

Statistical Bulletin of Civil Aviation Industry Development in 2019

In 2019, following Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, the entire industry fully implemented the guiding principles of the Party's 19th National Congress and the second, third, and fourth plenary sessions of its 19th Central Committee, as well as the Central Economic Work Conference. Guided by the new development concept and acting in accordance with the "one acceleration, two realizations" strategic process of building China into a civil aviation power in the new era, the industry fully implemented the general guidelines of "implementing one perception, ensuring simultaneous development of transport aviation and general aviation, guarding the three bottom lines, and "making up for the four meak links" governing civil aviation activities in the new era, in a bid to promote high-quality development of civil aviation, which produced remarkable results.

I. Transport Aviation

In 2019, China was confronted with increasing external risks and challenges, and the downward pressure on the domestic economy continued to amplify. The civil aviation industry continued to focus its development strategy on "controlling the total traffic volume while making structure adjustment", to allow the industry to

pursue progress while maintaining steady growth.

1. Transport Turnover

In 2019, the whole industry recorded a total transport turnover of 129.325 billion ton-km, up 7.2% year on year. Domestic routes registered a total transport turnover of 82.951 billion ton-km, up 7.5% year on year, including 1.690 billion ton-km for the markets in Hong Kong, Macao and Taiwan, down 3.5% year on year. The international routes witnessed a transport turnover of 46.374 billion ton-km, up 6.6% year on year.

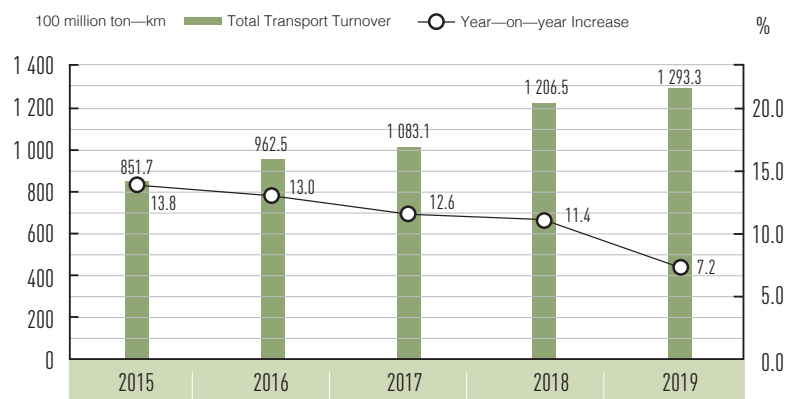


Figure 1 Total Transport Turnover of Civil Aviation 2015–2019

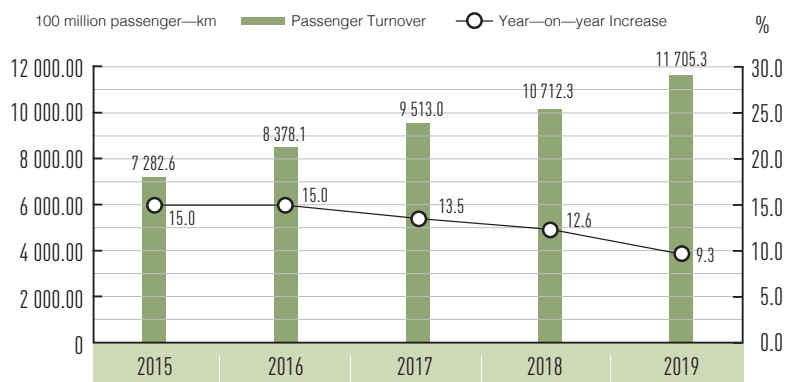


Figure 2 Passenger Turnover of Civil Aviation 2015–2019



A passenger turnover of 1.171 trillion passenger-km was registered in the whole industry, up 9.3% year on year. The passenger turnover on domestic routes reached 852.022 billion passenger-km, up 8.0% year on year, of which 16.046 billion passenger-km was attributable to the markets in Hong Kong, Macao and Taiwan, down 2.8% year on year. The passenger turnover on international routes hit 318.508 billion passenger-km, up 12.8% year on year.

The whole industry registered a cargo and mail turnover of 26.320 billion ton-km, up 0.3% year on year. The domestic routes recorded 7.859 billion ton-km, up 4.1% year on year, including 281 million ton-km on Hong Kong, Macao and Taiwan routes, a 6.9% decline year on year. The international routes saw 18.461 billion ton-km, a 1.3% fall year on year.

2. Passenger Traffic

In 2019, the whole industry transported 659.934 million passengers, up 7.9% year on year. 585.680 million passengers were transported on domestic routes, up 6.9% year on year, including 11.076 million on Hong Kong, Macao and Taiwan routes, down 1.7% year on year. The international routes saw a passenger traffic of 74.254 million, up 16.6% year on year.

