MARKET OUTLOOK
2017–2036

Scientific research parades after idea, fantasy, and fairytale.
K. Tsiolkovsky
INTRODUCTION

A decade of development of the United Aircraft Corporation in modern Russia makes it possible to speak more and more confidently of strengthening of the Company’s positions in the global civil aircraft market.

Having united the best traditions and design experience of world’s famous aircraft manufacturers such as Tupolev, Ilyushin and Yakovlev Design Bureaus, as well as current practices of Sukhoi Civil Aircraft and Irkut Corporation, UAC has done a great job of restoring competitive civil aircraft industry in the Russian Federation.

An important step in the implementation of the Corporation’s strategic development goals is the modern 100-seat Sukhoi Superjet 100 aircraft (SSJ) market entry in 2011. The new passenger aircraft family is in demand in the foreign and domestic markets. Positive feedback on reliability, cost-effectiveness and high flight performance comes from SSJ operators from the CIS countries, Western Europe, Asia and Latin America. The SSJ program development has reached the threshold of transition to production economic efficiency.

Creation of the medium range passenger aircraft MC-21, the first test flight of which took place on May 28, 2017, can be attributed to the obvious business successes of the Corporation. Airplane design and production are carried out in accordance with the global standards and the requirements of an efficient industrial model. In two years, the Corporation plans to launch customer deliveries of these aircraft.

The Corporation’s special efforts are aimed at improving market mechanisms for new aircraft sales. Together with the leading leasing companies, as well as national and international financial institutions, UAC creates the most attractive conditions for acquisition, leasing, lending and repurchase of aircraft with a guarantee of their residual value.

The processes of globalization provided an opportunity to form effective international cooperation in the creation of new aircraft. Currently, several UAC’s promising civil and military projects are being implemented within interstate cooperation. Creation of a Russian-Chinese wide-body passenger aircraft, which the Corporation plans to launch to the market in the next decade, is among them. Herewith, it is expected that this airplane will have wide access to both Russian and Chinese markets, which will allow not only ensuring sufficient initial production volumes, but also better financial conditions for the aircraft acquisition and operation in other countries.

In its development strategy and implementing various forms of promoting its civil aircraft to foreign markets, UAC considers international experience in introducing promising technologies in aircraft development and production, as well as global trends in the organization of efficient air transport operations.

When drawing up this forecast and assessing civil aircraft market development trends, UAC is constantly improving its own multifactor models that take into account the main parameters that determine the demand for new passenger aircraft in each of the world regions.

This issue of Market Outlook 2017–2036 is a vision of the Corporation on the air transportation development prospects and the formation of demand for new commercial aircraft. It also allows taking into account significant market factors in modernization of Russia’s aviation infrastructure.

### MARKET OF AIRCRAFT

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Creation of a modern dynamically developing civil aviation fleet, as well as a steadily functioning and balanced national air transport system, is a prerequisite for economic stabilization and recovery, improvement of the population’s living standards and ensuring of integrity and security of a state. Achievement of these goals opens opportunities for aviation manufacturers to gain leading positions in the global air transportation market.

Currently, air transportation is one of the most important branches of the world’s economy, technical and service achievements of which make it a highly efficient tool for the development of modern society. Direct annual benefit from the activities of the world civil air fleet exceeds USD 700 billion.

Today, civil aviation transport carries more than three and a half billion passengers per year and provides for one-third of inter-regional cargo exports.\(^\ast\)

Currently, the global commercial aviation fleet exceeds 26.5 thousand aircraft. Approximately 1,400 regular air routes have been opened. The annual passenger traffic grows by 6–7% each year. More than 50% of tourists travel by air taking into account the time factor and direct economic benefits. Product sales of almost 25% of the world’s companies depend on air transport, while using civil aircraft is a key factor for expanding the market for 70% of business representatives.

Despite the growing intersectoral competition in the freight market, the civil air fleet continues to develop dynamically in this direction. The emergence of new business forms, in particular, the so-called e-commerce, the volume of which reaches USD 1.5 trillion, contributes to this. Giant online stores actively stimulate air transportation by leasing dozens of cargo aircraft as contractual carriers. In general, two-thirds of the world’s postal deliveries are carried out by air.

A significant drop in aviation fuel prices has affected the airline business results. Profitability on operating profit reached 8%. Low-cost airlines continue to promote air transportation. Passenger traffic of low-cost airlines grows two times faster than that of other air carriers.

The ever-increasing demand for various types of air transportation has led to the creation of a comprehensive next-generation air transport system with sufficient flexibility and cost-effectiveness. When building a promising transport system, the solution to the task of achieving maximum mobility in the airspace becomes one of the main factors affecting further industry development.

The new airspace configuration requires the development of aircraft with an improved design having enhanced capabilities in flight, technical and operational characteristics, as well as capable of flying over complex trajectories subject to intense air traffic.

Rigid standards for building the next-generation air transportation system set special requirements for the development of airport ground infrastructure and for airlines themselves as well.

In order to further reduce the time and financial costs of the services provided, airport services need to solve the following tasks in the future: creation of new business models for distribution of “windows in schedules” for air carriers and air traffic schedule management; implementation of the most automated complexes for handling passenger and freight traffic; establishment of a more efficient system of traffic control over the airfield and coordination of take-off/landing times.

Subject to increasing competition in the field of air transportation, airlines will face the need to provide large volumes of passenger and goods delivery services. The introduction of trips according to the so-called gate-to-gate scheme allows combining all stages of passenger flights and cargo movement. That said, convenient schedule and its exact observance, high-quality services on board, as well as compensation for possible delays in the take-off/landing schedule, remain the main comfort criteria for passengers.

Growth rates of the world economy indicators, need to create new jobs, meeting of the future demand for air transportation, provision of high-quality services in accordance with the passenger needs and airline requirements, as well as support of the image of aviation as the most eco-friendly and safe transportation mode, will be key factors affecting the dynamic development of the air transportation market in the forecast period. The air transportation market development features for individual countries and regions are reflected in the following sections hereof.

\(^\ast\) ICAO Air Transport Bureau.
The decline in aviation fuel prices over recent years has led to a significant improvement in the financial position of many airlines. Air carriers have received the opportunity to develop new routes and acquire more modern aircraft.

Traditionally, the largest volume of the world aircraft fleet is concentrated in network airlines. At the same time, low-budget air carriers have also been developing quite dynamically over recent years. Interpretation of elements of various business models of airlines resulting in the complication of their classification by groups has become one of the latest trends.
Historical stages in the development of the commercial aircraft market and consistent world civil air fleet growth indicate significant changes that have occurred recently in the system of relations between air transport, the aviation industry and financial markets. Further transformation of the interaction of participants within this process will predetermine the nature and direction of long-term development of the market for promising civil aircraft and the demand for them.

From 2000 to 2015, the current world civil aircraft fleet increased by 54% in quantitative terms. Herewith, the share of the fleet of aircraft purchased under leasing increased from 24.7 to 39.4%, respectively*. A deeper look at the world fleet development dynamics over the past fifteen years allows to note newly revealed features.

In 2000–2010, the world commercial aircraft fleet increased by 42%, with the rate of only 8.5% in 2011–2015. The fleet of aircraft purchased by airlines under leasing during the designated periods of time increased by 105 and 19.6%, respectively. The annual average number of leased aircraft put into operation was reduced from 390 units (2000–2010) to 150 units (2011–2015). The continuous growth of the world commercial aircraft fleet was associated not only with the increase in the total passenger traffic and the decommissioning of obsolete aircraft types, but also with the cardinal changes that occurred in the financial markets, for example, the abnormally long usage of “zero” or “negative” base rates by the central banks in a number of states.

The consistently continuing annual growth in the commercial aircraft production and supply with relatively cheap acquisition instruments resulted in the actual long-term “freezing” of average market prices for the main long-haul aircraft models, which significantly affected the used aircraft market and reduced the ability of lessors for remarketing of the decommissioned aircraft.

Long-haul aircraft world serial production rate of 1,620–1,680 units per year (including newly emerged manufacturers) forecasted in 2018–2020, as well as further growth of the available manufacturing capacity, can lead to a significant disbalance in supply and demand, as well as to further serious transformation of the entire so-called leasing market.

The expected mass saturation of the market with re-engined next-generation long-haul and wide-body aircraft, expected at the turn of 2020, will intensify the need for the search for an acceptable balance of interests by all industry participants. The extension of the aircraft “aging” parameters incorporated in the design of next-generation aircraft will force all market participants to consider the development prospects of this segment in a new way, first of all, in the wide-body airliner sector, by 2023–2025.

The existing tendency to increase the maximum and average passenger capacity of the re-engined airplanes as well as limited increase of the range due to the cutting edge technologies introduced primarily during the creation of wide-body airliners will raise the issue of the necessity of creation and the layout of an intermediate-class aircraft (200+ seats), as well as its development approaches implemented viz. top-down (based on the current market range of wide body aircraft) or bottom-up (based on the newly created narrow-body aircraft) to all manufacturers of civil aviation products.


