GENERAL AVIATION IN CHINA

by

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ABSTRACT

In the last four decades, China has accomplished economic reform successfully and grown to be a leading country in the world. As the "world factory," the country is able to manufacture a variety of industrial products from clothes and shoes to rockets and satellites. But the aviation industry has always been a weak spot and even the military relies on imported turbofan engines and jet fighters, not to mention the airlines. Recently China has launched programs such as ARJ21 and C919, and started reform to change the undeveloped situation of its aviation industry. As the foundation of the aviation industry, the development of general aviation is essential for the rise of commercial aviation. The primary goal of this study is to examine the general aviation industry and finds the issues that constrain the development of the industry in the system. The research method used in this thesis is the narrative research of qualitative approach since the policy instead of statistical data is analyzed. It appears that the main constraint for the general aviation industry is the government interference.

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Chapter I – INTRODUCTION AND LITERATURE REVIEW

General aviation plays an integral and very important part in the civil aviation industry. Although scheduled air transport (airlines) is the larger operation in terms of passenger numbers and freight tons, general aviation is much larger in aircraft numbers and flight hours. According to GAMA's statistic report (2012), there are over 360,000 general aviation aircraft worldwide, ranging from two-seat training aircraft to intercontinental business jets, of which about 223,300 aircraft are based in the United States. Meanwhile, the world's commercial fleet stands at 20,310 aircraft (Boeing, 2012), of which 7,025 aircraft belong to U.S. airlines. In fact, general aviation is considered to be the foundation of the aviation industry. In addition to its numerous aircraft and flight hours, general aviation also involves millions of people working around the globe and fulfills needs that are increasingly important to the world's economy. The general aviation industry supports over one million jobs, tens-of-billions of dollars in revenue, and access to thousands of cities, businesses, and manufacturing facilities around the world.

As the largest economic entity in the world, the United States has the most developed general aviation industry. According to the FAA (2013), general aviation (Part 91 & 135) flew almost 25 million hours in 2010, and provides services at more than 5,000 public airports while scheduled airlines serve less than 500 airports. In Europe, the general aviation fleet can fly to over 3,900 airports. However, the aviation industry is highly dependent on economic and technological development. As a result, the general aviation industry is more developed in North America, Europe, and other countries such as Australia, Brazil, New Zealand, Japan, and South Africa.

Table 1. Total Number of Registered General Aviation Aircraft by Select Countries with Active General Aviation Industries (2010-2013) (GAMA, 2014)

Year	2010	2011	2012	2013
Australia	12,564	n/a	n/a	n/a
Austria	n/a	1,520	1,491	1,489
Brazil	17,335	18,710	19,796	20,429
Canada	34,175	34,947	35,540	36,078
China	1,010	1,124	1,320	1519
France	32,764	32,410	n/a	n/a
Germany	21,703	21,603	21,546	21,462
New Zealand	4,442	n/a	4,851	4,874
South Africa	11,203	11,483	11,746	11,946
United Kingdom	20,379	20,040	19,939	19,850
United States	223,370	n/a	209,034	n/a

As Table 1 shows the U.S. has the largest general aviation fleet in the world. On the other hand, as the second largest economic entity in the world (World Bank, 2013), China has a very small general aviation fleet. However, even such a small fleet was a result of high speed growth since the mid-1990s. In 2002, the general aviation aircraft fleet in China was only 335 (Civil Aviation Administration of China CAAC, 2006), but now the number is four times more after 10 years of development. The progress was incredible,

however, general aviation is considered to be “one of the few sectors that have not experienced strong growth over the past three decades” (MacCorkle & Wong, 2009, p.2).

Since opening up to foreign trade and investment and implementing free market reforms in 1979, China has been among the world’s fastest-growing economies, with real annual GDP growth averaging nearly 10% (Morrison, 2014), and has become the second largest economy after the U.S. (World Bank, 2013). Such a rapid rise and sustained growth within a period of about 30 years is often described as an economic miracle. Currently, China is the world’s largest trading economy, largest manufacturer, and largest holder of foreign exchange reserves. It is estimated that about 500 million people in China have been raised out of extreme poverty (Morrison, 2014), and the country is defined as upper middle income by World Bank (2014).

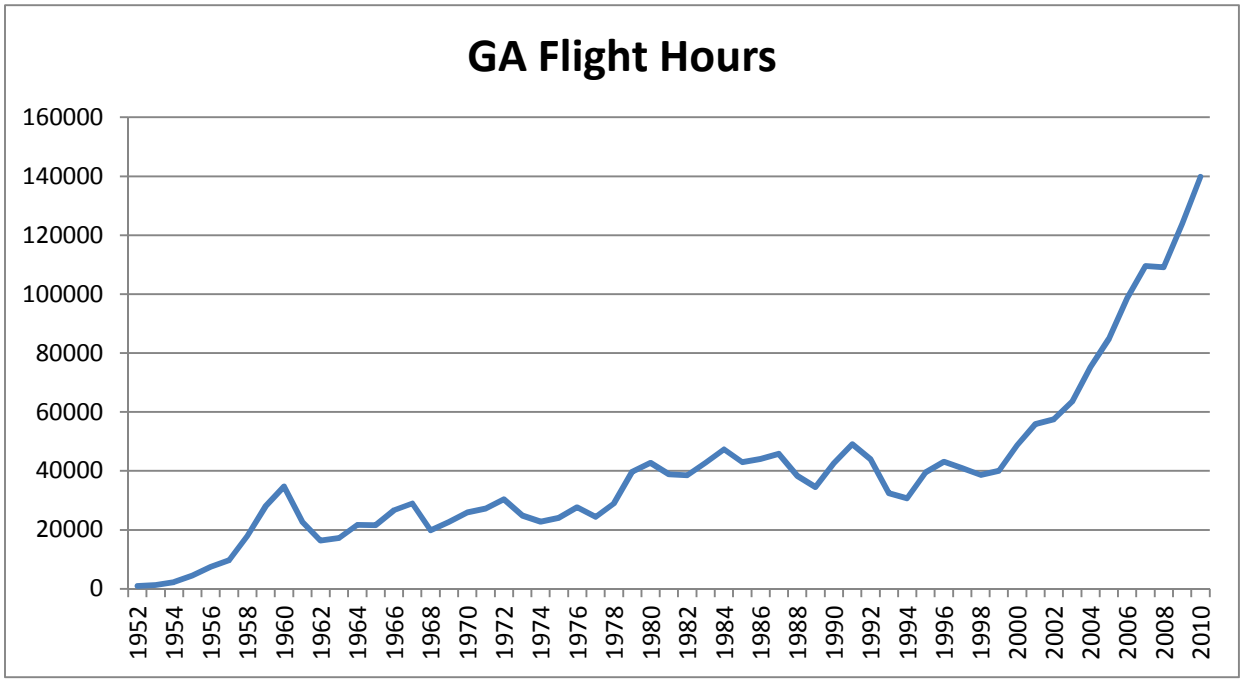

Figure 1. General Aviation Flight Hours (1952-2010). (CAAC, 2014)

Unfortunately, the aviation industry in China did not experience correspondingly high speed growth as the economy did during the past three decades, especially the general aviation sector. As Figure 1 indicated that general aviation flight hours remained at a low level and hardly increased from 1960 to 1999. After the promulgation of *The Decision by the CAAC on Issues Regarding the Development of General Aviation* in 1996, the industry entered a new fast-growing era in the 21st century.

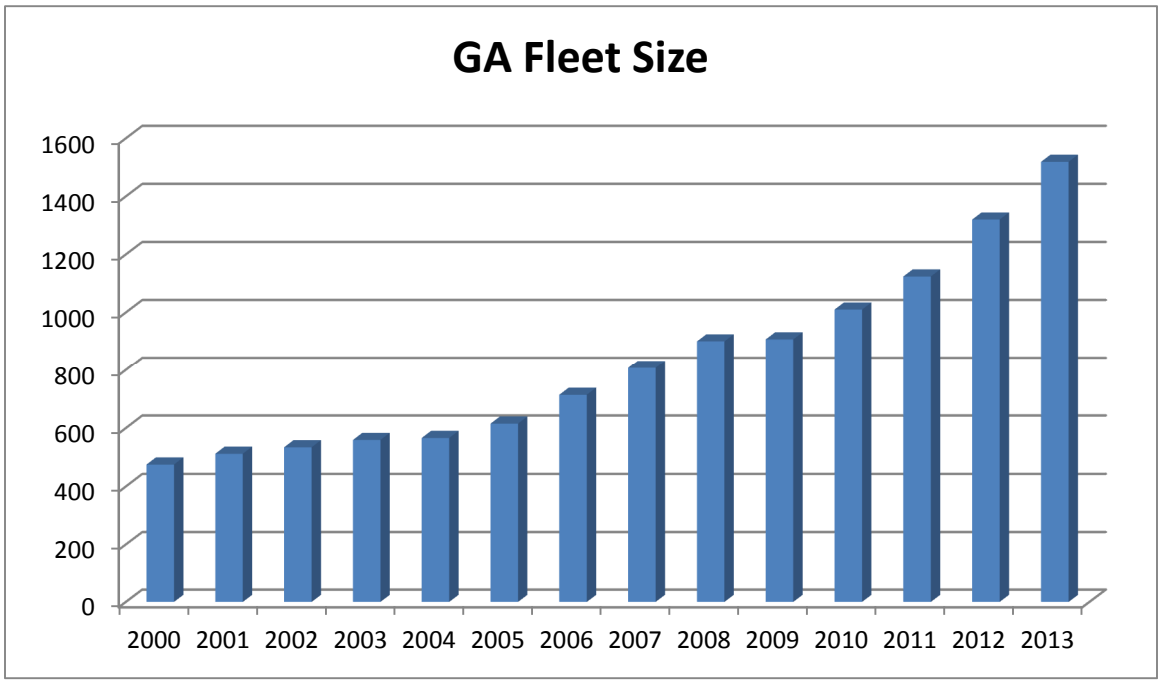

Figure 2. General Aviation Fleet (2000-2012). (CAAC Annual Reports)

It is a strange phenomenon that the aviation industry in China did not develop along with its economic rise. Generally, economic development will generate huge demand for aviation – enterprises are in need of business and corporate flights; residents with increased income are in need of air travel and personal flight; and airlines are in need of pilot training due to expanding market. The aviation industry would have a positive

impact on economic growth by contributing billions to the economy, creating high-paying jobs, and connecting people and commercial opportunities. In recent years, the Chinese central government has realized the importance of the general aviation industry and has decided to promote the industry from the state level.