3. Cargo and Mail Traffic

In 2019, the whole industry transported 7.531 million tons of cargo and mail, up 2.0% year on year. 5.112 million tons of cargo and mail were transported on domestic routes, up 3.1% year on year, including 222.2 thousand tons on Hong Kong, Macao and Taiwan routes, down 5.4% year on year. The international

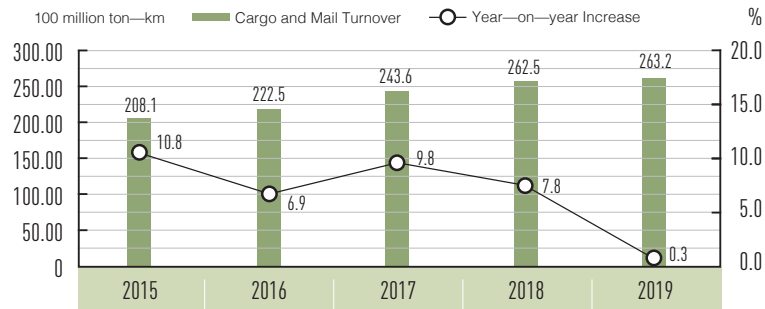


Figure 3 Cargo and Mail Turnover of Civil Aviation 2015—2019

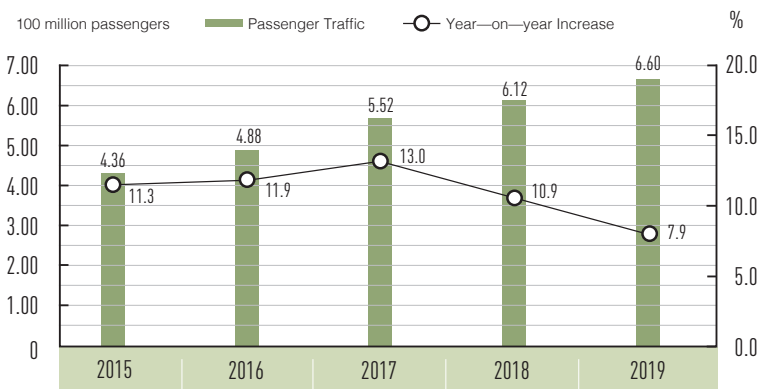


Figure 4 Passenger Traffic of Civil Aviation 2015—2019

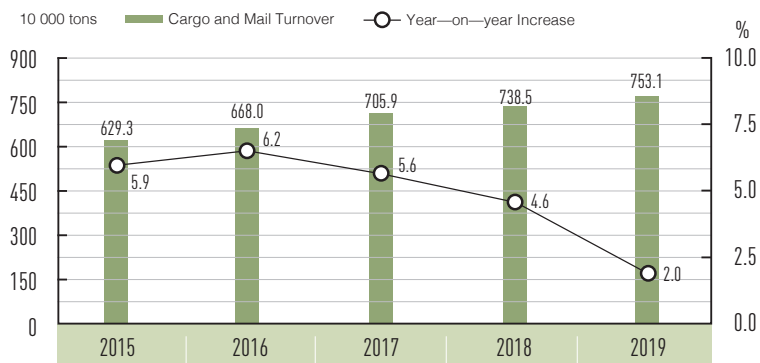


Figure 5 Cargo and Mail Transported by Civil Aviation 2015—2019

routes saw a mail and cargo traffic of 2.419 million tons, down 0.3% year on year.

4. Flight Hours and Take-offs

In 2019, transport airlines in the whole industry posted 12.311 million flight hours, up 6.7% year on year. 9.916 million flight hours were flown on domestic routes, up 6.2% year on year, including 200.8 thousand

flight hours on Hong Kong, Macao and Taiwan routes, up 1.8% year on year. The international routes saw 2.395 million flight hours, up 9.1% year on year.

In 2019, transport airlines in the whole industry performed a total of 4.966 million take-offs, up 5.8% year on year. 4.478 million take-offs were for domestic flights, up 5.1% year on year, including 83.8 thousand take-offs for flights in Hong Kong, Macao and Taiwan, up 2.0% year on year. International flights saw 488.4 thousand take-offs, up 12.2% year on year.

In 2019, transport airlines in the whole industry registered 32.1 thousand non-commercial flight hours, including 14.7 thousand flight hours for training, and performed 66.9 thousand non-commercial take-offs.

5. Number of Transport Airlines

By the end of 2019, there were a total of 62 transport airlines in China, a net increase of 2 from that by the end of 2018, including 48 state-controlled airlines and 14 privately-controlled airlines if categorized based on the type of ownership. Among all the transport airlines, there were 9 all-cargo airlines, 10 joint venture airlines and 8 publicly listed airlines.

6. Transport Aircraft Fleet

By the end of 2019, the civil aviation industry had 3 818 registered transport aircraft, 179 more than that by the end of 2018.