The average age of the passenger AC fleet at the end of 2016 was 11.4 years. Airplanes with a capacity of 30–60 seats were the most aged: turboprops of 23.9 y.o. and turbojets of 15.7 y.o., while turboprop AC with a capacity exceeding 60 seats of 8.1 y.o. and large wide-body airplanes with a capacity exceeding 325 seats of 9.0 y.o. were the latest. The most numerous segment of NB AC 120+ is 10.0 y.o.

* Data on aircraft orders as of April 2017.
The total world demand for new passenger aircraft is estimated at 41.8 thousand aircraft in the next 20 years. It is expected that narrow-body aircraft with a capacity of 120 or more seats (27.3 thousand AC, or 63% of the total number of new airplanes) will be the ones supplied most. The quantitative share of WB AC supplies is expected to be at the level of 17.8% (~7,450 airplanes), while the share of all regional aircraft with a capacity starting from 30 seats is expected to be at the level of 16.9%. The demand for regional jets (~4.8 thousand AC) will be higher than for turboprops (~2.3 thousand AC). Herewith, the low level of demand for regional jets with a capacity of 30–60 seats (less than 180 airplanes) shall be noted.

In general, the size of the world market for new passenger aircraft (from 30 seats) is estimated at USD 5,746 billion in 2017 prices. The segment of narrow-body aircraft with a capacity of 120 or more seats will become the most capital-intensive, which will account for USD 3,188 billion, or 55.5% of the market. The expected volume of the WB AC market will be USD 2,246 billion, or 39.1% of the market, and regional aircraft will be cost USD 311 billion, which is only 5.4% of the world market. It is noteworthy that 79% of the total cost of sales of aircraft with a capacity of up to 120 seats will be determined by the sales of jet aircraft with a capacity of 61–120 seats.
The studies to determine the demand for regional turboprop aircraft with a capacity of 30 or more seats have been carried out in the course of this Market Outlook preparation. The proposed assessments assign major importance to and take into account the impact on this market segment of “small” turboprop aircraft with a capacity of up to 30 seats due to the improvement of their flight, technical and operational performance and the expected sale of these aircraft in a number of regions of the world, including Russia.

The market for new regional turboprop aircraft with a capacity of 30+ seats covers almost all regions of the world and includes more than 300 operating airlines. At the same time, macroeconomic factors and features of the customer base for these aircraft will impose significant restrictions on the development of this market segment in the future.

The current fleet of airlines is heterogeneous in terms of the number of aircraft of this class in operation. At least 40% of air carriers have only one or two aircraft of the kind in their fleet. Two-thirds of airlines own less than five aircraft of this size. As of early 2017, only 19 operators had more than 20 aircraft in their fleet and four air carriers featured more than 50 aircraft with the capacity of 30 or more seats in their fleets.

Preferences of airlines in a number of regions of the world on the formation of their fleets by aircraft of this class required clarification of the model of demand for turboprop aircraft. Moreover, the appearance of new regional aircraft from the manufacturers of Russia, China, Indonesia and Iran in this segment may lead to correction of demand in these and some other regions of the world.

Taking into account the systematic factors and the development features of the market of regional turboprop aircraft with a capacity exceeding 30 seats, the potential demand for such aircraft in the forecast period will be about 2,300 units.

For the said period, 317 aircraft were contracted with 78% thereof belonging to the group with more than 60 seats. The ratio of firm orders to the general fleet of these aircraft is relatively small (11%), but in the group with a capacity exceeding 60 seats this figure is higher (20%). The share of aircraft ordered so far is 14% in the expected volume of twenty-year demand.

According to our estimates, about 240 AC from the current fleet of aircraft with a capacity of 30–60 seats and about 700 airplanes with more than 60 seats will still function by 2036. Most of the new aircraft supply (63%) will account for the group with a capacity exceeding 60 seats. The total number of the world turboprop passenger fleet in the group with a capacity of up to 60 seats will be reduced to 1,020 AC and increased to 2,910 AC in the group with a capacity exceeding 60 seats over the twenty-year period.

In general, the sales market for new regional turboprop aircraft is estimated at USD 60.9 billion in 2017 catalog prices, which is 1.1% of the world market in value terms.

MARKET OF TURBOPROP AIRCRAFT

The current turboprop aircraft fleet as of 31.12.2016

Aircraft with a capacity of up to 60 seats predominate in the current fleet of turboprop passenger airplanes with approximately 70% of the latter being over 20 years old. These airplanes are often operationally redundant and are gradually withdrawn by airlines from their fleet. Aircraft with more than 60 seats are in demand more and about 3/4 of them were purchased by air carriers over the last decade.

Firm orders for turboprop aircraft as of April 2017

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Quantitative demand

Cumulative cost, USD billion


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Formally “limited” sales volume of narrow-body aircraft with a capacity of 61–120 seats had a deterrent effect on the introduction of large-scale innovative solutions in current and prospective projects in this segment. This circumstance is typical for aircraft in the lower part of the current segment, where a number of non-market factors may sometimes influence the acquisition of such aircraft by airlines, for example, the requirements of the US flight crew trade unions to the technological appearance of regional aircraft.

Competition with the aircraft of the lower sub-segment with a capacity exceeding 120 seats is observed in the upper sub-segment of narrow-body aircraft with a capacity of 61–120 seats due to better operating economy of the latter. This factor significantly influenced the current contracting of these aircraft and led to a shift in the launch of the programs of re-motorized versions until after 2020.

It is expected that the main competitive struggle will occur during the distribution of potential demand between the upper sub-segment of narrow-body airplanes with a capacity of 61–120 seats and the lower sub-segment of airplanes with a capacity exceeding 120 seats, where the likelihood of a consistent “dilution” of the market share of the latter is high. This is facilitated by the continued growth of production capacity for manufacturing and contracting of aircraft with a capacity exceeding 150 seats, while maintaining relatively low prices for them.

Taking into account the growth of passenger transportation, the development of airport infrastructure and the route network, as well as regional features, the specifics of leasing and re-marketing, the studies conducted within the framework of this Market Outlook 2017–2036 allow to identify the potential demand for narrow-body aircraft with a capacity of 61–120 seats within the period in the amount of 4,610 aircraft with a high degree of accuracy.

In general, the market for new jet aircraft with a capacity of 61–120 seats is estimated at USD 244 billion at 2017 catalog prices, which is 4.3% of the world market in value terms. The cost of sales in the upper sub-segment (91–120 seats) is expected to be 43% higher than in the sub-segment of 61–90 seats, mainly due to the increase in the aircraft price with increasing passenger capacity.
Despite significant regional differences and stages of economic development of states, narrow-body aircraft with capacity exceeding 120 seats will continue to make up a large part of the world fleet of commercial aircraft during the forecast period. In a number of countries, their volume will reach 75% of the total number of airplanes operated by airlines.

In the future, competition in this market segment will intensify. Almost simultaneously, six manufacturers of narrow-body airplanes will offer operators new aircraft with improved flight performance and operation characteristics.

Russia and China will join further redistribution of shares in the market of narrow-body aircraft with a capacity exceeding 120 seats.

Consistent and many-year growth in demand for narrow-body aircraft has created new conditions and requirements for the leaders of aircraft manufacturing, their industrial model, the order of production localization and schemes for product commercialization. Such approach can be demonstrated by the example of the organization of the corresponding production (assembly) facilities in the USA and PRC. All new programs for manufacturing narrow-body aircraft are the best illustration of global and interdependent collaboration and cooperation in the aircraft industry providing the creation of new instruments to achieve strategic goals in the competition for a place in the global market for civil aviation equipment.

Significant improvement in the basic characteristics of new generation narrow-body airliners while maintaining their price availability on the market, withdrawal from operation of a significant part of aircraft with relatively low service lives and extended supply in the secondary market create prerequisites for the formation of a previously inaccessible route network and further increase in the customer base of aircraft of this class.

Multifactor modeling of the interconnection between the air transportation market and the production of narrow-body aircraft with a capacity exceeding 120 seats.

It is expected that the quantitative demand for new passenger aircraft in the segment of more than 120 seats will exceed 65% of the total demand for new passenger aircraft over a twenty-year period. The group with a capacity of 121–140 seats will account for 7% of the total volume of projected sales in the market, with 93% going for the sub-segment with a capacity exceeding 140 passengers. The firm orders declared amount to 22 and 34% of the estimated demand in the groups of 121–140 seats and more than 140 seats, respectively.

The total number of firm orders for NB planes designed for 120 or more passengers is 9,127. In the group with a capacity of 121–140 seats, the ratio of the number of orders to the fleet is relatively small being 26%, while it takes a record value of 69% in the sub-segment for 140 or more passenger seats.

The total cost of deliveries of new aircraft of this segment is estimated at USD 3,188 billion, which exceeds 55% of the total market for new passenger aircraft sales. Herein, sales are projected at USD 170 billion in the group of airliners with a capacity of 121–140 seats and at USD 3,018 billion (in catalog prices of 2017) in the sub-segment of the AC designed for more than 140 passengers.
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Over the last decade, the class of wide-body passenger aircraft has become the absolute leader of civil aviation in terms of the degree to which innovative solutions are introduced into their development and production, as well as in terms of formation of a system of the product attitude wherein the WB aircraft is treated as a product with maximum end-user performance. Along with the introduction of new aircraft families to the market, the leading aircraft manufacturers continue to expand the range of such aircraft within wide-body segment. A deep modernization of the previous generation aircraft is being carried out.