Review of Literature

China is the world's third largest country, after Russia and Canada. With an area of 3.748 million square miles and a coastline of 9010 miles, it has a great geographical opportunity for general aviation. It also has the world's largest population (1.36 billion) and the second largest economy, which indicates a tremendous market for general aviation. In addition, the country has an urgent demand for general aviation.

The Development of Chinese General Aviation

General aviation in China dates back to early 20th century. The very first flight in China was made by Belgian pilot Captain Charles Van den Born of the Far East Aviation Company. On March 18, 1911, Van den Born flew his Farman II "Wanda" in Hong Kong, and later in Guangdong province (Andersson, 2008). Another foreigner, French aviator Rene Vallon, flew in Shanghai (Jiangwan Airport) in March and April, 1911; however, he crashed and was killed on the Shanghai Racecourse in May (Andersson, 2008). Meanwhile, there were many young Chinese who learned to build and fly airplanes in the US and Europe and brought aviation back to China. Feng Ru was the most famous aviator.

The Father of Chinese Aviation

Of all the early Chinese aviators, the most recognized personage is Feng Ru, who was described as "the Father of Chinese Aviation". Feng Ru, also known as Fung Joe Guey,

was born in Guangdong province in 1883. He moved to San Francisco in his early teens with his family. Feng was staggered by American's power and prosperity, and he understood that industrialization made the country great, and felt that industrialization could do the same for China (Maksel, 2008). He went to the east coast to learn everything about machines and became a skilled mechanic. In 1906, inspired by the Wright brothers' success, Feng moved back to the west coast and erected his aviation workshop funded by local Chinese businessman. Needless to say that Fung went through enormous hard work and endeavor in his tiny workshop – a ten by eight foot shack – to build his own aircraft named Feng Ru 1 and successfully flew it for twenty minutes just outside Oakland, California on September 22, 1909 (Wright Brothers Aeroplane, 2014). It was also the first powered flight on the west coast of America (Wright Brothers Aeroplane, 2014) and was covered by several local newspapers, including the San Francisco Call and Oakland Tribune (William Wong, 2009). Although this was a great achievement, it was not a perfect time for a Chinese to make his mark since anti-Chinese sentiment was on the rise in the American west. Meanwhile, in the first decade of the 20th century, a revolt against the Qing Dynasty was brewing in Southern China. The leader of the Revolutionary Alliance, Sun Yet-Sen, known as the first president of Republic of China, invited Fung to bring his airplane back to China to aid the rebellion against the Qing Dynasty (Wright Brothers Aeroplane, 2014). Feng arrived in China in March 1911 and was named a captain in Sun's army. After the revolution succeeded in the autumn, Sun designated Feng as the commander of the newborn Republic of China's air force. Feng and his Guangdong Air Vehicle Company built the first aircraft manufactured in China – the Feng Ru 2, and successfully made several flying exhibition. Unfortunately,

he was killed while performing an aerial exhibition in 1912 due to a classic stall (Maksel, 2008). The Republic of China gave Feng Ru a full military funeral and buried him at the Mausoleum of the 72 Huanghuaguang Martyrs (the grave yard for the Revolutionary Alliance people who died in the revolt against Qing Dynasty). The words "Pioneer of Chinese Aviation" was inscribed on his tomb upon Sun Yet-Sen's request (Wright Brothers Aeroplane, 2014).

Feng is commemorated in China today. In his hometown, Enping, Guuangdong Province, a museum and a high school are in the name of Feng Ru. His tomb in Guangzhou has been preserved since 1921. Also, the Beihang University (Beijing University of Aeronautics and Astronautics) has a "Fengru Student Center of Innovation & Creation" and annually holds "Feng Ru Cup" technology activity to memorialize the "Father of Chinese Aviation". However, it is a pity that Feng died so young and did not have a chance to become a legend. Nevertheless, to the Chinese, Feng Ru is the Wright brothers and Glenn Curtiss of China.

Early General Aviation Activities

Feng Ru was probably the first and the only Chinese who designed, built and flew aircraft in China. Since aviation was mostly used by the government for military purpose, very few general aviation activities were recorded. There were several flying clubs and training schools in Hong Kong and Macao (Andersson, 2008), which were formed and managed by French, British, and Americans. However, these institutions were not very successful and only lasted for a short time. In 1931, the Zhejiang Province Conservancy Board used a Messerschmitt M18D to conduct aerial survey operations over the rivers near Hangzhou (Geng, 2007). The aircraft with a 325hp Wright Whirlwind engine was

specially equipped for aerial photography (Andersson, 2008), and "Kong Ce I" (aerial survey I) was marked on its tail. From 1937 to 1939, eleven Beech D17Rs were delivered to China (Andersson, 2008), and most were used for medical service. Also, warlord Chang Hsueh-liang ordered two Boeing 247s as executive aircraft for his personal use (Andersson, 2008). These two aircraft was later used by Chiang Kai-shek and destroyed by the Japanese armed forces.

The Development after 1949

After the civil war from 1946 to 1950, the Communist Party took over mainland China and the KMT government retreated to Taiwan. The new government founded the Civil Aviation Bureau, as a subsidiary of the People's Revolutionary Military Committee, and was under the command of the People's Liberation Army (PLA) Air Force. The first general aviation operation was pest control in Guangzhou in May, 1951 (CAAC, 2007), using a Curtiss C-46 (however, the origin of the aircraft was unknown). From June 13 to September, locust control operations were carried out in Heibei, Jiangsu, and Hubei Province (Geng, 2007), using Polikarpov Po-2 of PLA Air Force. In 1952, the first general aviation fleet – an agricultural and forestry squadron – was founded in Tianjin, and was equipped with 10 Aero 45 imported from Czechoslovakia (CAAC, 2007). From 1952 to 1965, general aviation growth was steady (see Figure 1). With technical (aviation experts) and aircraft (Lisunov Li-2, Antonov An-2, and Ilyushin Il-12) assistance from Soviet Union, operations like aerial photography, aerial prospecting, aerial forest conservation, aerial seeding and other agricultural operations were carried out all over the country. The general aviation industry started from scratch and made great progress during this period; however, after the rapid growth in the first few years, the annual flight

hours maintained around the same level until 1978. After the end of the "Cultural Revolution" and the start of economic reform, general aviation was stimulated by the economic growth and the annual flight hours almost doubled in two years (1977-1979). But after 1979, the annual flight hours remained around 40,000 until 2000, when a significant increase took place. In fact, the general aviation growth in 21st century was amazing – the fleet size and annual flight hours were tripled in ten years.

The Definition of General Aviation

Generally, general aviation is defined as "all civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire" (International Civil Aviation Organization, ICAO, 2009). In short, general aviation is "all civilian flying except scheduled passenger airlines" (Aircraft Owner and Pilots Association, AOPA. 2015). In China, general aviation has a more specific definition: "civil aviation operation other than public air transport with civil aircraft, including work in the fields of industry, agriculture, forestry, fishery and building industry, and flight in the fields of medical and health work, emergency and disaster relief, meteorological service, ocean monitoring, scientific experiment, education and training, tour, and sports." (Civil Aviation Law, 1996, p.61) However, such a specific definition reflects that general aviation is seen as a service for industrial work flight rather than business/corporate and personal flight. Review of the general aviation market reveals that education and personal/business flight account for about 20% flight hours in China while they are 80% in mature markets (An, Wang & Zhang, 2011), which means that general aviation has great potential growth.

Research on Chinese General Aviation

Han (2012) analyzed the demand for general aviation and categorized the demand into three major parts: public service, economic development, and consumption demand. Public service includes aircraft operations for government administration purpose and emergency service. In 2008, the earthquake that took place in Wenchuan, Southwestern China exposed the lack of emergency service ability when ground traffic was unavailable. General aviation could provide evacuation, search and rescue, medical service and relief supplies delivery under such circumstances – natural disasters, accidents, as well as public security. The economic development demand includes industrial and agriculture work, pipeline patrol, science experiments, and other operations that serve the country and the Great Western Development (a national policy adopted for the western regions of China in order to stimulate the economic growth). The consumption demand is based on the increase of GDP per capita, and it includes personal/recreational flight, charter service, instruction/education flight, business/corporate flight, and tourism flight. The GDP per capita of China has reached $4382 in 2010 and it will increase to $8000 by 2018 (An, Wang, & Zhang, 2011), therefore, personal and business aviation will become a main engine of general aviation growth.