7. Route Network

By the end of 2019, there were 5 521

Table 1 Number of Transport Aircraft in 2019

Aircraft Categories	Number of Aircraft	Increase from 2018	Percentage of Transport Fleet (%)
Total	3 818	179	100.0
Passenger Aircraft	3 645	166	95.5
Including:			
Wide-body Aircraft	457	48	12.0
Narrow-body Aircraft	2 997	114	78.5
Regional Aircraft	191	4	5.0
Freighters	173	13	4.5

scheduled routes in China, which included 4 568 domestic routes (including 111 for the Hong Kong, Macao and Taiwan markets) and 953 international routes. The total route distance was 13.630 million km if the overlap distance was counted in, or 9.482 million km if the overlap distance was deducted.

Table 2 Number of Scheduled Routes and Mileage in China in 2019

Indicator	Value
Number of Air Routes	5 521
Domestic Air Routes	4 568
Including: Hong Kong, Macao and Taiwan Air Routes	111
International Air Routes	953
Air Route Mileage Including Overlapped Distance (10 000 km)	1 362.96
Domestic Air Routes	917.66
Including: Hong Kong, Macao and Taiwan Air Routes	16.71
International Air Routes	445.30
Air Route Mileage Excluding Overlapped Distance (10 000 km)	948.22
Domestic Air Routes	546.75
Including: Hong Kong, Macao and Taiwan Air Routes	16.71
International Air Routes	401.47

By the end of 2019, 234 domestic cities were served by scheduled flights (excluding Hong Kong, Macao and Taiwan); Chinese airlines operated scheduled international flights to 167 cities in 65 countries; domestic airlines operated scheduled flights to Hong Kong from 30 mainland cities and to Macao from 19 mainland cities and to Taiwan from 49 mainland cities.

8. Operations of Transport Airlines (Groups)

In 2019, China National Aviation Holding Group recorded 2.799 million flight hours. It registered a total transport turnover of 31.861 billion ton-



km, up 1.9% year on year, and carried 143 million passengers, a y-o-y increase of 4.2%, and 2.047 million tons of cargo and mail, a 2.1% fall year on year.

China Eastern Air Holding Group recorded 2.436 million flight hours. It registered a total transport turnover of 25.241 billion ton-km, up 8.5% year on year, and carried 130 million passengers and 1.469 million tons of cargo and mail, a y-o-y increase of 7.5% and 1.8% respectively.

China Southern Air Holding Group recorded 2.951 million flight hours. It registered a total transport turnover of 32.624 billion ton-km, up 7.5% year on year, and carried 152 million passengers and 1.764 million tons of cargo and mail, a respective y-o-y increase of 8.4% and 1.8%.

Hainan Airlines Group recorded 1.902 million flight hours. It registered a total transport turnover of 20.127 billion ton-km, up 3.5% year on year, and carried 114 million passengers, a y-o-y increase of 4.6%, and 841.9 thousand tons of cargo and mail, a 2.6% fall year on year.

In 2019, all other airlines together recorded 2.224 million flight hours. They registered a total transport turnover of 19.473 billion ton-km, up 19.1% year on year, and carried 122 million passengers and 1.410 million tons of cargo and mail, a respective y-o-y increase of 15.8% and 12.4%.

9. Transport Airports

By the end of 2019, there were 238 certified transport airports in China, a net increase of 3 from that by the end of

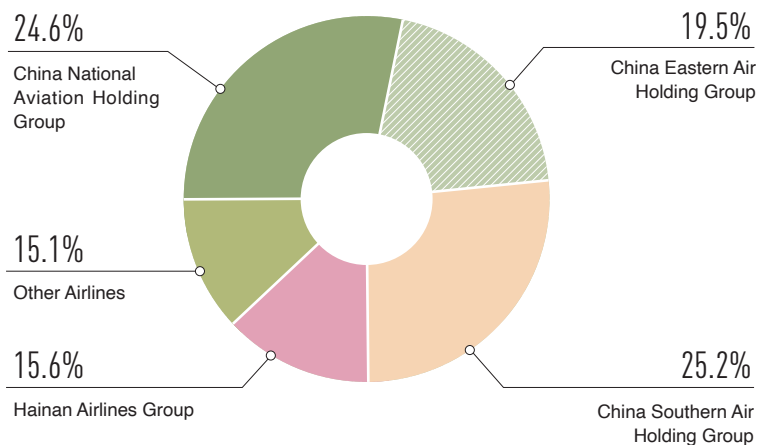


Figure 6 Proportions of Total Transport Turnover by Airlines (Groups) in 2019

2018. Newly built airports in 2019 were Beijing Daxing International Airport, Enyang Airport in Bazhong, Wushan Airport in Chongqing, and Garze Gesar Airport.

In 2019, Beijing Nanyuan Airport ceased operation, and Yibin Caiba Airport was replaced by Yibin Wuliangye Airport.

If classified based on the airfield area class, 13 of the certified airports were 4F, 38 were 4E, 38 were 4D, 143 were 4C, 5 were 3C and 1 was below 3C.