Over 2000–2016, the market of wide-body aircraft has undergone significant changes. The previously existing parity of the annual WB AC production volumes in the Boeing-Airbus duopoly has ended. Since the launch of the serial Boeing 787 production, the American aircraft manufacturer has significantly outperformed its European rival (since 2015, the ratio has been approximately two to one).

The annual increase in the production of wide-body aircraft creates a situation where the production capacity of corporations available will be almost 50% higher than the estimated demand for aircraft based on real transportation work. In such conditions, competitive rivalry between the leading manufacturers is transferred from the field of the main aircraft characteristics to the field of production efficiency, cooperation, logistics and the sales support and deal money flaws structuring systems. These factors are likely to lead to a revision of priorities and volumes in the formation of the airlines’ wide-body fleets and the redistribution of shares in the sub-segments of the market for this class of aircraft.

The continuing policy of manufacturers to maintain a high level of supply of aircraft of this class will significantly affect the secondary market of wide-body aircraft, in particular, the number of transactions and their commercial conditions. In such a situation, a significant part of wide-body aircraft from the secondary market is likely to be transferred to fleets of airlines that have never operated the airplanes of this class before. In view of these circumstances, it is possible to transform the customer base of wide-body aircraft, which will have an impact on upper part of the range of such aircraft within wide-body segment. A deep modernization of the previous generation aircraft is being carried out.

Based on the study conducted, the anticipated demand for wide-body aircraft in the forecast period is estimated at 7,450 units.

The current fleet of passenger WB airplanes consists of 4,455 AC, the majority of which (72%) are airplanes with a capacity of up to 325 passenger seats, including subgroups of 225–275 and 275–325 seats in the amount of 1,404 and 1,245 units, respectively. The average fleet age is 10.3 years. It is expected that up to 3,155 aircraft currently operated will be decommissioned by 2036; the remaining part of the current fleet will be approximately 1,300 units, of which 870 will be designed for 200–325 passengers and 430 for more than 325.

The demand for new passenger AC for the twenty-year period is expected at 7,450 AC, or 18% of the total number of sales. The share ratio of the capacity groups within the segment will change taking into account the current fleet retirement, the share of the capacity group of more than 325 seats will increase to 35% by the end of the forecast period. The firm orders declared correspond to 30% of the total forecast demand, including 26% and 38% in the sub-segments of the “junior” and “senior” capacity groups, respectively.

The total cost of new aircraft in the WB AC segment, the delivery of which is expected in the forecast period, is USD 2,246 billion (in catalog prices of 2017), which is equivalent to 39% of the total market for new passenger AC. The supply of airliners designed for 275–325, 325–375 and 225–275 seats (USD 708, 523 and 467 billion, respectively) will be the most profitable.

**Current fleet as of 31.12.2016**

<table>
<thead>
<tr>
<th>Capacity (Passenger seats)</th>
<th>Current fleet</th>
<th>Firm orders</th>
<th>Forecast 2017–2036</th>
</tr>
</thead>
<tbody>
<tr>
<td>200–325</td>
<td>2,635; 35%</td>
<td>992; 44%</td>
<td>1,263; 56%</td>
</tr>
<tr>
<td>325+</td>
<td>2,015; 29%</td>
<td>1,954; 41%</td>
<td>1,242; 56%</td>
</tr>
<tr>
<td>325+–375</td>
<td>810; 11%</td>
<td>1,205; 44%</td>
<td>983; 44%</td>
</tr>
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<td>810; 11%</td>
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**Firm orders for April 2017**

<table>
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The number of firm orders in the WB aircraft segment available (2,246 aircraft) is equal to half of the current fleet. The largest volume of deliveries (992 AC, or 80%) will be in the AC subgroup designed for more than 325 passengers.
In the forecast period, a significant increase in the efficiency of forms and methods of global trade in consumer goods and services will become the growth factor in this air transport segment. In the next 20 years, it is expected that airlines will update their cargo aircraft fleets more quickly, which will cause a steady annual increase in freight volumes, against the backdrop of a rapidly growing consumer market.

The demand for new cargo airplanes will have pronounced regional peculiarities related to the factors of the social and economic development of countries and government programs to support key customers fleets.

The emergence of new regional economic development leaders will lead to a gradual transformation of traffic flows and the predominant demand for cargo aircraft will be more provided by the airlines of the Asia-Pacific countries by the end of the forecast period.

The market of cargo planes has its own specific features determining the nature of competition and the mechanisms for the formation of demand for aircraft of this type.

Currently, USA is the largest regional market for cargo aircraft, where about 50% of the world fleet is operated by national airlines.

A characteristic feature of the US market is the desire of the state to ensure the constant readiness of the entire fleet of the US civil aviation in order to meet the challenges of mobilization readiness of its own armed forces. This is why the Civil Reserve Air Fleet (CRAF) state program is currently used by the leading US carriers involved in cargo transportation; this program is an important means to optimize a part of their costs for operating and upgrading their fleets from the budget of the US Department of Defense.

The effect of state programs on using civil aircraft to the benefit of ensuring the mobilization readiness of the state in the forecast period will directly affect the development of cargo airlines not only in the US, but also in China and Russia, as well as determine the long-term dynamics of demand for cargo aircraft in the world market.

Transformation of the route network and the structure of cargo transportation in the countries of the Asia-Pacific Region, increased efforts of China to implement the New Silk Road project, increased direct trade between the states of Asia and Latin America, as well as development of China – Pakistan and India – Iran “economic corridors” will provide significant influence on the whole cargo transportation system in the dynamically developing regions of the world.

Therefore, the air cargo turnover growth in the forecast period will be manifested not only at the expense of the countries with a traditionally developed segment of cargo transportation by specialized aircraft (the USA, China, etc.), but also by such states as Vietnam, Indonesia, Malaysia, Iran, Brazil, and Chile.

The Chinese market of cargo planes will be developing at an even higher rate. Purchases of new cargo airplanes by the country’s airlines will be at least 20% and at 27% of the world’s estimated demand in terms of converted aircraft.

The total demand for cargo aircraft within the forecast period is estimated in the amount of 2,390 units, with 1,495 (63%) converted and 895 (37%) new aircraft. According to the data for Q2 2017, there are firm orders for 122 new cargo airplanes and another 143 AC can be delivered in case existing options and agreements of intent are executed.

The world fleet of cargo airplanes totals 1,890 AC with 1,867 units in operation, of which:

- narrow-body – 1,043 wide-body cargo airplanes;
- wide-body – 1,615 narrow-body cargo airplanes.

As of mid-Q2 2017, the following are in operation:

- narrow-body – 725 (38.4%), 624 in operation;
- wide-body – 1,165 (61.6%), 1,043 in operation.

The USA is the largest operator of civil cargo aircraft.
The business aircraft market forecast prepared within this study considers the specifics of the demand for aircraft in only one part of this segment – airplanes with luxury cabins built on the basis of long-haul airliners.

The overall assessment of the entire market segment for business aircraft and business versions created on the basis of wide-body and other aircraft is not presented in this material.

Entry to the market of long-haul aircraft of the so-called next-generation aircraft by leading aircraft manufacturing corporations and other manufacturers after a certain time interval will lead to the emergence of competitive offers and business versions of luxury aircraft with a qualitatively new set of consumer and representative properties.

Operational characteristics of the next-generation long-haul aircraft that have significantly increased in relation to existing analogues, especially in terms of significant increase in maintenance intervals by calendar periods and operating time, as well as high production rate, create the prerequisites for the formation of a new cost model for the operating next-generation business aircraft. These factors potentially expand the customer base for this class of aircraft.

After 2023, at least twelve basic aircraft models of this class and at least six aircraft manufacturers will be present in the market of business aircraft, which will subsequently impact the formation (redistribution) of demand for business versions throughout the business aviation segment.

Currently, the main part of the customer base of the business airplane market segment is relatively stable. In the forecast period, a gradual increase in the number of operators of such aircraft is expected, along with the increase in the number of offers of business versions, which makes it possible to determine the demand for aircraft of this segment as sufficiently resistant to any possible changes in the external environment. The potential capacity of the market of new business aircraft in the segment in question will be at least 415 aircraft.

UAC delivered 24 aircraft of 276 aircraft operated in this segment. Boeing and Airbus delivered 74 and 145 units, respectively. Embraer manufactured 33 aircraft.
The upcoming 20 years can be described as a period of significant structural changes for the passenger air transportation market. Traditional leaders – Europe and North America will gradually lose their share of the world market showing moderate growth.

In 20 years, 3.2 billion people will live in the Asia-Pacific Region, excl. China, and the total GDP of the countries in the region will approach USD 28 trillion. Therefore, despite a relatively small increase in the passenger turnover growth rate vs. the worldwide average, the Asia-Pacific Region will reach the leading position of the world passenger air transportation market, as forecast.