Table 2. Comparison of China and Other Countries with Large Territory Area in the World. (Government statistics of China, US, Canada, Australia & Brazil)

	China	U.S.	Canada	Australia	Brazil
Total Area (Square miles)	3,706,581	3,795,967	3,855,103	2,988,902	3,287,614
Population (Million)	1350.69	313.91	34.75	22.72	198.66
GDP(2012) (Billion USD)	8.22	16.24	1.82	1.53	2.25
GDP Growth Rate (2012)	7.8%	2.8%	1.7%	3.4%	0.9%
Number of GA Aircraft (2012)	1320	209,034	35,540	12,430	13,094 (2011)
GA Flight Hours (2012)	517,000	24,403,000	1,700,000 (2010)	1,700,000	n/a
GA Airports/Landing Facilities	286	19,729	1,900	480 (2013)	3,500

Driven by the huge demand, general aviation in China has experienced double-digit growth since 2000. However, it is still at an embryonic stage (MacCorkle & Wong, 2009) and statistics show that China has been left far behind compared to other nations with an

aviation industry (see *Table 2*). Several key restraints of GA growth have been identified through recent study of the general aviation industry. First of all is the restrictive airspace in China. The entire airspace (A, B, C, and D) in China is tightly controlled by the Air Force and every flight operation must have approval from both Air Force and CAAC (Li & Su, 2010). This application-approval-operation process is cumbersome, ineffective, and difficult in gaining GA airspace (Hagner, 2012). Second is the legislation and regulation regarding general aviation. A study (Diao, 2009) indicated that the legal system of general aviation is in need of improvement in order to promote the industry. Currently, the only legislation for general aviation is Article 145 to Article 150 of *Civil Aviation Law*. In addition, there are only a dozen regulations issued by CAAC for general aviation while there are more than a hundred regulating commercial aviation. The lack of regulation increases the operation cost when importing aircraft and applying for airworthiness (Tong & Zhang, 2011). Moreover, there is no regulation for general aviation airports (Li & Su, 2010) which also increases operational costs. On the other hand, there is no legislation for environmental protection regarding general aviation operation. For example, noise control at airports has not been legislated, nor have the environmental impact of airport construction, maintenance operation, gas spills and many others. Third, the lack of a professional workforce constrains general aviation growth. By the end of 2010, the number of GA pilots and maintenance technicians was less than 4000 (Tong & Zhang, 2011). Fourth is the lack of infrastructure that constrains general aviation growth. According to statistics (General Aviation Committee of China Air Transportation Association, CATAGA, 2014), there are 43 certificated GA airports and landing facilities while 243 are uncertificated. It is also mentioned that the lack of

communication, navigation, and radar equipment, as well as the lack of weather forecast services is a great challenge for general aviation operations (Tong & Zhang, 2011). Fifth, general aviation aircraft manufacturing in China is undeveloped. The aviation industry in China has been military centered since the country was born; therefore, most Chinese-built aircraft are civilian models of military aircraft (for example, the Yun-5, Yun-8, Yun-12), which are also outdated and unreliable (Li & Su, 2010). On the other hand, the price of imported aircraft is ridiculously high because of multiple taxes and fees, which keep most people and enterprises out of general aviation. Sixth, the general aviation market in China is immature and government supervision is cumbersome and complicated. The aviation industry is highly related to the military in China and the airspace is considered to be military domain (Li & Su, 2010). The CAAC used to be a division of Central Military Commission before Deng Xiaoping transferred it to the direct control of the State Council in 1980 (CAAC, 2005). In 2008, the CAAC was made a subsidiary of the newly created Ministry of Transport. Therefore, the industry inherited the administrative examination and approval system from the central planned economy era. From establishing companies, purchasing aircraft, to daily operation, the industry has multiple examination and approval procedures (Qin & Liu, 2011). These procedures are believed to be complicated and lengthy, and make access to the general aviation market extremely difficult (Li & Su, 2010). Furthermore, these complicated procedures decrease government efficiency as well as increase enterprises' operational costs (Qin & Liu, 2011). Seventh, it is also mentioned that the general aviation industry is not the priority in the government's economic growth plan since the importance of general aviation to the economy has not been fully understood by the authorities (Li & Su, 2010).

Realizing the underdeveloped situation and existing problems of the general aviation industry, many suggestions and solutions have been proposed. The most pressing need appears to be open airspace for general aviation operations. For years the industry has been trying to gain attention and investment from the government and has been pushing for a policy change for controlled airspace. In 2006, the eleventh aviation five-year plan issued by CAAC mentioned the promotion of reforming low altitude airspace management. In 2010 the *Low-altitude Airspace management Reform Guidance* was approved by the State Council and the Central Military Commission and a timeline for airspace reform was set. However, airspace is not the only issue that constraining the general aviation growth. In fact, the Chinese general aviation industry is facing a series of issues.

Research Questions

A country like China with a large territory, high population, and consistent growing economy should have a strong aviation industry to provide vital transportation service. However, the fact is that the aviation industry, especially the general aviation section, is extremely weak and incompatible with the country. Therefore, the purpose of the study is to analyze the Chinese general aviation industry and its issues. Since forecasting general aviation activity has been proved to be an imperfect science (Shetty & Hansman, 2012), this paper will not try to predict general aviation growth in China but will discuss the current status of the industry and answer the following questions:

1. What are the issues of Chinese general aviation industry?
2. What is the key factor that constrains the growth of Chinese general aviation?

3. How will the current government policy affect the future development of the general aviation industry?

4. What is the government's role in promoting the general aviation industry?

Chapter II – METHODOLOGY

The research paper utilized narrative research for a qualitative approach methodology. The data was acquired from government issued reports and general aviation association reports. However, the statistics of aviation in China are not open to the public as in the States. The annual report issued by CAAC does not provide detailed general aviation statistics but only mentions total flight hours, number of GA companies, and fleet size. In addition, the GA statistics were not included in the CAAC annual report before 2007. The "*Development Report on China General Aviation*" issued by the General Aviation Committee of China Air Transportation Association (CATAGA) emerged in 2008. This development report has detailed general aviation statistics; however, the editions from 2009 to 2012 are not available. Other data resources included materials in professional journals and newspaper articles. Since the purpose of the thesis is to analyze policy in order to identify the issues existing in the general aviation industry, there is no statistical analysis provided. The annual reports issued by the government and industry association are the most reliable data source. In addition, this thesis is also based on the previous work conducted by other researchers.

CHAPTER III – ANALYSIS

Current General Aviation Issues

Unlike the United States, aviation in China is still a luxury activity. General aviation, such as personal, business, corporate, or sports flight has not gained in popularity, although every aspect of the country – population, land area, economy development – feels strong demand for it. According to CAAC (2014), by the end of 2013, the total number of licensed pilots in China was 35,505 (including commercial pilots), and the total number of general aviation aircraft was 1,519. On the other hand, the GDP of China in the 2013 was 9.24 trillion dollars (World Bank, 2014). The contribution of general aviation to the economy remained unidentified until recently. However, study shows that the number was about 300 million dollars in 2006 (Tan, 2008). The most optimistic estimation is that general aviation would contribute 0.01% to the GDP in 2013. It is hard to believe that the general aviation industry is just a tiny part and has little contribution to the second largest economy in the world. In fact, Chinese general aviation is facing a series of problems including a small aircraft fleet and low annual flight hours, controlled airspace and a complicated flight approval process, insufficient general aviation airport or landing facilities and very few Fixed Base Operator (FBO)/Maintenance, Repair and Overhaul (MRO) facilities, insufficient workforce and training facilities, lack of effective legislation and regulation, a monopoly on aviation gasoline, and others that make quite a list. For all problems, there is a source in history.

History Issue

The Wright brothers made the first successful powered flight in 1903; however, the exploration of aviation has lasted for centuries. Scientists in Europe and America have

been searching for ways to fly since the 17th century, both theoretically and experimentally. Meanwhile in China, modern science (especially the physics, aerodynamics, chemistry, and engineering which are applied in aviation industry) did not develop under the rule of the Qing Dynasty. One of the reasons is that the domestic policy, literary inquisition, for example, enslaved people's thought and eliminated creativity. Moreover, since the empire conquered China with armed forces and slaughter, the concern of how to maintain Manchu rule was more important than science and art. On the other hand, the arrogance and ignorance of the "Celestial Empire" led to isolationism and the Canton System. The lack of communication with the rest of the world left the country in darkness until the Europeans bombed the door open. Along with cannons and guns came technologies and industries.

The revolution of 1911 ended the Qing Dynasty; however, it did not end the chaos. Decades of war continued among warlords, central government, provincial powers, the Kuomintang(KMT) and the Communist Party of China(CPC) had torn the country apart. Furthermore, the Japanese Empire started to seize portions of China in 1931, and the full invasion began in 1937. Shortly after the surrender of Japan in 1945, the civil war between KMT and CPC restarted. Under such circumstance, aviation in China has served military purposes, and the nation did not have a chance to establish an integrated aviation industry. As a matter of fact, without aid from the US and USSR the Chinese would not have been able to build aircraft during the war. In one word, ever since aviation was introduced to China, it has been endless chaos and wars and it is impossible for the aviation industry (including other modern industries) to develop under such circumstances.

The People's Republic of China (PRC) brought peace to the old nation, but it did not end the hostility. The communist government had a tense relationship with KMT government in Taiwan, the US, and even the USSR. National defense has always been the priority of the government so the airspace was strictly controlled by the air force to prevent any hostile aircraft flying into China. On the other hand, the new government eliminated any kind of private property – private possessions and companies were confiscated (especially the rich people who were considered to be capitalists). As a result, general aviation activities – personal flight, business and corporate flight, sports and recreation flight – ceased to exist. General aviation was only to provide services for industrial and agricultural activities. Actually, the operations were mainly in several fields, such as aerial photography, aerial survey/prospecting, aerial forest conservation, aerial seeding/weeding/fertilizing, and pest control. This simplicity of operation may well be the main reason for the low general aviation growth.

In addition, the new government's foreign policy made the country isolated from the world. The hostile relations between China and western countries lasted for more than 20 years. Also, the relation with the Soviet Union became intense in the 1960s. Since the modern industry was extremely weak in China, these intense international relations had made it difficult to gain economic or technical assistance, or international cooperation to develop Chinese aviation industry. Meanwhile, the domestic political campaigns, Great Leap Forward and Cultural Revolution for example, also lasted for about 30 years. These political campaigns were not in favor of education and science. However, this paper will not discuss these political details.

The economic reform began in 1978 brought opportunity for the aviation industry. As income increased, general aviation activities became available and affordable for normal people, and gained popularity. The emergence of personal, business, and corporate flight stimulated the new growth of general aviation in the new century. However, the Chinese aviation administration system is desperately outdated and has stalled the development of general aviation.