In 2019, 126 airport projects were newly launched or carried over from 2018. 7 runways, 444 parking stands and 1.749 million square meters of terminal floorage were newly added. By the end of 2019, transport airports in China had 261 runways, 6 244 parking stands and 16.29 million square meters of terminal floorage.

Table 3 Number of Certified Transport Airports by Region in 2019

Region	Number of Certified Transport Airports	Percentage of the Total (%)
Nationwide	238	100.0
Including: Northeast Region	54	22.7
East Region	36	15.1
West Region	121	50.8
Central Region	27	11.3

10. Traffic Handled by Airports

In 2019, the civil transport airports across China handled 1.352 billion passengers, up 6.9% year on year.

Specifically, 710 million passengers were handled by airports in the eastern region, 156 million by airports in the central region, 403 million by airports in the western region, and 84 million by airports in

the northeastern region, representing a year-on-year increase of 5.4%, 10.8%, 8.3% and 6.2% respectively.

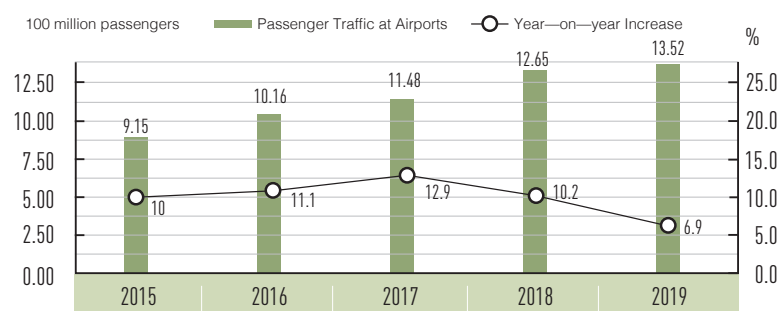


Figure 7 Passenger Traffic at Civil Transport Airports 2015–2019

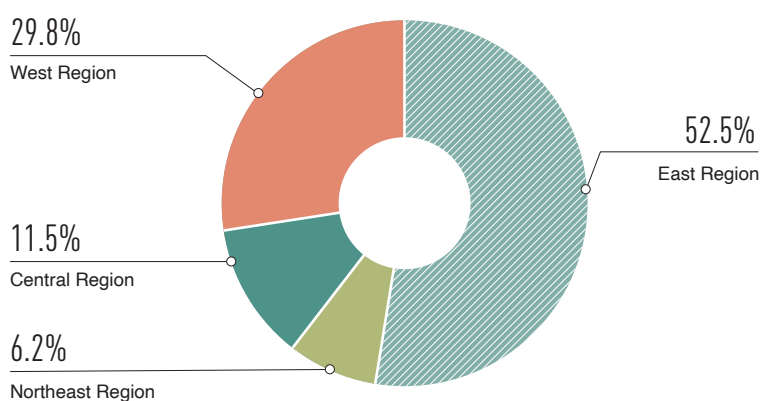


Figure 8 Distribution of Passenger Traffic at Airports by Region in 2019

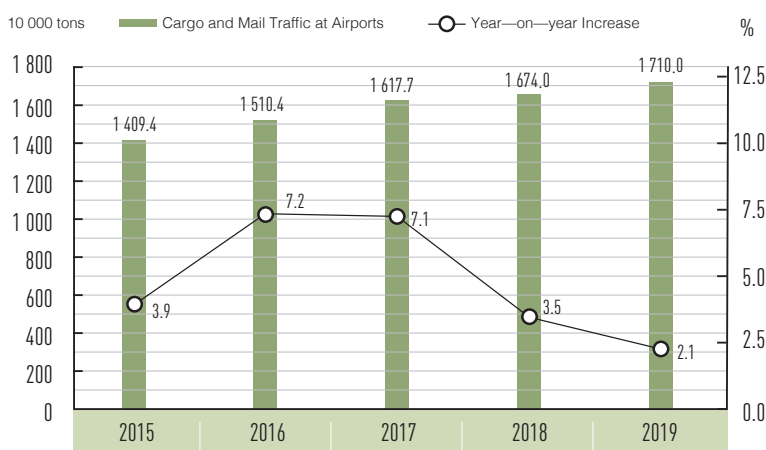


Figure 9 Cargo and Mail Traffic at Civil Transport Airports 2015–2019

In 2019, civil transport airports across China handled 17.100 million tons of cargo and mail, up 2.1% year on year.

Specifically, 12.459 million tons of cargo and mail were handled by airports in the eastern region, unchanged from a year earlier; 1.247 million tons by airports in the central region, up 9.9%; 2.790 million tons by airports in the western region, up 7.4%; and 603.6 thousand tons by airports in the northeastern region, up 9.6%.

In 2019, civil transport airports across China saw 11.661 million movements, up 5.2% year on year, including 9.868 million movements for commercial flights, a year-on-year increase of 5.3%.

In 2019, there were 106 transport airports capable of handling more than 1 million passengers annually. The airports of Beijing, Shanghai and Guangzhou contributed 22.4% to the total traffic, a decrease of 0.9 percentage point from 2018.