The European passenger air transportation market will retain the leading position in the world rating in the forecasted period, but it will experience growing competition from the dynamic economies of the developing world. Despite the fact that the growth rate of the passenger air transportation market in Europe will be somewhat lagging behind the worldwide average, the European Commission will reach the leading position of the world passenger air transportation market, as forecast.

The air transportation market of the North American region will generally follow the trend of redistribution of the economic power of states in the 21st century gradually losing its primary importance in the world balance. By 2036, this market is expected to not only give way to Europe, but also to China and the countries of the Asia-Pacific Region.

In terms of passenger turnover growth, the Middle East and Latin America are likely to be significantly ahead of North America and Europe; however, relatively small population (referring to the Middle East) and much more modest aggregate GDP will help the region leaders keep significant distance.

During the forecasted period, China will demonstrate the highest dynamics of the passenger air transportation market development. In terms of volume, the Chinese market is equal in size to large regional markets, moreover it has a pronounced specificity that predetermined its consideration separately from the rest of the countries of the Asia-Pacific Region within this review. It is expected that China’s passenger turnover will almost equal that of Europe by 2036. High growth rates will ensure China’s rise from the fourth position among the regions (countries) considered in this outlook to the third position being only slightly inferior to Europe.

The prospects for the passenger transportation market in Africa will be determined by more than 50% increase in the population over the next 20 years combined with relatively modest GDP growth. In general, passenger turnover growth for this region is expected at the level of worldwide average.

Russia is a specific market occupying a separate section of the review, along with China. Although the Russian market of passenger air transportation lags behind the Chinese, it is the most promising from the point of view of promotion of Russian aircraft. Along with the forecast moderate growth of indicators on par with the global average, some issues of the current development of the Russian market can subsequently become potential points of its growth, for example, through the development of small aircraft, inter-regional air traffic, intra-regional flights within the country and other factors.
RUSSIA
RUSSIA

STATISTICS AND INFographics

The population of Russia will not change significantly until 2036. A slight increase from the current figure of 146.5 to 148.3 million people (+1.2%) is expected by 2026. By 2036, Russian population will gradually decrease to 147.0 million people, according to the State Statistics Committee of the Russian Federation.

The share of Russia in the total global population will decrease from the current 2.0 to 1.7%. By 2026, Russia's GDP will increase by 1.2 times (from USD 1.7 to 2.1 trillion) and by 1.4 times (to USD 2.4 trillion) by 2036. Herewith, Russia's share in the global GDP will decrease from 2.3 to 1.8% by 2036.

Regional programs to develop the transport infrastructure, modernize the aircraft fleet, subsidize domestic regional (local) and inter-regional air transportation continue to be implemented in the federal districts and regions of the Russian Federation (the Far East).

Domestic air transportation has become more active. The tourist potential of the country is growing.

Leading domestic airlines are shifting from the intensive growth strategy to the business efficiency improvement model. The quality of their corporate governance is undergoing significant improvement.

The positive experience of developing low-cost air transportation services, as evidenced by the example of Pobeda discounter, stimulated growth and territory coverage by this type of transportation.

Active implementation of projects for the development of high-speed rail traffic in the European part of Russia serves as an additional incentive for improving the Russian air transport efficiency.

The industry development is significantly influenced by the antimonopoly legislation of the Russian Federation.

Now and in the long run, the fleet update process carried out by the Russian airlines will be linked to the impact of such factors as:

- expansion of domestic aircraft production in different market segments and staged development of tools to support their sales, as well as the after-sales service system;
- influence of the unified customs and tariff policy of the member countries of the Eurasian Economic Union formed until 2025–2030 taking into account the consensus of interests of all the participating states;
- arrival of next-generation aircraft made by Boeing and Airbus in the fleets of the leading airlines that will consistently change the model of demand for the purchase of domestic aircraft.

In the long run, narrow-body aircraft with a capacity exceeding 120 seats will be the basis of demand for domestic airlines and the total forecast demand for aircraft from Russian air carriers may reach 1,170 units.

In the forecast perspective, passenger turnover in Russia will grow by 1.6 times by 2026 (from 216 to 338 billion RPK) and by 2.2 times (to 484 billion RPK) at the turn of 2036, which will generally correspond to the worldwide average growth rate. Global passenger turnover will experience a slight share decrease from 3.1 to 2.8%. The compound average annual growth rate of passenger air transportation in Russia will be 4.1% until 2036. In terms of air transportation, Russia ranks seventh in the world.

Trends

Currently, the air transportation market and infrastructure in the Russian Federation are undergoing another cycle of transformation and update. Important geopolitical events of the recent years have had a negative impact on Russia's external environment and macroeconomic indicators, as well as they have led to a change in the air transportation industry development trends in the country.

The federal target program “Transport System Development” is being consistently implemented, the airfield support network and the national air traffic control complex are being updated.

In general, the nature of the transportation distribution across the ranges in Russia will change insignificantly. The greatest reduction in the transportation share is forecast for the routes with orthodromic range of 2 to 3 thousand km, while the greatest growth is forecast for the routes from 9 to 10 thousand km. It is expected that the median of the peak passenger turnover distribution characterizing the typical flight range will increase from 2,560 to 2,572 km, i.e., only by 0.5%, over 20 years.

The Russian fleet of passenger aircraft totals 981 units. The average age of the AC fleet is 16.8 years, which is higher than the worldwide average (11.4 years). It is expected that 240 aircraft from the current Russian fleet will remain in operation in 2036. The sub-groups of turboprop aircraft with a capacity exceeding 60 seats (aged 11.3 years on average) and NB aircraft with a capacity exceeding 120 seats (11.4 years) have been identified as the youngest. The fleet of Russian airlines is characterized by a high share (41%) of aircraft with a capacity of up to 120 seats, while globally this figure is 30%.

It is expected that Russian airlines will receive 1,170 new passenger aircraft for a total of USD 135 billion in 2017 catalog prices over the 20-years period. The existing firm orders cover 47% of the expected demand. The highest degree of demand coverage with orders is observed in the groups of NB 120+ and WB <325 seats (57 and 56%, respectively). We also note the high share of the expected demand for NB airplanes with a capacity of 91–120 seats (15% vs. worldwide average 6%) and the low share of demand for WB AC (10% vs. 18% in the world in general).

The positive experience of developing low-cost air transportation services, as evidenced by the example of Pobeda discounter, stimulated growth and territory coverage by this type of transportation.
CIS COUNTRIES (EXCL. RUSSIA)  
STATISTICS AND INFographics

By 2026, the population of the states of the Commonwealth of Independent States will increase from 140.5 to 146.1 million people (+4.0%) and to 148.1 million people (+5.4% vs. the level of 2016) by 2026. Herewith, the share of the CIS in the world’s population over the 20 years will fall from 1.9 to 1.7%.

The GDP growth is forecast at the level of the worldwide average for the countries of this group. By 2026, their GDP will grow by 1.3 times (from USD 384 to 785 billion) and to USD 1,017 billion dollars by 2036, i.e., by 1.7 times with respect to the current value. The global GDP share will change slightly and remain at the level of 0.8%.

The passenger turnover growth rate in the Commonwealth countries will correspond to the worldwide average. By 2026, the passenger air transportation volume will increase from 49 to 79 billion RPK and to 119 billion RPK by 2036, in accordance with the forecast expectations, i.e., it will increase by 1.6 times and 2.5 times vs. the level of 2016, respectively. Herewith, the world passenger turnover share will change slightly and remain at the level of 0.7%. The compound average annual growth rate of passenger air transportation will exceed expectations, i.e., it will increase by 1.6 times and 2.5 times vs. the level of 2016, respectively. The growth of the global passenger fleet and turnover share of the CIS states will long remain focused on acquiring aircraft from the secondary market due to economic reasons.

TRENDS

A previously fairly interconnected and balanced air transportation system of the Commonwealth of Independent States has undergone significant changes over recent years. The Russian Federation, the Republic of Kazakhstan, Belarus, Armenia and Kyrgyzstan formed the Eurasian Economic Union. Ukraine formally participating in the CIS currently does not associate its future with this international organization.

Further development of the EAEU states will require modernization of the unified transport system of the member countries of the association. The heads of the EAEU states decided to develop a strategy (concept) for the creation of the so-called “Single Sky” of the member countries of the Eurasian Economic Union by 2025 with the subsequent liberalization of domestic air transportation. New opportunities for the development of the route network and significant increase in the volume of inter-regional air transportation are opened.

When solving the tasks of aircraft fleet forming, the national carriers of the CIS countries switched to the acquisition of new airplanes. Such airlines as AZAL (Azerbaijan), Air Astana (Kazakhstan) and O’zbekistona have started operating next-generation aircraft (A320NEO and B787).

Havo Yollari have started operating next-generation aircraft (A320NEO and B787).

The Republic of Kazakhstan with the most liberalized domestic market demonstrates an example of a new approach to airline development. In 2019, Air Astana plans to conduct an initial public offering (IPO). Securities will be offered both in Kazakhstan and in the foreign markets.