Administrative System Issue

In 1949, the PRC government established the Civil Aviation Bureau (CAB), under command of the PLA Air Force. The agency was the regulator of the aviation industry, as well as the operator of airlines and general aviation. In 1952, the government decided to separate the operation part from the administration and established the People's Aviation Company of China. However, the company just lasted for 11 months and was canceled in 1953. The CAB restored the operation of all civil aviation activities. In 1956, the bureau created a professional aviation department to arrange general aviation operations. Two years later, in 1958, the CAB became a subsidiary of Ministry of Transport, but in 1962, the CAB was separated from Ministry of Transport and was directly subordinate to the State Council.

In 1969 civil aviation became a part of the PLA Air Force. The agency was managed as a military unit until 1980. The CAB was under control of the State Council once again. In 1987, the central government reformed the aviation administrative system. Airlines were separated and so was general aviation, but they were still under the command of the bureau. The China General Aviation Corporation was founded in 1989 to carry general aviation operations as well as airline service. However, airports were still run by the

agency's regional offices. In 1993 the agency changed its name to the General Administration of Civil Aviation of China. In 2002, the agency became a sole government agency regulating civil aviation. The airlines (Air China, China Eastern, China Southern), and other aviation service corporations such as China National Aviation Fuel (China Aviation Oil Supply Corp), China Aviation supplies, and TravelSky Technology Limited were reorganized and transferred to the direct control of the State Owned Assets Supervision and Administration Commission. The airports were handed over to local governments except for Beijing Capital Airport and all Tibetan airports. In 2008, the agency was made a subsidiary of Ministry of Transport and adopted Civil Aviation Administration of China as its official name, and remained as a government regulator.

The evolution of the administrative system shows a process of deregulation and demilitarization. However, the process is extremely slow and incomplete. For 30 years, the CAAC has been a military unit, and for 40 years, it has been a combination of enterprise and government agency. The reform has taken place in the recent two decades and has already been successful – the aviation growth was significant. But the airspace is still strictly controlled by the military and the government also has the complicated administrative examination and approval system over the industry. So unless further deregulation policies become reality, the aviation industry will hit another bottleneck.

Controlled Airspace Issue

Studies indicate that the controlled airspace and the complicated flight approval process are one of the key constraints of general aviation growth in China (Hagner, 2012). The appeal for open airspace and simplification of the approval process has been made

for years. In order to improve the system, it is necessary to understand the current regulations of the airspace and flight approval process.

According to Civil Aviation Law, Chapter VII, the Chinese airspace is controlled airspace and is managed by both the State Council and the Central Military Commission, which means that the CAAC and the PLA Air Force both have jurisdiction over the airspace. The CAAC regulation "Civil Aviation Airspace Usage" (CCAR-71, 2004) classifies airspace from class A to class D.

- Class A is the high-altitude airspace. All flight operations must be conducted under IFR and all aircraft are subject to ATC clearance. All flights are separated from each other by ATC.
- Class B is the middle to low altitude airspace. Flight operations may be conducted under IFR or VFR. All aircraft are subject to ATC clearance. All flights are separated from each other by ATC.
- Class C is the approach airspace. Flight operations may be conducted under IFR or VFR. All aircraft are subject to ATC clearance. Aircraft operating under IFR are separated from each other and form aircraft operating under IFR. VFR operations are given traffic information with respect to other VFR flights.
- Class D is the airport tower airspace. Operations may be conducted under IFR or VFR. All aircraft are subject to ATC clearance. Aircraft operating under IFR are separated and given traffic information with respect to VFR flights. Aircraft operating under VFR are given traffic information with respect to all other flights.

Class E, F, and G airspace, which are uncontrolled or partly controlled airspace, are not used in China. The purpose of such airspace classification and usage, as it explained in CCAR-71, Article 3, is to ensure "flight safety, national security, economic benefits, air traffic control service, high traffic flow, adaptability, and international standardization." In fact, the key factors are national security and flight safety. The *Civil Aviation Law of PRC* (1996) and the *General Flight Rules of PRC* (2001) have both stated in the first article that the purpose of the regulation is "safeguarding the national sovereignty of territorial airspace." Since the national security is the priority, it is not hard to understand that the whole airspace must be controlled airspace and all civil aviation activities must be under supervision and administration of the authority (Civil Aviation Law, 1996). That is, the flight control system.

The *General Flight Rule (2001)*, Chapter three regulates that the PLA Air Force is responsible for the implementation of flight control. All flights must apply for approval, and then operations shall be conducted. Article 39 states that general aviation activities must apply for approval prior to operations, which includes a mission statement, aircraft identification, flight range, time period, flight altitude, flight condition, etc. The *General Aviation Flight Control Regulation* (2003) has made specific requirements for the flight application – flight airspace and flight plan. General aviation activity must apply for airport flight airspace, air route, and airway use prior to the flight operation. Also, general aviation activity must apply for a flight plan prior to the operation, which includes applicant information (person or company), mission statement, captain or pilot information, call sign, crew member information, aircraft identification and number, communication and transponder code, take off, landing and alternate airports, start and

end time of the operation, weather information, air route, flight altitude and range, and other special requirements. In addition to the flight plan application, general aviation activity must apply for permission if the flight mission includes cross border operation, operation in a no-flight zone or within 10km of the border, aerial survey or photography operation, operation outside coast line or territorial water, foreign aircraft operation or foreigner flying a Chinese aircraft. The flight plan application should be submitted no later than 1500 on the day before the scheduled operation, and the flight control department should notify the result to the applicant no later than 2100 on the day before the operation.

The strictly controlled airspace and complicated flight approval procedure have been criticized for hindering general aviation growth. For many years, the general aviation community has been appealing to the central government to open the low-altitude airspace for general aviation operation (Li & Su, 2010). However, in a historical perspective, since the airspace is a high value military resource, it will not be easy to reform the current system, especially for a highly centralized country. But the good news is that deregulation is in progress. In 2010, the State Council and the Central Military Commission approved the *Low-altitude Airspace management Reform Guidance*, which set reform targets to gradually open low-altitude airspace (below 3000 feet) for general aviation operation across the country. The purpose of the reform is to classify the low-altitude airspace into three classes:

- Controlled airspace – All flight operations require approval and ATC clearance.

- Surveillant airspace – All flight operations require report and record, and are under control of ATC. Flight information and warning services are provided.
- Report airspace – All flight operations require report and record, and are self-organized when take-off and landing times are informed to the authorities. Flight information is provided upon request.

According to the Guidance, the reform would start in the Shenyang and Guangzhou flight control regions and then extend to Beijing, Lanzhou, Jinan, Nanjing, and Chengdu regions from 2011 to 2015, until 2020, when an efficient low-altitude airspace management system will be established all across the country.

Meanwhile, in 2013, the PLA General Staff and CAAC issued *General Aviation Flight Mission Approval and Administration Regulation* in order to stimulate general aviation activities and simplify the flight approval procedure. It regulates that it is unnecessary to conduct the flight mission application and approval procedure; however, the operation must apply for a flight plan and mission statement, except for the nine conditions listed below:

- Cross border operation or foreign aircraft entering Chinese airspace shall get approval from CAAC, PLA General Staff and Ministry of Foreign Affairs.
- The operation cross Taiwan Strait FIR shall get approval from CAAC, PLA General Staff and Taiwan Affairs Office of the State Council. Operations shall get approval from authorities before entering Hong Kong and Macao.
- Aircraft entering an area within 10km of the border shall get approval from CAAC regional office and local military region. Operations that cross maritime

FIR shall get approval from CAAC regional office and local military Region Air Force and be put on file with local Military Region. Forest firefighting and emergency search and rescue in these areas shall get approval from local flight control center and be put on file with local Military Region Air Force.

- Operations entering a no-flight zone shall get approval from CAAC and PLA General Staff. Operations entering a dangerous flight zone and a restricted flight zone shall get approval from CAAC regional office and Military Region Air Force or the Navy.
- Aerial photography and aerial survey operations related to military facilities shall get operation area approval from CAAC regional office and local Military Region; operations related to important political, economic target and geographic information shall get operation area approval from CAAC regional office and local provincial government.
- Aerial photography and aerial survey operations cooperated with a neighboring country involving cross border activities shall get approval from the State Council.
- Foreign aircraft or foreign pilot in Chinese aircraft using domestic-only airport, airspace, and air route shall get approval from CAAC and PLA General Staff.
- Using military aircraft shall get approval from a corresponding military authority.
- General aviation flights at a special event organized by the government shall follow related regulation.

This new regulation clarified the authority to approve flight missions and seemed to be a step to further deregulation. Though flight mission approval is no longer necessary,

according to the *General Aviation Flight Control Regulation (2003)*, the flight plan must be approved by local flight control authority or the PLA Air Force. As a result, these two regulations are contradictory and confusing. Furthermore, it is not stated that the application will definitely be approved, nor notify the applicant with rational explanation if the application was rejected. It means that the military and the government have absolute power over aviation and most of the time, absolute power easily breeds graft. As a matter of fact, in order to conduct further reform and deregulation and maintain steady growth, the general aviation industry is in pressing need of a sophisticated and sound legislative environment.

Legislative Issue

Currently, there are three levels of legislation regulating general aviation. The first and most basic one is the *Civil Aviation Law of the People's Republic of China* (1995), enacted in 1996. It is the only act with regard to the aviation industry and is the foundation of making other aviation regulations. It has one chapter and six articles that define general aviation and the qualifications of operating general aviation.

The second level is the administrative regulations that were ratified by the State Council:

- *Provisional Regulation Regarding to General Aviation Administration by the State Council*, 1986. For the first time, this defined general aviation and clarified the administrative agency of general aviation, as well as the approval procedure of general aviation operation and the approval procedure of general aviation business licenses. Before the *Civil Aviation Law* was enacted, it was the legislation

framework for general aviation and currently it provides the legislative basis for general aviation companies operating internationally.

- *General Flight Rules of the People's Republic of China*, 2000.
- *Regulation of General Aviation Flight Control*, 2003. This is the basis of general aviation flight operations, which defines the procedure of applying for airspace and flight plans.
- *Regulation of General Aviation Flight Mission Approval and Administration*, 2013. This is the further explanation of the *Regulation of General Aviation Flight Control* and it clarifies the procedure of applying for flight missions.
- *Regulation of Civil Airport Administration*, 2009.