In 2019, there were 59 transport airports capable of handling more than 10 thousand tons of cargo and mail annually. The cargo and mail traffic handled by the airports of Beijing, Shanghai and Guangzhou accounted for 46.5% of the total, a decrease of 2.3 percentage points from 2018.

In 2019, Beijing Capital International Airport handled 100 million passengers, ranking the second in the world for 10



consecutive years. Shanghai Pudong Airport handled 3.634 million tons of cargo and mail, ranking the third in the world for 12 years in a row.

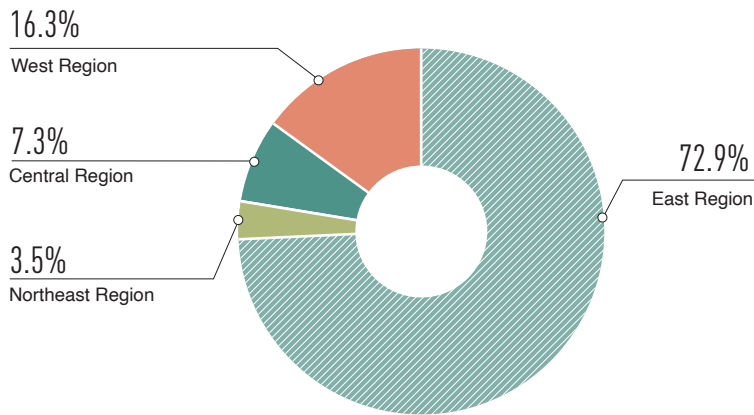


Figure 10 Distribution of Cargo and Mail Traffic at Airports by Region in 2019

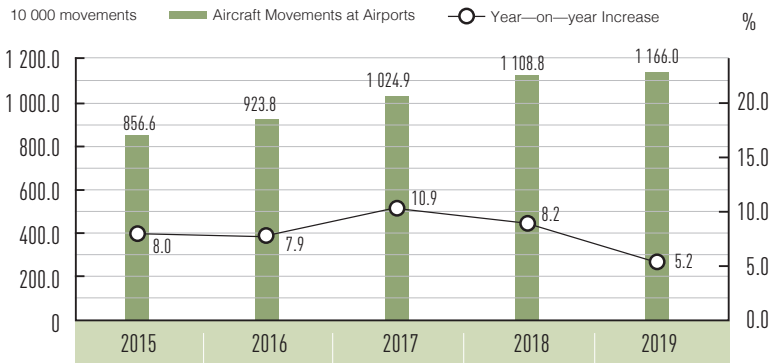


Figure 11 Aircraft Movements at Civil Transport Airports 2015—2019

Table 4 Number of Airports with Passenger Traffic Exceeding 1 Million in 2019

Annual Passenger Traffic	Number of Airports	Increase from 2018	Percentage of Total (%)
More Than 10 Million Passengers	39	2	83.3
1~10 Million Passengers	67	9	13.2

Table 5 Number of Airports with Cargo and Mail Traffic Exceeding 10 000 Tons in 2019

Annual Cargo and Mail Traffic	Number of Airports	Increase from 2018	Percentage of Total (%)
10 000 Tons or Above	59	6	98.4

II. General Aviation

1. General Aviation Enterprises

By the end of 2019, there were 478 certified general aviation enterprises, including 104 in North China, 39 in Northeast China, 113 in East China, 116 in Central Southern China, 55 in Southwest China, 33 in Northwest China, and 18 in Xinjiang.

2. Aircraft Fleet Size

By the end of 2019, there were a total of 2 707 registered general aviation aircraft, including 849 aircraft for training.

3. General Aviation Airports

In 2019, 44 general aviation airports were newly certified, adding the number of certified general aviation airports to 246.

4. Flight Hours

In 2019, the whole general aviation industry posted 1.065 million flight hours, up by 13.6% from a year earlier, including 99.5 thousand hours of passenger-carrying operations, up by 17.5% from 2018; 160.5 thousand hours of industrial aviation operations, a year-on-year increase of 4.3%; 386.6 thousand hours of training operations, up by 26.1%; 53.2 thousand hours of other GA operations, up by 6.6%; and 365.2 thousand hours of non-commercial operations, a y-o-y increase of 6.7%.

5. Unmanned Aircraft

By the end of 2019, there were 371 thousand registered unmanned aircraft users, including 324 thousand individual users and 47 thousand enterprises, public institutions and government

entities, with the number of registered unmanned aircraft in China totaling 392 thousand.

In 2019, there were 67 218 valid UA pilot licenses in China.

In 2019, unmanned aircraft that participated in the CAAC Unmanned Aircraft Cloud System flew a total of 1.25 million hours.

III. Transport Efficiency and Financial Performance

1. Transport Efficiency

In 2019, the industry-wide average daily use rate of registered transport aircraft stood at 9.33 hours, down by 0.03 hours from 2018. Specifically, the rate of medium and large sized aircraft was 9.49 hours, up by 0.01 hours from a year earlier, whereas that of small-sized aircraft was 6.39 hours, down by 0.52 hours.