Direct or indirect support of national air carriers from the state remains an important factor in the development of airlines in the region. Creation of a new airline Gazaq Air for the development of domestic transportation on modern turboprop aircraft in Kazakhstan can serve as a typical example.

At the same time, the market of a number of CIS countries will remain focused on acquiring aircraft from the secondary market due to economic reasons.

In the long run, regional air transportation will develop at a moderate pace and correspond to the forecast growth estimates of the macroeconomic indicators of the Commonwealth countries.

The fleet renewal process will be carried out by the CIS airlines by small purchases. Herewith, the scheme for acquiring aircraft into ownership of an air carrier will stay as a stable trend.

In the long run, narrow-body aircraft will form the bulk of deliveries and the total forecast demand for aircraft from airlines in the region is estimated at 260 units.

Current passenger fleet consists of 382 airplanes. The average AC age is 19.8 years. Turboprop aircraft (average age of 55.5 years) are the most aged, while the WB AC are the youngest (11.1 years). By 2036, the world passenger fleet will feature about 75 airplanes from the current fleet of the Commonwealth countries. The number of orders for new aircraft is 45 and the ratio of orders to the fleet is 12%, which is the lowest figure among all world regions. The 48% share of aircraft with a capacity of up to 120 seats in the passenger fleet of the region exceeds the worldwide average of 30%.

Regional demand for new passenger airplanes is estimated at 260 AC amounting to USD 28.3 billion, which is 4.1 times less than in Africa, and 4.8 times less than in Russia. The existing firm orders cover 18% of the expected demand. Half of the supplies and 51% of the total cost will be for the NB 120+ capacity group (65 and 55% globally, respectively). The countries of the region are the most active buyers in the secondary market and acquire more than half of the aircraft used there.

The routes serviced by regional airlines are limited mainly by short distances. Thus, 69% of passenger transportation is performed in the range of up to 3 thousand km with only 53% in the world on the average. The expected changes in the share of transportation on different ranges are insignificant. It is forecast that the median of the peak passenger turnover distribution will increase from 2,437 to 2,512 km, i.e., by 3.1%, over 20 years.
CHINA

STATISTICS AND INFOGRAPHICS

According to current forecasts, the population of China will grow by 2.4% by 2026, from 1.39 to 1.42 billion people. In 2028, the population of the People’s Republic of China (PRC) will slowly decline amounting to 1.41 billion people by 2036, in accordance with the expectations of demographers. Total growth for the entire forecast period is estimated at 1.8%.

The share of China in the world’s population will decrease by 2.8 p.p., from 18.7 to 15.9%, over 20 years. By 2026, China’s GDP is expected to grow by 1.8 times, from USD 9.8 to 17.6 trillion. By 2036, it will grow by 2.7 times over 20 years to USD 26 trillion. The share of the PRC in the global GDP will increase by 6.7 p.p., from 12.8 to 19.5%.

China will demonstrate the highest growth rates of passenger air transportation. By 2026, they are expected to double, from 0.98 to 2.01 trillion RKp. By 2036, over 20 years, the volume of passenger turnover is expected to increase by 3.3 times, to 3.24 trillion RKp. The PRC share in world passenger turnover will increase by 5 p.p., from 13.9 to 18.9%. The aggregate annual growth rate of passenger turnover of Chinese airlines will be 6.7%.

TRENDS

The civil aviation of the PRC has passed a long way of development by now and will face new goals in the future, such as moving away from solving local tasks for transport support of the country’s needs to achieve the leading positions in the global air transportation market.

Consistency in the adoption of political and economic decisions in the field of civil aviation development of the PRC creates favorable conditions for the formation of the next-generation air transportation system, the development and operation of which will affect all major markets of the world air transport complex.

A balanced set of multi-level measures is carried out for the dynamic development of air transportation in China.

Within the framework of creation of a qualitatively new national network of airfields, long-term plans to build more than 100 new airports and associated infrastructure in the country by 2025 are being implemented. Major update of the national air traffic control system is being carried out.

Long-term corporate development plans for the leading national airlines are being implemented. The practice of using a low-cost transportation model and the formation of air carriers with mono-type aircraft fleet is developing in the country. Development of Chinese airlines will support China’s growing economic activity in the direction of the New Silk Way.

Secondary effects from the steady growth of the standards of living, business activity and air mobility of the Chinese population will also have a positive impact on the development of the economy and the air transportation industry in a number of other countries in various regions of the world.

At the turn of the 2020’s, the PRC will be the only country in the world where assembly lines of the world’s three largest aircraft manufacturers will simultaneously be located, including the one of national COMAC.

China has consistently continued to accumulate in its possession global leasing assets, both on the basis of BOC, ICBC and CDB with the participation of state banks, and through private companies like Bohai Leasing (including its “Western” assets Avolon and CIT Aerospace) and CALC, assisted by associated bank capital.

Just like now, the demand in the long term will be based on narrow-body aircraft with a capacity exceeding 120 seats, and the total demand for aircraft by Chinese airlines is expected to be at least 7,580 units.

The passenger fleet of Chinese airlines featuring 3,079 aircraft as of late 2016 is the youngest in the world. The average fleet age is 9.8 years. Another feature of the Chinese fleet is the relatively large share of NB aircraft with a capacity exceeding 140 seats (69% vs. worldwide average of 47%), while the share of all aircraft with capacity of up to 120 seats, on the contrary, is relatively small (8% vs. worldwide average of 30%). It is expected that approximately 56% of the aircraft of the current Chinese airlines’ fleet will stay in the world passenger fleet by the end of the forecast period. The number of firm orders for new aircraft is 1,448, which is 47% of the AC fleet size.

The twenty-year demand for new passenger aircraft of Chinese airlines is estimated at 7,580 units; considering the catalog prices of 2017, it is equivalent to USD 1,011 billion. The existing firm orders cover only 19% of the expected demand. The greatest demand is expected in the NB 120+ segment (5,430 airplanes at a cost of USD 616 billion), which is covered by 17% by the existing firm orders.

In 2016, internal transportation limited to the range of 4 thousand km determined the share of the maximum passenger turnover at this range at the level of 76.3%. It is forecast that the share of transportation at the range up to 4 thousand km will increase by 1.5 p.p. by 2036. The distribution median will decrease by 3.5%, from 1,744 km in 2016 to 1,683 km in 2036.

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ASIA-PACIFIC REGION (EXCL. CHINA)
**ASIA-PACIFIC REGION (EXCL. CHINA)**

**STATISTICS AND INFOSGRAPHS**

In terms of population growth, the Asia-Pacific Region will still exceed the worldwide average by 2026 and fall behind the worldwide average by 2036. By 2026, the region’s population will grow by 10.6%, from 2.67 to 2.96 billion people; by 2036, the excess over the current level will be 19.1% and this will correspond to 3.18 billion people in absolute terms. Herewith, the share of the Asia-Pacific population as compared to the world population will decrease slightly, by 0.2 p.p., from 36.0 to 35.8%.

Growth of GDP of the Asia-Pacific countries will be higher than the worldwide average as compared to the level of 2016 by USD 14.7 trillion; in 2026, it will increase by 1.4 times, to USD 20.5 trillion, and is expected to increase by 1.9 times to the level of USD 27.9 trillion in 2036. The increase in the share in the global GDP distribution will be 1.5% (19.3% – 2016, 20.8% – 2036).

The Asia-Pacific Region is a pioneer in creating a low-cost airline carrying out long-haul transportation operating wide-body aircraft.

In the long term, the most important factors influencing the development of the air transportation market of the Asia-Pacific countries will be the following:

- state regulation of the industry by authorized bodies;
- policy of the states of the region to determine the access of foreign airlines to national domestic air transportation markets;
- forms and volumes of state participation in the capital and support of national air carriers;
- compliance of airlines with global standards in the field of AC flight safety;
- significant financial problems for a number of airlines.

In the period in question, the total demand in the countries of the region will grow steadily, and its total volume is forecast at 8.625 civil aircraft at least.

The total demand for new passenger aircraft is forecast at 8.625 units, which is valued at USD 1,314 trillion in 2036. The emphasis in demand will be shifted towards more capacious aircraft. The total share of demand for WB AC in the region will be 23% in terms of quantity and 45% in value, which is 6 and 5 p.p. more than worldwide average, respectively. The existing firm orders cover 43% of the expected demand. The maximum level of coverage (73%) is in the group of jet aircraft with a capacity of 61-120 seats.

The transportation distribution is expected to undergo a minor transformation. Along with the reduction in the share of the shortest routes (up to 500 km) and the increase in the transportation share of the longest routes (>10,000 km) typical for most regions, a 2.5 p.p. decrease in the share of transportation in the range of 5–10 thousand km and a 2 p.p. increase in the share of transportation in the range of 0.5–5 thousand km are expected. In general, the median of the peak passenger turnover distribution will decrease by 2.6%, from 2,906 km in 2016 to 2,831 km in 2036.
EUROPE
The growth rate of the European population will significantly lag behind the worldwide average in the forecast period. The current population is 617.8 million people. Forecast levels: 628.1 million people in 2026 (+1.7%), 632.7 million people in 2036 (+2.4% by 2016). The share of Europe in the population of the Earth will decrease by 1.2 p.p., from 8.3 to 7.1%, over the forecast period.