The third level is the CAAC orders:

- *General Flight and Operation Rules,* 2004 (CCAR-91).
- *Rule of Civil Aircraft Pilot and Ground Instructor Certificate,* 1996 (CCAR-61).
- *Rule of Civil Aircraft Pilot School Certificate,* 2004 (CCAR-141).
- *Civil Aviation Airspace Usage*, 2004 (CCAR-71).
- *Provision of General Aviation Business Licensing*, 2007 (CCAR-135).
- *Provision of Non-profit General Aviation Registration Administration,* 2004 (CCAR-285).
- *Provision of Civil Airport Operation Safety Management*, 2007 (CCAR-140).
- *Provision of Civil Airport Construction Management*, 2012 (CCAR-158).

These regulations form the basic framework of the general aviation legislative system. However, the problem is that there are over 100 CAAC regulations and most of them regard scheduled air transport. The dozen of regulations listed above are the ones that specifically relate to general aviation. It shows that the general aviation legislative system is in need of improvement and perfection.

First, there is no act or law passed by the legislative body to specifically regulate or promote general aviation. The *Civil Aviation Law* is the only act that mentions general aviation. The others are administrative regulations and orders which have a lower force of law. In other words, there is no high level legislation to support general aviation when needed. Second, many regulations are not made specifically for general aviation. General aviation airports, for instance, are using the regulations made for scheduled air transportation airports. Third, the regulations have not covered every aspect of general aviation. For example, there is no regulation related to noise control, nor environmental protection.

Fuel Supply Issue

According to the statistics (CATAGA, 2014), by the end of 2013, there were 385 rotorcraft and 1239 fixed wing aircraft in China. As Figure 3 and Figure 4 show, the most popular three types of helicopters and six types of fixed wing aircraft are single piston-engine aircraft. That is, more than one third of the helicopters and more than half of the fixed wing aircraft are using aviation gasoline. There is no public data regarding the production, transportation, or importation of avgas in China, however, it is reported that the China National Petroleum Corporation (CNPC) Lan Zhou oil refinery is the exclusive facility which is capable of and certified to produce avgas in China (NetEase, 2014). This

oil refinery will conduct the production and sale under supervision of National Development and Reform Commission (NDRC) (Xu, 2014), which means that the NDRC decides the allocation and price of the avgas. In general, the avgas production will guarantee the supply of State Owned Enterprises, such as Heilongjiang Agriculture Reclamation Bureau and Civil Aviation Flight University. Other general aviation companies which are not qualified to get allocation from NDRC have to place their orders 12 months in advance, with full payment of 2000 tons (NetEase, 2014). Furthermore, the purchasers have to rent fuel tanks from the seller and manage transportation on their own. However, most small general aviation companies do not have the ability to transport, store or consume 2000 tons of avgas.

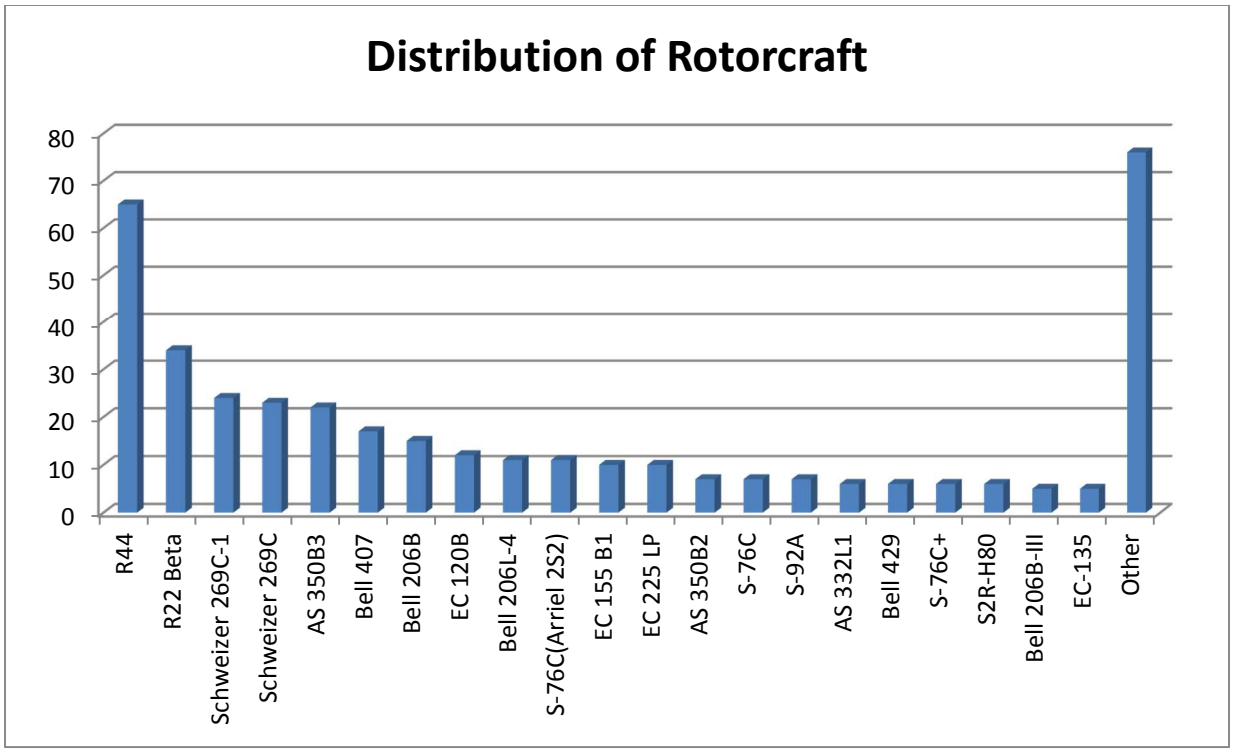

Figure 3. Distribution of Rotorcraft by Type. (CATAGA, 2014)

On the other hand, the current Chinese national standard of avgas (GB1787-79) was made in 1979, which has not been modified in more than 30 years. The 95/130 (tetraethyl lead – TEL less than 9 grams per US gallon) and 100/130 (TEL less than 7 grams per US gallon) are the two most used grades in China, while the 100 Low Lead (1.2 to 2 grams TEL per US gallon). In addition, the TEL still depends on importation and the procedure is extremely complicated and time-consuming. And this situation also limits the yield of the gasoline.

As the number of general aviation aircraft increases, the demand for avgas will not be satisfied by only one supplier. First, one producer has limited production yield. Second, there are no professional transportation, storage, and refuel services provided or such regulations existing. Then, the price is not decided by the market. This is because the National Aviation and Vessel Fuel Appraisal Committee is the only institution of technical appraisal and issuing certification of avgas production. Since it was founded in 1960, only one facility – the CNPC Lan Zhou oil refinery – has been approved and certified to produce avgas. Even the CAAC could not make the Committee change its policy to introduce more facilities to provide avgas (Xu, 2014). Moreover, the production is under planning of the NDRC, instead of meeting the market's demand.

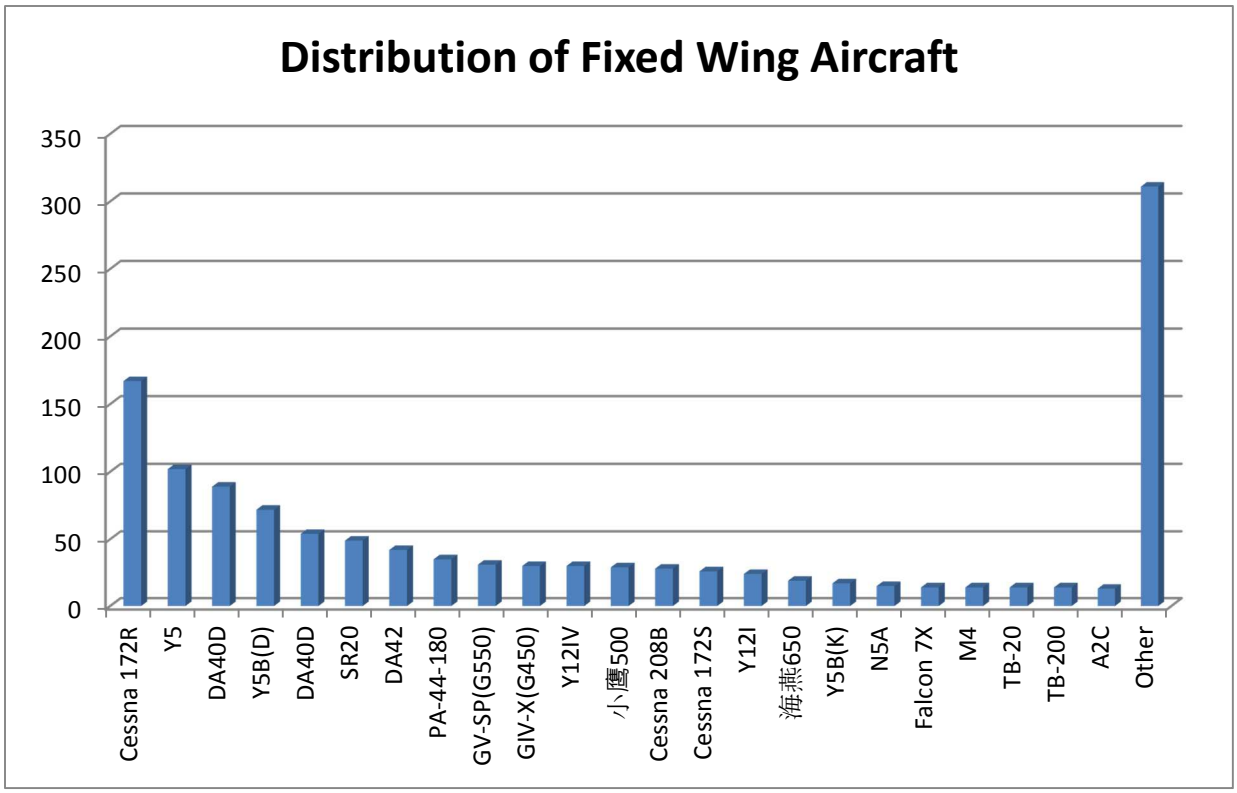

Figure 4. Distribution of Fixed Wing Aircraft by Type. (CATAGA, 2014)

Obviously, avgas in China is totally a monopoly, and has become a major constraint of general aviation growth. Without sufficient fuel supply, the aircraft on the ground would just increase the operation cost. As a result, the operators have to pay a higher price to purchase fuel from SOEs with allocation or small oil refineries without certification, or search for fuel on the grey market. Such disorder of the fuel supply will certainly increase the risk of general aviation operations. Moreover, the transportation, storage and refueling of avgas are also badly in need of specific regulations to control operation risks.