In 2019, the passenger load factor for scheduled flights averaged 83.2%, the same level as that of 2018.

In 2019, the weight load factor for scheduled flights averaged 71.6%, a 1.6 percentage points fall year on year.

Table 6 Passenger Load Factor and Weight Load Factor for Scheduled Flights in 2019

Indicator	Value (%)	Increase from 2018 (Percentage Points)
Passenger Load Factor of Scheduled Flights	83.2	0.0
Domestic Air Routes	84.6	-0.2
Including: Hong Kong, Macao and Taiwan Air Routes	77.8	-3.1
International Air Routes	79.5	0.6
Weight Load Factor of Scheduled Flights	71.6	-1.6
Domestic Air Routes	73.6	-2.0
Including: Hong Kong, Macao and Taiwan Air Routes	64.5	-3.2
International Air Routes	68.2	-1.3

2. Financial Performance

According to preliminary statistics, in 2019, the whole civil aviation industry made 1.062 trillion yuan in business revenue, up by 5.0% from 2018, and 54.13 billion yuan in profit, up by 5.76 billion yuan from a year earlier. Specifically, airlines made 648.72 billion yuan in business revenue, up by 6.5% from a year earlier, and 26.11 billion yuan in

profit, up by 5.73 billion yuan from 2018; airports made 120.70 billion yuan in business revenue, up by 8.1% from 2018, and 16.11 billion yuan in profit, down by 550 million yuan from 2018; support businesses made 293.06 billion yuan in business revenue, up by 0.7%, and 11.92 billion yuan in profit, up by 590 million yuan from a year earlier.

According to preliminary statistics, in 2019, across the whole industry, the revenue was 4.62 yuan per ton-km, down by 0.06 yuan from the previous year. Passenger revenue per ton-km was 5.47 yuan, down by 0.14 yuan from 2018; cargo and mail revenue was 1.45 yuan per ton-km, down by 0.06 yuan from 2018.

According to preliminary statistics, in 2019, the taxes payable by the whole civil aviation industry stood at 35.79 billion yuan, down by 6.85 billion yuan from 2018.

IV. Aviation Safety and Service Quality

1. Aviation Safety

In 2019, the civil aviation industry of China performed in a stable and controllable manner in terms of safe operation. The 10-year rolling value of the major transport accident rate per one million movements was 0.028 as opposed to the world average level of 0.292. There were 15 general aviation accidents, resulting in 8 deaths.

From August 25, 2010 to the end of 2019, transport aviation had been operating safely for 112 consecutive months, with an accumulated 80.68 million hours of safe operation.



2019 saw 570 transport aviation incidents, down by 2.23% year-on-year, including 11 severe incidents representing a decrease of 31.25% from 2018. The rate of severe incidents and the rate of incidents attributable to human factors per 10 000 flight hours were 0.009 and 0.023 respectively. All safety indicators fell within the target ranges set for the year.

In 2019, a total of 39 transport airlines were free of human factors induced incidents.

2. Aviation Security

In 2019, the civil aviation security inspection units screened 660 million passengers, 349 million items of checked baggage, 532 million items of air cargo (excluding mail and express deliveries), and 244 million items of mail and express deliveries, handled 38 cases of unlawful interference involving falsified terrorist threat information, and addressed 14 582 instances of security incidents, effectively ensuring on-going aviation security. By the end of 2019, civil aviation had operated with zero security accident attributable to human factors for 17 years and 7 months in a row.

3. Flight Regularity Rate

In 2019, passenger airlines in China operated 4.611 million flights in total, among which 3.765 million flights were punctual, resulting in an average flight regularity rate of 81.65%.

In 2019, major airlines operated 3.305 million flights in total, among which 2.691 million flights were punctual, resulting in an average flight regularity rate of 81.43%.

Table 7 Causes of Flight Irregularity in 2019

Item	% of the Total	Growth from 2018(%)
Causes of Flight Irregularity for All Airlines	100.00	0.00
Including: Weather	46.49	-0.96
Airlines	18.91	-2.22
ATC	1.43	-0.88
Others	33.17	4.08
Causes of Flight Irregularity for Major Airlines	100.00	0.00
Including: Weather	47.47	-1.15
Airlines	18.36	-2.64
ATC	1.79	-0.96
Others	32.38	4.75

In 2019, the average delay of passenger flights in China was 14 minutes, 1 minute shorter than the previous year.

4. Service Quality

By the end of 2019, 229 airports and major airlines implemented paperless travel process. An average of 71.6% of domestic passengers used self-service check-in facilities at the 37 airports with an annual passenger traffic of over 10 million passengers. 8 airlines and 29 airports piloted the practice of checking baggage through to the ticketed destination for interline itineraries. 410 aircraft operated by 15 airlines provided cabin internet access to passengers, among which 202 aircraft by 9 airlines provided internet service to 8.05 million passengers in the air. Over 1.60 million electronic air waybills were used for air cargo. The civil aviation service quality supervision hotline 12326 was put into service, and the response rate to the complaints against domestic airlines reached 100%.