By 2026, the GDP of European countries will grow from USD 20.4 to 24.1 trillion (1.3 times). In 2036, the GDP of the countries of the region will amount to USD 28.3 trillion (growth by 1.8 times). In general, the growth rates of GDP of the European countries will lag behind the worldwide average, which will lead to a reduction in their share in global GDP from 26.7 (2016) to 21.1% by the end of the forecast period.

### TRENDS

Civil aviation of the member countries of the European Union has historically been one of the global leaders both in terms of the scale of its activities and the size of aircraft fleet in operation, and in terms of organizational construction of the management system and efficiency of airline business models. High level of competition in this economy sector has led to a significant transformation of structural forms of the leading European aviation equipment (AE) operators over recent years. Middle Eastern and Asian air carriers entered the capital of a number of groups and individual airlines.

The so-called “Big Three” of AE operators with holding structure and multinational system of assets has formed among the largest European network airlines. The Turkish national air carrier demonstrating high growth rates far exceeding the growth rate dynamics of the country’s economy occupies an independent position in this list. Currently, the largest European airlines are facing three key threats:

- fierce competition from the leading AE operators of the Middle East (mainly on long-haul routes);
- continuous expansion by the four largest European low-cost airlines in terms of servicing tourist flows and passengers flying for business purposes;
- growing competition with the US air carriers on transatlantic routes.

The noticeable growth of conflict potential in the civil aviation sector of the European Union facilitates the creation of new associations by the leading European aviation groups and low-cost airlines in order to develop efficient tools for protecting their interests at the interstate level. Establishment of A4E (Airlines for Europe) association is the evidence to the benefit of forming this trend. The struggle of European airlines (groups) for maintaining competitiveness in the forecast period will contribute to the further development of the processes of their unification and enlargement.

Within the next twenty years, the development of civil aviation in the region will be associated with new challenges conditioned by the following:

- desire of official authorities of the European Union to exclude any form of state support for the development of low-cost airlines and national carriers in general;
- disproportion in the income of airlines and in the system of regulating relations between airports and AE operators;
- growth of environmental requirements for civil aviation equipment and formation of new approaches to the next-generation air transport system.

Obtaining of significant results in terms of resource-saving transport with a minimum impact on the environment is expected after the implementation of the research on the Clean Sky European program, which will allow significantly upgrading the aviation industry by 2025.

Due to the accumulated amount of currently contracted airplanes, the demand for aircraft will be uneven over the periods mainly focusing on the acquisition by air carriers of narrow-body aircraft with a capacity exceeding 120 seats, as forecast. The total demand for civil aviation equipment by European airlines is forecast at 8,660 aircraft.
LATIN AMERICA
LATIN AMERICA

STATISTICS AND INFOGPHICS

In the forecast period, the cumulative increase in Latin American population will be 9.4% as of 2026 (640.4 million people in 2016, 705.5 million people in 2026). By 2036, the population is forecast at 746.3 million people (an overall increase by 16.5%). The share of the population of Latin America will slightly decrease by 0.2 p.p. (from 8.6 to 8.4%) in relation to the total world population.

TRENDS

Geographical location, reserves of hydrocarbons, metal ores and various minerals, as well as rich forest and water resources led to wide penetration of foreign, primarily US, companies, into the economy of Latin American countries, which to some extent was a deterrent to the development of national industry and private entrepreneurship, including the air transport industry.

Civil aviation in the countries of Latin America has seen more than 80 years of development obtaining a number of specific features forming the conditions and nature of its development for the long term.

The features of the economic and geographical situation of Latin America, the proximity of the USA and the remoteness from other regions of the world have a significant impact on air transportation directions in the region.

Subject to a low level of development of the transport system of Latin America, disunity of territories and weak overland connections between countries on the continent, air transport acquires exceptional importance in the economic development of the states of the region.

Introduction of the so-called open sky regime has stimulated Latin American airlines in recent years to reform their business models, to go through the enlargement stage in the form of multinational and multi-profile holding companies, as well as to accelerate the development of low-cost transportation and revise the fleet development strategy in terms of reducing the average service life of aviation equipment.

The forecast of GDP dynamics in Latin America is close to the worldwide average suggesting that GDP will increase by 2026 by 1.3 times, from USD 5.71 to 7.81 trillion.

By 2036, an increase by 1.8 times is forecast, i.e., to USD 10.38 trillion. The share of the region in the global GDP will increase by 0.3 p.p., from 7.5 to 7.8%.

In terms of growth in passenger turnover, Latin America is only slightly inferior to the leading regions (China and the Middle East). By 2026, growth by 1.7 times, from 364 to 632 billion RPK, is expected. As of 2036, passenger turnover is expected to triple, to 1,110 billion RPK. The regional share in world passenger turnover will increase by 1.3 p.p (from 5.2 to 6.5%). The compound average annual growth rate of passenger air transportation volume in Latin America will be 5.7% until 2036.

The total demand for new passenger airplanes is estimated at 3,410 AC, or USD 400 billion. The firm orders declared cover 29% of the expected demand. A record-setting high share of deliveries is expected in the NB 120+ segment (77% in the number of aircraft and 84% in their cost vs. worldwide average of 65 and 55%, respectively).

When comparing the distribution of the modern aircraft fleet of the region to the similar world average distribution, a high share of aircraft with a capacity up to 120 seats (39% in the region vs. 30% in the world) and, correspondingly, a small WB AC share (9% in the region vs. 17% in the world) can be noted. The average fleet age is 11.3 years, which is close to the worldwide average of 11.4 years. It is expected that 720 aircraft will live through to the end of the forecast period, i.e., 39% of the current fleet. The number of firm orders for new aircraft is 984, which is 53% of the fleet size in 2016.

The expected substantial growth of economic activity of the so-called middle class in the countries of the region during the forecast period will contribute to increasing the mobility of the population and preserving the steady development of air transportation, especially on domestic and regional routes. In this connection, the current formally significant network of airports and airfields (about 12.5 thousand) in Latin America will not correspond to the planned rates of growth in air transportation and will require the implementation of new projects for the development of civil aviation infrastructure in the region and relevant government support measures.

Development of the airport infrastructure and air transportation network in the region, active operation of large aviation holding companies and national airlines, as well as the high share of low-cost transportation on domestic routes, make it possible to forecast that the total demand for new aircraft in the region will amount to 3,410 units in the specified period with the priority of narrow-body aircraft with a capacity exceeding 120 seats.

Transportation distribution by range

The airlines of the region perform transportation in all ranges, but the prevailing range is from 0.5 to 3 thousand km (59.6% of the total passenger turnover vs. worldwide average of 49.7%). The greatest reduction and the greatest growth in the transportation share are expected in the ranges of 8–9 and 0.5–1.5 thousand km (by 1.4 and 2.3 p.p., respectively). The median of the peak passenger turnover distribution will decrease by 2.2%, from 2,084 km in 2016 to 2,019 km in 2036.
It is expected that the growth rate of the population of the Middle East will be twice of the worldwide average in the forecast period lagging behind Africa only. By 2026, the population in this region will grow by 17.9%, from 244.1 to 287.8 million people. According to the current forecasts, the population of the Middle East will be 325.7 million people by 2036, i.e., the total growth over 20 years will be 33.4%. The share of the region in the world population will increase by 0.4 p.p., from 3.3 to 3.7%.

Unlike the impressive growth rates of the population, the economic growth of the region in accordance with the forecast expectations will only slightly outstrip the worldwide average. By 2026, the GDP of the region will grow by 1.4 times, from USD 2,53 to 3.63 trillion. By 2036, the GDP of the countries of the Middle East will double over the entire forecast period and amount to USD 4.97 trillion. The share of the region in the global GDP will increase by 0.4 p.p., from 3.3 to 3.7%, from 2016 to 2036.

The region is characterized by the largest share of wide-body aircraft (48% at a world average of 17%) and the largest ratio between the number of orders and the number of aircraft in the passenger fleet (more than 100% at a world average of 49%). The existing fleet is relatively young. The average fleet age is 9.4 years (11.4 years for the world in general). It is expected that 520 aircraft, or 36% of the modern fleet, will remain in the world passenger fleet in 2036. The announced firm orders are concentrated in the capacity groups of NB 120+ and WB airplanes.

According to the forecast, the Middle East will compete with China with its growth rates of passenger air transportation, being significantly ahead of other regions of the world. By 2026, it is expected that passenger turnover in the Middle East will double, from 673 to 1,341 billion RPK. By 2036, the volume of passenger air transportation will increase by 3.2 times, to 2,153 billion RPK. The regional share in world passenger turnover will increase by 3.1 p.p., from 9.5 to 12.6%. The compound average annual growth rate of passenger air transportation in the Middle East will be 6% by 2036.