General Aviation Airport Issue

China is the third-largest country in the world (3,706,581 square miles), about the same size as the United States (3,795,967 square miles). There are total of 19,729 airports and landing facilities (GAMA, 2013) in the US, of which 5,168 are public use (including 551 Part 139 airports), 14,111 are private use, and 272 are military only. In China, however, the number of certificated public transportation airports is 193 (CAAC, 2014), while the number of certificated general aviation airport and landing facilities is 43 (CATAGA, 2014). Adding in the uncertificated airports, the total number is 286. Though this number is hard to believe, it is true that the lack of airport has become a major constraint of general aviation growth.

There are two contributing factors to such an airport shortage. First, it is because currently there is no specific regulation for general aviation airports. There are two kinds of civil airport in China, transportation airports and general aviation airports. According to the Regulation of Civil Airport Construction Administration (2012), Article 119, both kinds of airport implement the same planning and construction procedures. That is, to build an airport for small airplanes, Diamond, or Cessna, for example, would cost equal effort as building an airport for jumbo jets. Second, the CAAC is responsible for planning of all civil airports and the supervision of construction (CAAC, 2012). In addition to CAAC approval, the airport site selection must have paper approval from multiple government agencies, including the military, urban and rural planning, Ministry of Transport, environmental protection, Meteorological Administration, Administration of Cultural Heritage, Ministry of Land and Resources, Earthquake Administration, State Radio Regulation, electricity, Ministry of Water Resources, and communication. The

purpose of a general aviation airport is to provide service for the local community; however, this centralized planning mode and time-consuming bureaucracy are not very encouraging. Moreover, general aviation airports also need regulations for safety management system (SMS), noise management, and environmental protection (construction, operation emission, fuel/oil storage and disposal, deicing/anti-icing substance disposal, etc.).

General Aviation Companies Issue

As a result of the general aviation airport shortage, there are also not enough general aviation companies to provide services, such as Fixed Base Operators (FBO), Flight Service Station (FSS), and Maintenance Repair & Overhauls (MRO). According to CAAC (2014), by the end of 2013, the total number of licensed general aviation companies is 189. The number was 111 by the end of 2010, so it increased 40% in three years. The list of licensed general aviation companies of 2011 (see Appendix A) was researched and the business scope of each company is listed. In China, the general aviation companies are classified into three different categories – class I, II and III, and each category has different operation activities (CAAC, 2007):

- Class I – onshore oil service, offshore oil service, helicopter external load operation, artificial precipitation, emergency medical service, aerial prospecting, aerial tour, business aviation, private or commercial pilot training, helicopter maritime pilot operation, aircraft management service, rental service, charter flight service.

- Class II – aerial filming, aerial advertising, marine monitoring, fishery service, meteorological sounding, scientific experiment, urban firefighting, aerial inspection.
- Class III – aerial seeding, aerial fertilizing, aerial plant growth regulator spray, aerial weeding, disease and pest control of agriculture and forestry, grassland deratization, hygiene pest control, aerial forest conservation, aerial photography.
- Business activities not included in aforesaid three categories shall be determined by the CAAC.

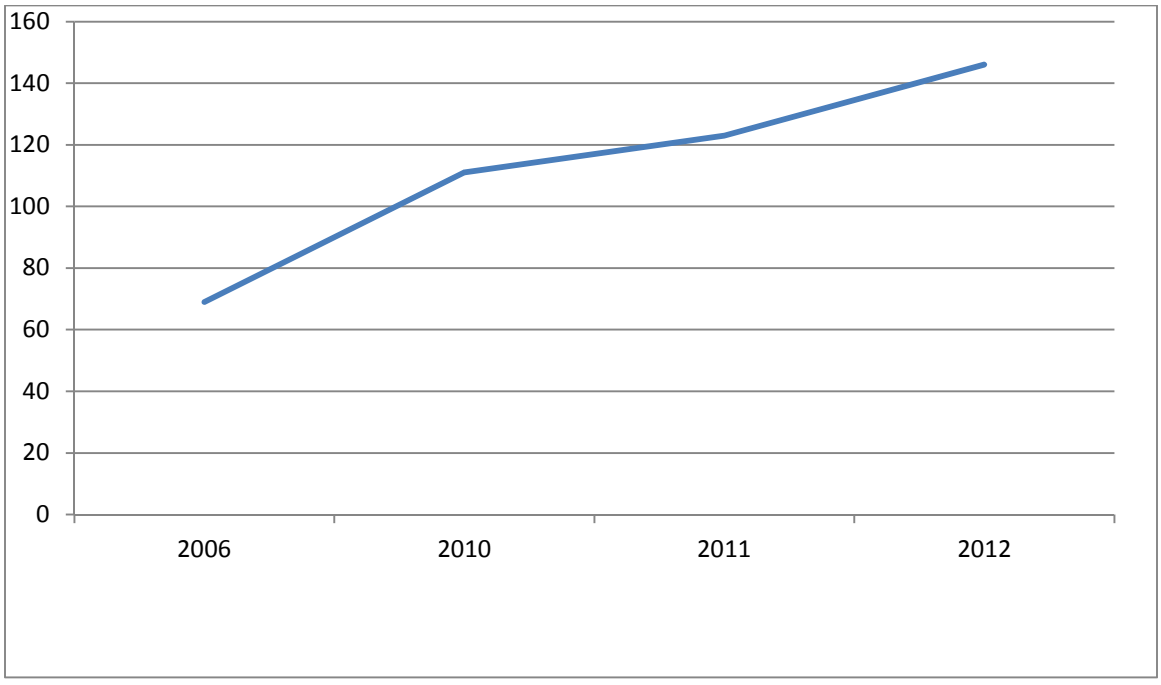

Figure 5. Licensed General Aviation Companies (2006-2013). (CAAC annual reports)

General aviation companies must register one or several specific items from these three categories, or one category, or all three categories on their business license That is, a company is legally qualified to provide such services. Of all three categories, business

aviation, aircraft management service, rental service, and charter flight service in Class I are considered to be part of the FBO services, and the rest are totally industrial and agricultural operations. The FBO, FSS, and MRO services are not mentioned at all. According to the developed list, only 46 of the 121 (38%) licensed general aviation companies in 2011 registered FBO related services. This shows that it is hard to say that a real FBO exists in China. On November 13, 2013, the first general aviation FSS was put into service in Zhuhai, Guangdong Province (Bian, 2014), and three more were approved to be built (Shenzhen, Guangdong Province; Dongfang, Hainan Province and Faku, Liaoning Province). As for MRO facilities, since there is no facility in China manufacturing multi-engine jets, no such MRO exists. The lack of these critical services has significantly constrained general aviation growth.

One of the reasons is that the general aviation industry is not a capital market. The aviation industry is still under strict government supervision and the state owned enterprise (SOE) has a dominant position. The SOEs were established to fulfill certain demand, such as offshore oil service, pipeline/electricity grid inspection, or aerial fertilizing, etc. These industrial/agricultural operations are usually carried on in areas far away from cities and the operation volume is relatively steady. So there was barely any growth for almost 20 years until 1996 when private enterprises were allowed to enter the industry and business and personal flight became popular. The other reason is that the procedure for establishing a general aviation company is rather complicated. There are two phases to found a company. The first step is to submit a preparation application to the CAAC regional office (where the company is based) with other documents including a feasibility study report and a resume of the founder(s). Once the preparation is

approved, the company can start the procedure of purchasing aircraft, aircraft registration and airworthiness, airmen certificates, radio certificate, insurance, contract with the airport, and an operation manual, etc. And then, all these documents, along with other files (including financial report, resume and identification of owner/manager/board members, operation service contracts and prices, and other documents required by the authority) shall be submitted to CAAC regional office when applying for a business license. The license expires in three years and all the documents mentioned above must be provided in order to renew the license.

In addition, according to the *Provision of General Aviation Business Licensing* (2007), there is also a minimum requirement on self-fund "non-loan fund" of aircraft purchases. The company that provides business/corporate flight services, rental services, and charter services must have minimum self-fund of RMB 50 million (about 8 million dollars), while class I requires RMB 20 million (about 3.22 million dollars), class II requires RMB 10 million (1.61 million dollars) and class III requires RMB 5 million (0.8 million dollars).

Other Contributing Issues

- General aviation aircraft manufacturing – Aircraft manufacturing has always been a weak point of the Chinese aviation industry. According to statistics (CATAGA, 2014), there are three main general aviation aircraft manufacturers in China – Aviation Industry Corporation of China (AVIC), Shandong Bin-Ao Aircraft (joint venture with Diamond Aircraft Industry), and Shanghai Sikorsky Aircraft Company. The total general aviation aircraft shipment was 59 in 2011 (CATAGA,

2014). The main product is single piston engine light aircraft, as *Table 3* shows. The Chinese aviation industry does not have or lacks the ability to manufacture business jet and other turboprop utility aircraft. As a result, many general aviation aircraft rely on importation.