In 2019, CAAC, its regional administrations, CAAC Consumer Affairs Center and CATA handled a total of 30 462 complaints.

In 2019, passenger satisfaction with airline and airport service quality came in at 4.26 and 4.32 (full score 5) respectively.

V. Education and Technological Innovation

1. Education

In 2019, universities and colleges

directly under CAAC enrolled a total of 23 610 students, including 1 144 postgraduates, 20 614 undergraduates and junior college students, and 1 852 adult students. 6 232 were flight students.

In 2019, there were 72 512 registered students at universities and colleges directly under CAAC, including 3 015 postgraduates, 64 902 undergraduates and junior college students, and 4 595 adult students.

In 2019, a total of 19 489 students graduated from universities and colleges directly under CAAC, including 858 postgraduates, 16 930 undergraduates and junior college students, and 1 701 adult students.

2. Technological Innovation

In 2019, 9 innovation leaders, 20 top notch innovation talents and 12 innovation teams involved in civil aviation technological innovation were selected from across the industry. 8 key labs and engineering technology research centers in civil aviation sector were certified. 10 research institutes and bases, which aimed at upgrade civil aviation sector's capability to innovate, passed the review process. 3 strategic alliances were approved for pilot operation, to advance technological innovation in the civil aviation industry. Two major national R&D projects were approved.

In 2019, a total of 32 technological achievements in civil aviation sector went through inspection and acceptance, and the CATA technological innovation awards in 37 categories were selected.

3. New Navigation Technologies

By the end of 2019, 19 airlines in the industry were capable of HUD operation, 1 256 aircraft were equipped with HUDs, 97 airports were capable of special category I HUD operation (15 more than that of 2018), 21 airports were capable of special category II HUD operation, and 11 airports were capable of taking off using HUD under visibility of 150 meters.

230 transport airports were capable of operating PBN flight procedures, 26 airports with complex terrain were capable of operating RNP AR procedures, 98% of the transport aircraft were equipped with ADS-B system, and 39 airlines were utilizing EFB.

VI. Professionals

1. Number of Pilots

By the end of 2019, there were a total of 67 953 valid pilot licenses in China's civil aviation industry, up 6 461 year on year, including 1 173 Sport Pilot Licenses (SPLs), 4 352 Private Pilot Licenses (PPLs), 35 329 Commercial Pilot Licenses (CPLs), 193 Multi-crew Pilot Licenses (MPLs) and 26 906 Airline Transport Pilot Licenses (ATPLs).

Table 8 Statistics of Civil Aviation Pilot Licenses of China in 2019

Type of License		Number	Year-on-year Increase
On-the-job	Part 121 Airlines (Operational Personnel)	42 870	3 435
	Part 121 Airlines (Non-operational Personnel)	6 540	1 347
	General Aviation Airlines	3 599	95
	Part 141 Flight School Instructors	1 198	213
	Government Affairs	108	4
On-training	Part 141 Private License Holders	2 671	485
	Part 141 Commercial License Holders	435	-35
	On-training Students of Part 61 Training Organizations	457	42
Off-job	Personnel Who Are Part 141 Aviation Schools Graduates Waiting to be Registered in Transport Airlines	1 919	1 919
	Private Pilots	1 214	413
	Sports Aircraft Pilots	1 173	279
	Pilots Not Employed	1 514	-1 520
Inactive		4 255	-216
Total		67 953	6 461



2. Other Professionals

By the end of 2019, there were 59 124 licensed maintenance staff in the industry, 3 881 more than that by the end of 2018; and 8 450 licensed dispatchers, 807 more than the previous year.

By the end of 2019, there were a total of 30 964 ATM technicians in 4 categories, 3 257 more than that by the end of 2018, including 13 828 air traffic controllers, 700 more than the previous year.

VII. Foreign Relations

In 2019, China had bilateral aviation talks or written consultations with 25 countries or regions. By the end of 2019, China had already signed 127 bilateral air services agreements with its counterpart countries or regions, up by 1 (Bahamas) from 2018, including 44 in Asia (including ASEAN), 27 in Africa, 37 in Europe, 12 in Americas and 7 in Oceania.

In 2019, China and Singapore signed a mutual recognition agreement on airworthiness maintenance.

In 2019, China signed the Airworthiness Implementation Procedures (revised) with Russia, the Memorandum of Understanding on Airworthiness (revised) respectively with Cambodia and Laos, the Memorandum of Understanding on Airworthiness with Benin, and the Airworthiness Technical Arrangements with Hungary. By the end of 2019, 39 countries or regions had established bilateral airworthiness relations with China, with a total of 238

bilateral airworthiness documents currently in force.