The main feature of the regional airlines’ distribution by range is the abnormally high share of operation on ultra-long-haul routes (> 10,000 km) equal to 19.3% with a world average of 7.7%. By 2036, this share in the region will increase to 22% vs. only up to 9% in the world in general. The median of the peak passenger turnover distribution by range is expectedly high (5,228 km in 2016) and will increase by 4.5% (to 5,480 km) by 2036.
NORTH AMERICA
The population in the countries of North America in the forecast period until 2026 will grow from 360.7 to 390.4 million people and to 416.6 million by 2036, which will mean an addition to the current level by 8.2 and 15.5%, respectively. These growth rates will be lower than global. As a result, the share of countries in the region with respect to the global population will decrease by 0.2 p.p. over the 20 years, from 4.9 to 4.7%.

The forecast expectations are based on the assumption that North American GDP growth rates will gradually fall behind the world average. By 2026, the GDP growth is expected to increase 1.2 times, from USD 18.7 to 23 trillion; by 2036, the forecast level is USD 28.2 trillion, which means an increase by 1.5 times. Herewith, the share of the states of the region in the global balance will decrease from 24.4 to 21.1% by the end of the forecast period.

The volume of passenger air transportation in the countries of North America, according to the forecast expectations, will grow by 1.3 times to 2026, from 1.7 to 2.2 trillion RPK; by 2036, growth by 1.7 times to the level of 2016 is expected, up to 2.9 trillion RPK. The share of North America in the global balance will decrease by 71 p.p., from 34.1 to 17%. In the period until 2036, the aggregate average annual growth rate of passenger air transportation in the region will be 2.7%.

The forecast demand for new passenger airplanes is estimated at 8,360 AC amounting to USD 879 billion. According to the expected number of new AC deliveries, North America will give way to Europe and the APR, and also to China in terms of their cost. The existing firm orders cover 28% of the expected demand. A characteristic feature of the region is the high share in the expected demand for jet aircraft with a capacity of 61–90 seats (19% of the total number of new AC in the region, while the worldwide average is 6%).

The development of civil aviation in the USA in the forecast period will be largely connected to the gradual formation of a new vision of the Aeropolicy of State primarily meeting the national interests. Results of the implementation of the State Program of the Federal Aviation Administration of the United States for the creation of a next-generation national air transport system will play a special role in this regard. The ten-year program New Aviation Horizons (2017–2026) and NASA’s Strategic Plan for Aviation Development until 2035 will make it possible to successfully implement the plans outlined. The provisions of the new US Aeropolicy of State will become the main standards for the formation and implementation of the aviation industry development programs for other countries of the continent, despite Canada’s own position on civil aviation development.

Growing competition in transatlantic shipping will further lead to increased US protectionism, perhaps not always directly, which will affect the pattern of demand for new aircraft in the region.

In the forecast period, the North American market will be one of the major in the total world demand for new aircraft. The total demand of North American airlines is expected to be 8,360 aircraft.

North America has the largest passenger AC fleet with an average age of 13.5 years, which is 2.1 years more than the worldwide average. By 2036, approximately 1,660 airplanes of those available in the region at the end of 2016 will remain in the world passenger fleet. The number of orders for new aircraft is 2,203 (29% of the number of aircraft in the fleet), which is much lower than the worldwide average (49%). The composition of the modern fleet of regional airlines is characterized by the same high share (41%) of airplanes with a capacity of up to 120 seats, as that of the Russian airlines.

A shift in the distribution of transportation towards longer routes is forecast for airlines in the region. The greatest reduction in the share is expected on the routes of up to 1.5 thousand km (2.7%); the greatest growth is expected on the routes with a range of 3 to 6 thousand km and exceeding 7 thousand km (1.4% each). The median of the peak passenger turnover distribution will increase by a record-setting 5.5%, from 2,625 to 2,769 km, yet still lagging behind the worldwide average.

Transportation distribution by range

Over the past 15 years, this US industry has continued to develop actively and has undergone significant changes. According to the rating of World’s Top 50 Airlines in terms of the scale of activity and the size of the fleet of aircraft in operation, the first three places are occupied by American network carriers with a significant margin.

The policy of air transportation liberalization in the countries of the Northern and Southern Americas has allowed low-cost airlines from the USA taking leading positions in this segment, especially within the Caribbean. The world’s largest US low-cost airline is ranked fifth in the world Top-50 rating according to the number of passengers carried, while its aircraft fleet is almost twice as large as the fleet of the largest low-cost carrier in Europe.

The forecast turnover share

Historically clearly formulated principles of development and the sequence of their implementation within the so-called State Aero-Policy combined with tight coordination of the activities of authorized state bodies and business structures allowed creating a modern air transportation system and an effective pool of airlines in the USA.

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MARKET REVIEW 2017–2036

TRENDS

Civil aviation of the North American countries in terms of gross indicators is leading the global air transport industry.

Historically clearly formulated principles of development and the sequence of their implementation within the so-called State Aero-Policy combined with tight coordination of the activities of authorized state bodies and business structures allowed creating a modern air transportation system and an effective pool of airlines in the USA.
AFRICA

STATISTICS AND INFographics

The specifics of the passenger air transportation market development in Africa is that it is the region with the fastest growing population. Thus, as of 2026, the population of the African continent is expected to grow by 26.3%, from 1.21 to 1.53 billion people. By 2036, the population on the continent will increase by 55.8%, to 1.89 billion people. Over the entire period from 2016 to 2036, the African share in the total population of the Earth will increase by 4.9 p.p., from 16.3 to 21.2%

From 2016 to 2026, the GDP of the African countries will grow by 1.4 times, from USD 2.31 to 3.33 trillion, which is higher than the worldwide average (1.3). By 2036, it is expected that the GDP of African countries will double as compared to 2016, to USD 4.72 trillion, which will also exceed the expected level of worldwide average growth (1.8). The share of Africa in the global GDP for 20 years of the forecast period will increase by 0.5 p.p., from 3.0 to 3.5%

By 2036, the total passenger turnover of African companies will increase the figures of 2016 by approximately three times.

Objective restrictions on the access of air carriers to debt financing, as well as the terms and conditions of its provision, will be deterring the development of many airlines in the region. This circumstance will preserve the current practice of acquiring aviation equipment from the secondary market by operators, which will continue to dominate primarily in the regional aviation segment. Moreover, in terms of the number of countries and airlines operating modern turboprop airplanes of western production (customer base), African civil aviation is approaching Europe as the leader of the segment (African accounts for 18% with 22.2% for Europe). However, the average number of such airplanes per African airline is only 3.5 AC, while it is 6.3–11.5 units in Europe and 8.7–10.7 units in North America. In general, the share of African airlines is only 9.7% (Europe – 25.8%) of the total world fleet of turboprop airplanes manufactured in the West.

Despite the desire of the airlines’ management to improve the efficiency of business and comply with international flight safety standards, limited transactions for the acquisition of new jet aircraft of the world’s major manufacturers will not be able to change the current trends in AC fleet update and the carrier development in the region.

In the long run, the basis of demand of African airlines will be formed by narrow-body and wide-body aircraft with a capacity of 150 and 250 seats, respectively, and the total demand for new aircraft is forecast at 810 units.

The growth dynamics of passenger turnover in Africa will largely follow the global trends. By 2026, it will grow by 1.6 times, from 150 to 239 billion RPK. By 2036, the volume of passenger air transportation will increase by 2.5 times, to 370 billion RPK. The share of Africa in world passenger turnover will give a minimum increase of 0.1 p.p (2.1% in 2016, 2.2% in 2036). The compound average annual growth rate of passenger air transportation in Africa will be 4.6% by 2036, as expected.

TRENDS

Africa is the second largest continent after Eurasia. The low level of economic development of African countries, their limited financial resources and political instability have a significant impact on the air transport system development and the intensity of civil air transportation in the region.

An important feature of economic activity in Africa is concentration (polarization) of production potential in several centers: North and South are industrially developed in the regional dimension, West has its oil resources and the so-called copper belt, while East with its agriculture and livestock is the least developed center, which is also expressed in the fragmented nature of improvement of the transport infrastructure and airlines of the countries of the region.

Having significant land, mineral, plant, water and other resources, Africa has become a zone of competition for control over them between the USA, the EU, Japan and China. However, this factor contributes to the strengthening of the air transport industry of the continent to a certain extent.

Active expansion of leading carriers from the Gulf with flights through their hubs with have a significant impact on further development of airlines in Eastern and Southern Africa.

The passenger aircraft fleet of African airlines consists of 1,186 AC with an average age of 15.2 years. The region is characterized by the largest share of aircraft with a capacity of up to 120 seats (52% vs. worldwide average of 30%) and one of the smallest ratios between the number of orders and the number of aircraft in the passenger fleet being 13% (only the CIS countries ex Russia have less – 12%). It is expected that about 280 aircraft (24%) of the current regional fleet will remain active by 2036.

African airlines meet 41% of the need for passenger aircraft through purchases in the secondary market (only the CIS countries ex Russia meet more). This circumstance to a large extent determined the demand for new passenger aircraft in the amount of 810 units and USD 117 billion in 2017 catalog prices. Despite the prevailing fleet structure with the predominance of relatively small aircraft, the most profitable market in the region is expected to be the market for WB aircraft with the number of seats up to 325 (46% of the regional market in terms of cost). The firm orders declared cover only 15% of the expected demand of the region.