Table 3. General Aviation Aircraft Shipment. (CATAGA, 2014)

Aircraft		**2011**	**2010**
Y-12	Twin turboprop utility aircraft	7	2
LE500	Single piston engine 5 seat light aircraft	20	15
Y-5 (Antonov-2)	Single piston engine biplane utility/agricultural aircraft	5	6
DA40D	Single piston engine 4 seat light aircraft	23	13
Z-9 (Eurocopter AS365)	Twin turboshaft medium multipurpose utility helicopter	2	4
HW13		2	3

- General aviation aircraft tax – According to the General Administration of Customs, importing aircraft must pay tariff and value added tax (VAT), however, there is a preferential policy for aircraft with an empty weight of more than 55,115 lbs, on which dutiable VAT is just 5%. In addition, this tax preferential policy is exclusive for scheduled air transportation. For example, a Boeing 737

sold to an airline company has a lower dutiable tax through Customs than sold to a corporation as a business jet.

Table 4. Aircraft Importation Tax. (China Customs, 2014)

Product	Tariff	VAT
Helicopter empty weight less than 4410 lbs	2%	17%
Helicopter empty weight between 4410 lbs and 15,432 lbs	2%	17%
Helicopter empty weight more than 15,432 lbs	2%	17%
Light aircraft	5%	17%
Medium aircraft	4%	17%
Aircraft empty weight between 33,069 lbs and 99,208 lbs	5%	17%
Extra-large aircraft	1%	17%
Aircraft engine, rotor and spare part	1%	17%
Aircraft landing gear and spare part	1%	17%
Aircraft and helicopter spare part	1%	17%
Ground simulator and spare part	1.5%	17%

- Pilots – The pilot shortage is a serious problem of the Chinese aviation industry. According to CAAC, the total number of licensed pilots in 2013 was 35,505. However, most of them are airline pilots. *Table 5* shows that less than 20% pilots

are considered to be general aviation pilots, but among them, two thirds are in Part 141 operations and are training to be airline pilots.

Table 5. Distribution of Pilot Certificate Holders. (CAAC, 2014)

Type of Certificate	Number
Part 121 (operation)	23,189
Part 121 (non-operation)	4,996
Part 135	720
Part 141	3,854
Part 91	708
Sports Aircraft Pilots	476
Government Agencies	94
Private Pilots	458
Foreigners	514
Other	499
Total	35,505

- Operation Costs – Both the high aircraft tax and pilot shortage, plus the complicated flight approval procedure, have increased the operational cost of general aviation. However, airport charges recently have become another high pressure on the operation cost. It is reported that over 90% of the companies operating charter service are in deficit (Tang, 2014). The charter service is

charged 5,000 to 8,000 dollars per hour; however, it is hard for the operator to be profitable after paying the airports.

Table 6. Airport Fee in Some of the Chinese Cities. (Tang, 2014)

Part of the Airport Charges in Chinese Cities				
	Main Hub			
	Domestic Dispatch	Domestic Business	International Dispatch	International Business
Beijing	$5,548	$8,987	$6,193	$10,600
Shenzhen	$2,774	$5,548	$3,258	$6,516
Guangzhou	$2,225	$4,415	$2,548	$5,096
Shanghai	$2,580	$3,387	n/a	n/a
	Medium/Non Hub			
Sanya	Landing fee: $806 per flight		Gate fee: $2,177 per flight	
Wuhan	Gate fee: $2,064 per flight		n/a	
Nanjing	Service fee: $2,580 per flight		n/a	
Taiyuan	Landing fee: $806 per flight		Gate fee: $1,612 per flight	
Dalian	Domestic landing fee: $1,935 per flight		International landing fee: $2,580 per flight	

- General Aviation Information – There is no information system such as NOTAMs, or National Based Aircraft Inventory Program in exist and in China.

- General Aviation Research and Statistics – The CAAC issues annual report for the entire aviation industry every year. However, the report that is allowed public access has only 16 pages, and the general aviation part has only three paragraphs, accounting for half a page. In addition, the statistic numbers in the CAAC annual report, fleet size and airport numbers for instance, are different from the report issued by General Aviation Committee of China Air Transportation Association (CATAGA).

CHAPTER IV – DISCUSSION

Generally, the Chinese general aviation industry is facing an awkward situation – no aircraft to fly, and difficult to take off and land. The analysis above indicates that the root of the immature industry is the restriction and constraint caused by the national policies. Unless these restrictions are lifted, there will be no revitalization for the general aviation industry. The best scenario is to pass a new law to define and promote general aviation and revise the current *Civil Aviation Law* to change airspace control policy and the approval procedure. However, according to Chinese legislative history, the legislation process might take a very long time – the first aviation law was enacted in 1996 when the country had been established for 47 years. So it is predictable that the emergence of general aviation law is sure to take years. Moreover, the Chinese government is highly centralized and a Communist Party monopoly. It tends to solve problems with administrative decisions or orders instead of formal legislation. On the other hand, in order to maintain its one party monopoly, the communist controlled military will not give up high value military resources such as airspace. Hence, it appears that reform will only be a modification of the current system and procedure. It means that part or even most of the airspace will gradually open for public use while the whole airspace is kept under control of the PLA Air Force.

Nonetheless, reform definitely will stimulate the rapid growth of the general aviation industry, if only the right steps are taken. The airspace seems to be critical; however, the industry did not have rocket-boosted growth as people expected after the low-altitude airspace reform took place in 2011. That is because the reform has to be full scale –

simply low-altitude airspace reform will not help with general aviation growth. Every aspect of the industry needs to be changed.

Airspace

The low-altitude airspace reform should be the start of the whole airspace reform. The airspace below 10,000 feet is perfect for personal, recreational, and training flight with single or twin piston engine aircraft. Obviously, this is not enough for general aviation. Business and commercial aviation using jets and turboprops require the whole airspace. Business aviation is also the most important and profitable part of general aviation. So the opening of middle and high-altitude airspace seems to be more important.

General Aviation Fleet

Figure 3 and Figure 4 show that the current general aviation fleet is not only small in size, but also outdated in model. For example, the second most popular fixed wing aircraft is the Y-5, which is the Chinese variant of Soviet Antonov An-2, a single engine biplane designed in the 1940s. Since the Chinese have limited capabilities of aircraft manufacturing, general aviation relies on importation in order to expand its fleet size. Hence, the government needs to lower the tax on general aviation aircraft, and at least maintain the same preferential rate (5% tariff and 5% C%VAT) as the transportation aircraft.

On the other hand, the restriction of foreign investment on aircraft manufacturing should be released to encourage general aviation aircraft manufacturing. According to the *Guidance of Industry List for Foreign Investment* (2011), and the *Provision of Foreign Investment on Civil Aviation* (2002), foreign investment on aircraft design, manufacturing, and maintenance is restricted to joint ventures and the Chinese must hold controlling

interest. Of course, there are a series of approval procedures which make cooperation extremely difficult. The restriction is meant to protect domestic aircraft manufacturers, however, it is unnecessary to set barrier if there is nothing much to protect. On the contrary, foreign investment will introduce advanced technology and management to the Chinese aviation industry.

Flight Control System

The *Regulation of General Aviation Flight Mission Approval and Administration* issued in 2013 was a great step of deregulation and indicated that the government was about to simplify the procedure of pre-operation approval. However, the reform should set up a goal of eliminating the government approval procedure because the government should be the regulator of safety and security. It is totally unnecessary to get government approval to conduct general aviation operations. Obviously, it will be extremely hard to make the government deregulate itself so the approval procedure will likely remain, at least for quite a while. It is likely that the military could separate civil aviation airspace from military airspace so that the flight operation does not have to apply for airspace every time. The CAAC could establish an online flight approval system which will simplify the procedure. The pilot could submit a short application a couple hours before takeoff and get a quick approval for the flight.

Airport

It is unlikely that the CAAC will change its responsibility for airport construction planning and approval, however, it is impending that the CAAC make specific regulations for general aviation airports. It is unnecessary for general aviation airports to implement the standards of commercial airports.

General Aviation Companies

The government should accelerate the process of general aviation marketization, and lift the restriction on foreign company investing and operating general aviation in China. The reason that China has become an economic miracle was the deregulation and marketization took place in the late 1970s. However, over 30 years later, the general aviation industry is still under strict government supervision. History has proved that central planning will destroy the industry, while free competition and marketization will bring prosperity. The government should make regulations to protect fair competition and provide services.

Research Questions

1. What are the issues of Chinese general aviation industry?

The Chinese general aviation industry is facing a series of issues. The airspace is not fully open for the public yet; the industry is in lack of aircraft, infrastructure, operators, and service providers; the legislation and regulation regard general aviation needs to be perfected; the country has little ability to build aircraft and engines; a safety management system for general aviation is needed; the industry is in need of a professional workforce; and so on. In other words, general aviation in China is immature and is in its early development phase; the most important issue is to build an ecosystem for the industry to make sure it has consistent and sustainable growth.

2. What is the key factor that constrains the growth of Chinese general aviation?

Many believe that controlled airspace is the key factor for general aviation. However, from a historical and political perspective, government interference appears to be the cause of the undeveloped situation of general aviation, and is the key factor that

constrains the growth of the industry. China is a country with a powerful central government, therefore the government controls every aspect of the aviation industry. It is obvious that such strong interference is not helping the industry.

3. How will the current government policy affect the future development of the general aviation industry?

As mentioned earlier, the Chinese government is promoting airspace reform to gradually open the airspace for public use. Meanwhile, the CAAC is planning to increase the number of airports in the country, both part 139 and small general aviation airports/landing facilities. It is reported that the CAAC is working on the *General Aviation Layout Plan* (Netease, 2015), and over 1,600 general aviation airports are planned to be built by 2030. Although the plan is not yet issued, such an ambitious number is definitely in need for further consideration and evaluation. The general aviation industry is not just about airports but a complicated and delicate system. It should be kept in mind that number alone is not the goal; otherwise, it could be another Great Leap Forward and definitely not good for the growth of the industry.