VIII. Airworthiness Certification

In 2019, the entire industry saw an additional 613 aircraft go through the nationality registration process, including 220 newly registered commercial aircraft and 393 general aircraft. The number of newly registered general aircraft exceeded 300 for four consecutive years.

In 2019, civil aviation airworthiness certification departments issued a total of 204 design approvals, 33 production approvals and 154 approvals for aviation fuel and chemical products, which boosted the safe use of domestic aviation products and ensured the development of civil aviation industry.

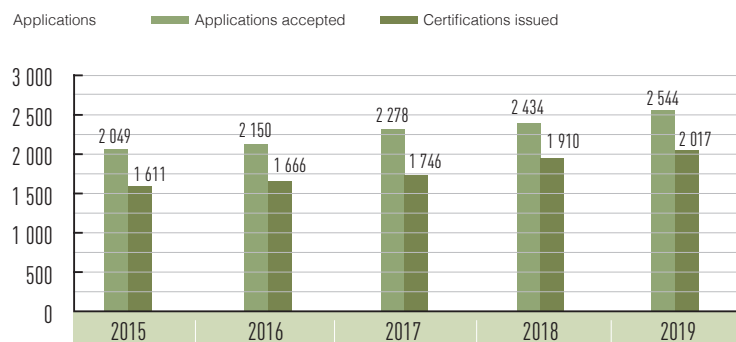


Figure 12 Number of Type Certification and Validation of Type Certification from 2015—2019

IX. Investment in Fixed Assets

In 2019, China's civil aviation made investment in fixed assets to the tune of 181.99 billion yuan, including 96.94 billion yuan in civil aviation infrastructure development and technological upgrading, up 3.5% year on year.

The investment in infrastructure development and technological upgrading can be broken down by system as follows: 75.14 billion yuan in the airport system; 5.06 billion yuan in the ATM system; 170 million yuan in the security system; 80 million yuan in the information system; 530 million yuan in the scientific and

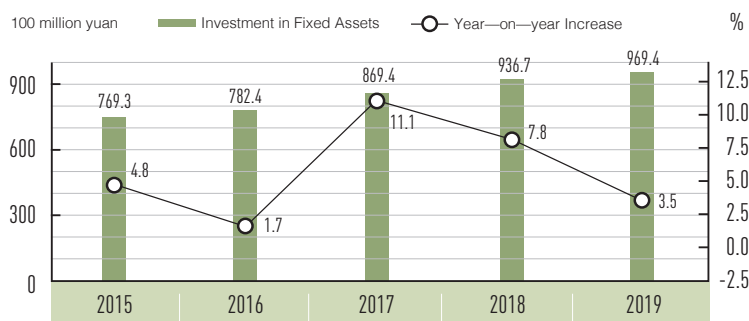


Figure 13 Investment in Civil Aviation Infrastructure Development and Technological Upgrading 2015–2019

educational system; 2.31 billion yuan in the fuel system; 50 million yuan in the maintenance system; 7.05 billion yuan in the transport service system; and 6.55 billion yuan in the public facility system.

X. Energy Conservation and Emissions Reduction

In 2019, 0.285 kg of fuel were consumed per ton-km in China's civil aviation industry, down by 16.2% from 2005 (the baseline year for energy conservation and emissions reduction in the industry); the energy consumption per passenger at airports saw an approximate 15.8% decline, compared to the average of the final three years of the 12th Five-Year Plan period (2013–2015).

In 2019, 373 thousand flights used temporary routes, cutting the flight distance by 15.70 million km, saving 85 thousand tons of fuel and cutting carbon dioxide emissions by 267 thousand tons.

By the end of 2019, more than 95% of the airports handling more than 5 million passengers had installed and put into use alternative units to APUs, and airports handling more than 10 million passengers had basically realized full application.

By the end of 2019, among the ground support vehicles at civil airports, there were 2 700 electric ones, accounting for 7.5% of the total vehicles. Also, there were 1 400 recharging facilities.

2019 saw a steady rise in the use of clean energy at airports, with

electricity, natural gas and thermal power accounting for 83%, and clean energy such as solar energy and geothermal energy accounting for 1.4% of the total energy consumption.

XI. Legal and Credit System Development

In 2019, 5 civil aviation regulations were revised and published, or abolished.

In 2019, there were a total of 326 cases involving administrative punishments; 11 natural persons were included in the CAAC List of Individuals with Serious Dishonest Acts due to their engagement in the serious dishonest acts set out in the Civil Aviation Industry Credit Management Measures (Trial); 10 168 passengers were included in the List of Passengers Restricted from Taking Civil Flights.

XII. The Labor Union

In 2019, in its response to the applications filed by CAAC Labor Union, the All-China Federation of Trade Unions granted the National May 1 Labor Medal to one high-performing entity and three high-performing individuals, and named 10 high-performing teams as the "2019 China National Pioneer Workers".

In 2019, a total of 673.1 thousand employees coming from 32.7 thousand teams in 444 entities participated in the industry-wide Ankang Cup competition. ■