.

FLEET PROFILE SHOWS GAP IN THE MIDDLE
UNABLE TO EFFICIENTLY ADDRESS NEW INDUSTRY REQUISITES

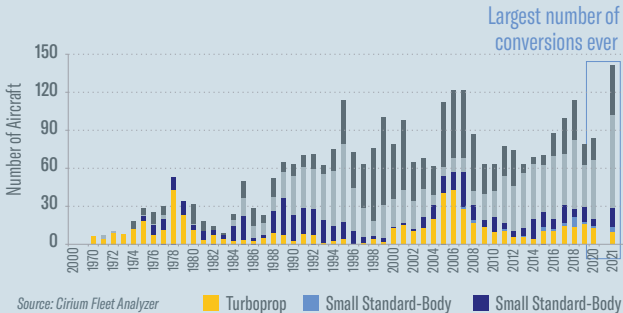


Source: Cirium Fleet Analyzer

A CHANGING ENVIRONMENT

Demand for dedicated cargo aircraft soared during the early days of the pandemic which prompted new interest in passenger-to-freighter conversions. The number of conversions in 2021 is expected to set an industry record.

P2F HISTORICAL CONVERSIONS BY CATEGORY - WORLDWIDE

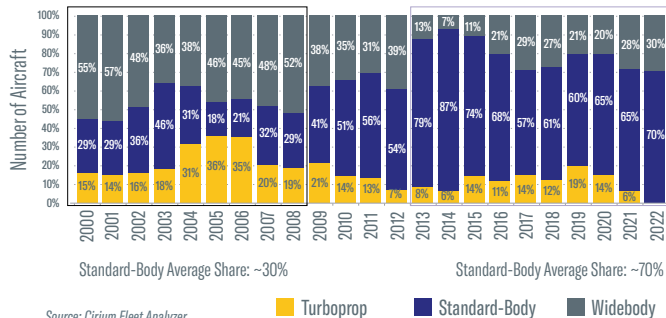


Source: Cirium Fleet Analyzer

Legend: Turboprop (Yellow), Small Standard-Body (Light Blue), Small Standard-Body (Dark Blue)

The trend to more standard-body conversions began in 2013. An average of 30% of all conversions were standard-body jets from 2000 to 2008. The percentage jumped to an average of 70% from 2013 and is forecast to stay constant through 2022.

P2F HISTORICAL CONVERSION SHARE BY CATEGORY - WORLDWIDE



Standard-Body Average Share: ~30%

Standard-Body Average Share: ~70%

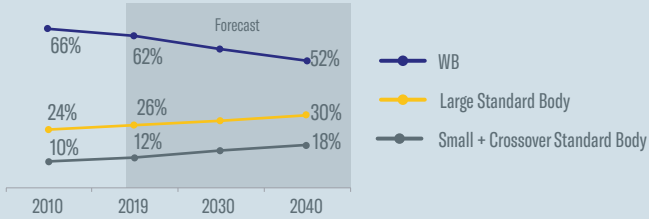
Source: Cirium Fleet Analyzer

Legend: Turboprop (Yellow), Standard-Body (Dark Blue), Widebody (Grey)

CARGO DEMAND FORECAST

The global cargo aircraft fleet has few standard body and small and crossover jets compared to larger-capacity widebodies. Retailers growing their e-commerce businesses will look to secondary markets to ensure order availability, fast delivery, and service reliability. Demand for smaller all-cargo aircraft will increase as consumers buy more products online. Standard body jets will represent 48% of the cargo aircraft fleet in service by 2040.

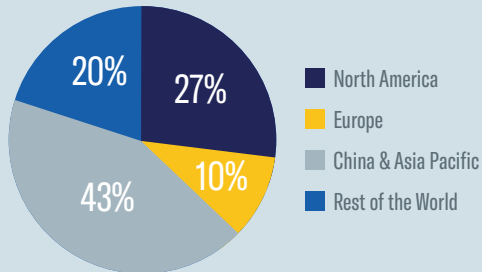
CATEGORY SHARE EVOLUTION – JETS ONLY



Source: Embraer

Embraer forecasts worldwide demand for 700 small and crossover standard body all-cargo aircraft over the next 20 years (the size of those aircraft is similar to those in the sub 150-seat passenger jet category). Growth will account for 65% of deliveries and 35% for replacement.

SMALL AND CROSSOVER STANDARD-BODY JET DELIVERIES BY REGION



Source: Embraer



DATA SOURCES

ALL ANALYSIS DEVELOPED USING DATA FROM:

- / IHS Markit
- / The Economist, OECD, World Bank, IMF, McKinsey Global Institute
- / OAG
- / ICAO, IATA
- / A4A, A4E, CAAs, AEA, ALTA, CAPA, AFRAA
- / CAAC (Civil Aviation Administration of China)
- / Sabre
- / Cirium Fleet Analyzer
- / Embraer Market Intelligence
- / Airlines

For more information, please visit:
embraermarketoutlook2021.com

REGIONAL DEFINITIONS

- / North America
- / Latin America (includes Mexico & Caribbean)
- / Europe (includes Israel)
- / Russia/CIS
- / Africa
- / Middle East (includes Egypt & Turkey)
- / Asia-Pacific (includes China)



CHALLENGE.
CREATE.
OUTPERFORM.