The distribution of transportation by range is one of the most uniform among other regions of the world. The total share is expected to decrease by 2.1 p.p. in the range of up to 1,500 km and to increase by 3.2 p.p. in the range from 1.5 to 5 thousand km. At ranges exceeding 5 thousand km, the change in the transportation share can be characterized as multi-directional. The median of the peak passenger turnover distribution in terms of range will increase by 2.2%, from 3,098 km in 2016 to 3,164 in 2036.

Regional Review 2017-2036
APPENDICES

STATISTICAL INDICATORS

World passenger aircraft fleet at the end of 2016 (AC quantity)

<table>
<thead>
<tr>
<th>Capacity/AC size</th>
<th>World in general</th>
<th>Russia</th>
<th>CIS (post-Basket)</th>
<th>China</th>
<th>Asia-Pacific (High-growth trend)</th>
<th>Europe</th>
<th>Latin America</th>
<th>Middle East</th>
<th>North Africa</th>
<th>Russia</th>
<th>Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;30 TPE</td>
<td>1,801</td>
<td>151</td>
<td>76</td>
<td>31</td>
<td>317</td>
<td>209</td>
<td>188</td>
<td>27</td>
<td>429</td>
<td>193</td>
<td></td>
</tr>
<tr>
<td>&gt;60 TPE</td>
<td>1,253</td>
<td>29</td>
<td>4</td>
<td>0</td>
<td>440</td>
<td>370</td>
<td>104</td>
<td>16</td>
<td>179</td>
<td>111</td>
<td></td>
</tr>
<tr>
<td>30–60 TJE</td>
<td>1,867</td>
<td>88</td>
<td>33</td>
<td>31</td>
<td>28</td>
<td>159</td>
<td>61</td>
<td>19</td>
<td>1,140</td>
<td>108</td>
<td></td>
</tr>
<tr>
<td>61–120 NB</td>
<td>3,307</td>
<td>159</td>
<td>70</td>
<td>181</td>
<td>250</td>
<td>531</td>
<td>374</td>
<td>143</td>
<td>1,374</td>
<td>206</td>
<td></td>
</tr>
<tr>
<td>125–250 NB</td>
<td>14,180</td>
<td>452</td>
<td>168</td>
<td>2,381</td>
<td>2,216</td>
<td>3,271</td>
<td>962</td>
<td>544</td>
<td>3,824</td>
<td>382</td>
<td></td>
</tr>
<tr>
<td>&lt;325 WB</td>
<td>3,213</td>
<td>74</td>
<td>31</td>
<td>412</td>
<td>740</td>
<td>704</td>
<td>141</td>
<td>309</td>
<td>646</td>
<td>156</td>
<td></td>
</tr>
<tr>
<td>&gt;325 WB</td>
<td>1,242</td>
<td>49</td>
<td>0</td>
<td>63</td>
<td>378</td>
<td>233</td>
<td>21</td>
<td>370</td>
<td>98</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>TOTAL AC</td>
<td>26,463</td>
<td>981</td>
<td>382</td>
<td>3,079</td>
<td>4,369</td>
<td>5,497</td>
<td>1,851</td>
<td>1,428</td>
<td>7,690</td>
<td>1,186</td>
<td></td>
</tr>
</tbody>
</table>

Average annual growth rate for RPK and GDP (world in general)

- CAGR GDP 2.7% 2.8%
- CAGR RPK 5.4% 4.5%

Long-haul airplanes with luxury cabins

- 276 AC 415 AC

Cargo airplanes

- 1,800 AC 2,390 AC

Long-haul airplanes with luxury cabins

- 276 AC 415 AC

CARGO AND BUSINESS AIRCRAFT, CURRENT FLEET AND DELIVERIES (WORLD IN GENERAL)

<table>
<thead>
<tr>
<th>Item No.</th>
<th>ABBREVIATION</th>
<th>INTERPRETATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>“+”</td>
<td>exceeding</td>
</tr>
<tr>
<td>2.</td>
<td>“09/11”</td>
<td>terrorist attack on the USA on 11.09.2001</td>
</tr>
<tr>
<td>3.</td>
<td>A4E</td>
<td>Airlines for Europe</td>
</tr>
<tr>
<td>4.</td>
<td>AC</td>
<td>aircraft</td>
</tr>
<tr>
<td>5.</td>
<td>AC age</td>
<td>calendar service life of the aircraft since the beginning of operation</td>
</tr>
<tr>
<td>6.</td>
<td>AE</td>
<td>aviation equipment</td>
</tr>
<tr>
<td>7.</td>
<td>Air mobility</td>
<td>number of passenger-kilometers per capita</td>
</tr>
<tr>
<td>8.</td>
<td>BOC</td>
<td>Bank of China</td>
</tr>
<tr>
<td>9.</td>
<td>CAGR</td>
<td>compound average annual growth rate</td>
</tr>
<tr>
<td>10.</td>
<td>CALC</td>
<td>China Aircraft Leasing Group Holdings Limited</td>
</tr>
<tr>
<td>11.</td>
<td>CDB</td>
<td>China Development Bank</td>
</tr>
<tr>
<td>12.</td>
<td>CIS</td>
<td>Commonwealth of Independent States</td>
</tr>
<tr>
<td>13.</td>
<td>Clean Kt</td>
<td>European research program developing innovative aviation technology</td>
</tr>
<tr>
<td>14.</td>
<td>COMAC</td>
<td>Commercial Aircraft Corporation of China</td>
</tr>
<tr>
<td>15.</td>
<td>CRAF</td>
<td>the Civil Reserve Air Fleet program for cargo transportation in the interests of the US Department of Defense</td>
</tr>
<tr>
<td>16.</td>
<td>CSL</td>
<td>calendar service life</td>
</tr>
<tr>
<td>17.</td>
<td>DB</td>
<td>design bureau</td>
</tr>
<tr>
<td>18.</td>
<td>EIA</td>
<td>Independent agency in the US federal statistical system</td>
</tr>
<tr>
<td>19.</td>
<td>ESCAP</td>
<td>United Nations Economic and Social Commission for Asia and the Pacific</td>
</tr>
<tr>
<td>20.</td>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>21.</td>
<td>gate-to-gate</td>
<td>from the airport apron (airport of departure) to the airport apron (airport of destination)</td>
</tr>
<tr>
<td>22.</td>
<td>GDP</td>
<td>gross domestic product</td>
</tr>
<tr>
<td>23.</td>
<td>ICBC</td>
<td>Industrial and Commercial Bank of China</td>
</tr>
<tr>
<td>24.</td>
<td>IRI</td>
<td>Islamic Republic of Iran</td>
</tr>
<tr>
<td>25.</td>
<td>Kt</td>
<td>ton-kilometer</td>
</tr>
<tr>
<td>26.</td>
<td>LRA</td>
<td>long-range aircraft</td>
</tr>
<tr>
<td>27.</td>
<td>NB</td>
<td>narrow-body aircraft</td>
</tr>
<tr>
<td>28.</td>
<td>Online store</td>
<td>a store selling via Internet</td>
</tr>
<tr>
<td>29.</td>
<td>p.p.</td>
<td>percentage point</td>
</tr>
<tr>
<td>30.</td>
<td>PRC</td>
<td>People’s Republic of China</td>
</tr>
<tr>
<td>31.</td>
<td>RPX</td>
<td>revenue per kilometer</td>
</tr>
<tr>
<td>32.</td>
<td>RF</td>
<td>Russian Federation</td>
</tr>
<tr>
<td>33.</td>
<td>S&amp;P 500</td>
<td>stock index of 500 US companies with the largest capitalization</td>
</tr>
<tr>
<td>34.</td>
<td>SARS</td>
<td>severe acute respiratory syndrome epidemic</td>
</tr>
<tr>
<td>35.</td>
<td>SCAC</td>
<td>Sukhoi civil aircraft</td>
</tr>
<tr>
<td>36.</td>
<td>SSJ</td>
<td>Sukhoi Superjet</td>
</tr>
<tr>
<td>37.</td>
<td>TJE</td>
<td>AC with a turbojet engine</td>
</tr>
<tr>
<td>38.</td>
<td>TPE</td>
<td>AC with a turboprop engine</td>
</tr>
<tr>
<td>39.</td>
<td>UAE</td>
<td>United Arab Emirates</td>
</tr>
<tr>
<td>40.</td>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>41.</td>
<td>USA</td>
<td>United States of America</td>
</tr>
<tr>
<td>42.</td>
<td>WB</td>
<td>wide-body aircraft</td>
</tr>
<tr>
<td>43.</td>
<td>XAL</td>
<td>index considering the most liquid shares of air companies</td>
</tr>
</tbody>
</table>

Notes:

2. The cost parameters of the review (where there are no additional indications) are given in the catalog prices of 2017.
3. Statistical data on the AC fleet are provided as of December 31, 2016.
4. Statistical data on the AC orders are provided as of April 2017.
5. In preparing the review, the information provided by FlightGlobal Flight Fleets Analyzer, ICAO Data Plus, IATA, IHS Markit, the UN, statistical committees of individual countries and other sources was used.