4. What is the government's role in promoting the general aviation industry?

The government should change its role and deregulate the industry. The government should focus on providing safety regulations, funding for research and education, funding for air service in remote and underdeveloped areas, providing infrastructure for the industry, and establishing information system such as weather forecast. This means that the function of the government would change from administrative to service oriented.

Limitations

The research is meant to provide an overview of the current Chinese general aviation industry; therefore, it is not detailed in every aspect. Furthermore, the data acquired from different publications differs from each other. For instance, the number of general aviation airports has several different versions. Even the CAAC has different numbers in different publications. The number of general aviation aircraft counted by CAAC and industry association is also different. The researcher had to choose the most reliable source; however, it might not be the most accurate. It is also must be mentioned that the annual reports issued by CAAC and industry association are not clear in specific numbers. For example, the annual flight hours have three categories: agricultural, industrial and other. The other accounted for about 80% in 2013, however, there is no statistical data about what does the other category include. In addition, many airports, especially general aviation airports, do not have monthly or annual reports regard based aircraft, fuel flowage, operations, and financial reports. Therefore, the researcher has difficulty in acquiring data to analyze the real performance of the general aviation industry.

Future Studies

The general aviation industry is a huge and complicated system. Every aspect of the industry could be a fine topic for further studies. For example, studies could be conducted on these topics: the regulations of general aviation, the analysis of fuel consumption at general aviation airports, the history of general aviation before and after 1949, the contribution of the general aviation industry to the economy, SMS implementation in general aviation (companies, airports and pilot training), the design of an effective SMS program for a certain general aviation organization, and general aviation airport layout

plan for a given area. As a matter of fact, the general aviation industry in China is desperately in need for educational research as well as practical research. The scientific instruction will help the industry with sustainable growth.

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APPENDICES

Appendix A – General Aviation Companies in China (2010). (CAAC, 2011)

Company Name	Scope of Business	Base	Registered Capital	
CAAC Northeastern Regional Office				
Baicheng General Aviation	Class I: Artificial Precipitation. Class II: Aerial Filming, Aerial Advertising, Meteorological Sounding, Scientific Experiment, Aerial Inspections. Class III.	Baicheng, Jilin	rmb 33.75 million	
Kaida General Aviation Co., Ltd	Class II: Aerial Filimng, Aerial Advertising, Aerial Inspections. Class III.	Harbin, Heilongjiang	rmb 11 million	Y5, Y5B
Daqing General Aviation	Class II & III.	Daqing, Heilongjiang	rmb 10.8 million	
Northeast General Aviation	Class II: Aerial Filming, Aerial Advertising, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections. Class III.	Nenjiang, Heilongjiang	rmb 10 million	
China Flying Dragon	Class I: On Oil Service, Helicopter External Load Operation, Artificial Precipitation, Emergency Medical Service, Aerial Prospecting, Private and Commercial Pilot Training, Aircraft Management Service, Rental Service, Charter Flight Service, Aerial Tour. Class II: Aerial Filming, Aerial Advertising, Marine Monitoring, Fishery Service, Scientific Experiment, Aerial Inspections. Class III: Aerial Forest Conservation, Aerial Photography. Concurrently: Aircraft Research and Experiment, Aircraft Maintenance.	Harbin, Heilongjiang	rmb 170 million	
Beidahuang General Aviation Co.	Class I: Artificial Precipitation, Aircraft Management Service, Private and Commercial Pilot Training. Class II: All Except for Marine Monitoring and Fishery Service. Class III.	Jiamusi, Heilongjiang	rmb 104.66 million	Fleet size: 52. Y-12, Y-11, Y-5B, DA-20, DA-40, DA-42, M-18A, M-18B, N-5A
Qiqihar Hexiang General Aviation Co., Ltd	Class III.	Qiqihaer, Heilongjiang	rmb 5 million	
Jilin Provinve General Aviaiton Company	Class I: Aerial Prospecting. Class II: Aerial Filimng, Aerial Advertising, Scientific Experiment, Aerial Inspections. Class III: All Except for Aerial Forest Conservation.	Changchun, Jilin	rmb 11 million	
Jilin Jialaibao Sport Aviation Co., Ltd	Club: (Restricted Airworthiness and Ligher-than-air Aiecraft)Private Pilot Training, Sports Aviation Training, Sports Aviation Performance, Personal Entertainment Flight	Changchun, Jilin	rmb 0.5 million	3 light aircraft
Shenyang Hummingbird Aviation Club	Club: (Restricted Airworthiness and Ligher-than-air Aiecraft)Private Pilot Training, Sports Aviation Training, Sports Aviation Performance, Personal Entertainment Flight	Shenyang, Liaoning	rmb 4 million	
Shenyang Golden Eagle Aviaint Club	Club: Sport Aviation Training, Sport Aviation Performance, Personal Entertainment Flight.	Shenyang, Liaoning	rmb 0.6 million	

Daliang Flying Eagle Aviaitn Club	Club: (Restricted Airworthiness and Ligher-than-air Aiecraft)Private Pilot Training, Sports Aviation Training, Sports Aviation Performance, Personal Entertainment Flight	Dalian, Liaoning	rmb 3 million	
Dalian General Aviation	Class II: Aerial Advertising, Scienrific Experiment, Aerial Photography.	Dalian, Liaoning	rmb 10 million	Drigible Company
ZYB Lily Jet	Class I: Business Aviation, Aircraft Management Service, Rental Service, Charter Flight Service.	Shenyang, Liaoning	rmb 66 million	Bambardier/Gulf Stream
Shenyang General Aviation	Class II: Aerial Filming, Aerial Advertising. Class III.	Shenyang, Liaoning	rmb 13 million	
Tianjin Tanggu General Aviation	Class I: Aerial Prospecting, Aerial Tour. Class II & III: Aerial Filming, Aerial Advertising, Aerial Inspections, Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control of Agriculture and Forestry, Grassland Deratization, Aerial Forest Conservation.	Tianjin	rmb 10.25 million	
Tongliao Gening General Aviation	Class III: Aerial Seeding, Aerial Fertilizing,Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation. Club: Using Restricted Certificate Of Airworthiness Of Aircraft And Lighter-than-air Aircraft Engaged In The Private Pilot Training, Sport Aviation Training, Sport Aviation Performance, Personal Entertainment Flight.	Tongliao, Liaoning	rmb 5 million	light/super light aircraft 30+
Tianjin Flying Man General Aviation	Club: (Restricted Airworthiness and Ligher-than-air Aiecraft)Private Pilot Training, Sports Aviation Training, Sports Aviation Performance, Personal Entertainment Flight	Tianjin	rmb 20 million	
Tianjin Jeppesen International Flight College Co.,Ltd Chaoyang Flight College of CAUC	Class I: Private And Commercial Pilot Training, Aircraft Management.	Chaoyang, Liaoning	rmb 60 million	
CAAC Northern Regional Office				
Beijing Taigeer Aviation Club	Club: (Restricted Airworthiness and Ligher-than-air Aiecraft)Private Pilot Training, Sports Aviation Training, Sports Aviation Performance, Personal Entertainment Flight	Beijing	rmb 1 million	
Beijing General Aviation Techsport Love	Class II: Aerial Filming, Aerial Advertising, Aerial Inspections. Class III: Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation. Club:Using Restricted Certificate Of Airworthiness Of Aircraft And Lighter-than-air Aircraft Engaged In The Private Pilot Training, Sport Aviation Training, Sport Aviation Performance, Personal Entertainment Flight.	Beijing	rmb 10 million	
Beijing Huajiao General Aviation	Class II & III: Aerial Filming, Aerial Advertising, Meteorological Sounding, Scientific Experiment, Aerial Inspections, Marine Monitoring.	Beijing		Drigible

Beijing Fanya General Motors Aeronautics	Class II: Aerial Filming, Aerial Advertising, Aerial Inspections. Class III: Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Beijing	rmb 10 million	
Beijing Tianxingchuangmei Aviation Club	Club: (Restricted Airworthiness and Ligher-than-air Aiecraft)Private Pilot Training, Sports Aviation Training, Sports Aviation Performance, Personal Entertainment Flight	Beijing	rmb 2 million	
Beijing Tianxing Aviation Sport	Club: (Restricted Airworthiness and Ligher-than-air Aiecraft)Private Pilot Training, Sports Aviation Training, Sports Aviation Performance, Personal Entertainment Flight	Beijing	rmb 0.5 million	Hot Air Ballooning
Asia Air Medical	Class I: Emergency Medical Service, Business Aviation, Rental Service, Charter Flight Service, Aircraft Management Service.	Beijing	rmb 70 million	air ambulance and charter
Beijing Feiren Power Sports Equipment Co., Ltd Changping Technology Training Center	Club: (Restricted Airworthiness Aircraft) Private Pilot Training, Sport Aviation Training, Sport Aviation Performance, Personal Entertainment Flight.	Beijing	rmb 1 million	
HNA Capital Helicopter	Class I: Business Aviation, Rental Service, Charter Flight Service, Aircraft Management Service, Aerial Tour.	Beijing	rmb 60 million	EuroCopter AS350B3 - 5, EC134 - 4, Robinson R22 - 1
HNA Capital Airlines	Class I: Rental Service, Emergency Medical Service, Aircraft Management Service, Helicopter Maritime Pilot Operation.	Beijing	rmb 776.5 million	Airbus A319 - 24, A320 -14
Beijing Airlines	Class I: Business Aviation, Rental Service, Charter Flight Service, Aircraft Management Service.	Beijing	rmb 1 billion	BBJ, A318, G450, Global Express, C605, DF 7X
Eastern General Aviation Corporation Co., Ltd	Class I: Onshore Oil Service, Offshore Oil Service, Helicopter External Load Operation, Helicopter Maritime Pilot Operation, Artificial Precipitation, Emergency Medical Service, Aerial Prospecting, Aerial Tour, Business Aviation. Class II & III: Aerial Filming, Aerial Advertising, Marine Monitoring, Fishery Service, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections, Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Tianjin & Handan, Hebei	rmb 202.524 million	Rotary wing: S-92, S-76, Bell-212, Bo105. 13 helicopters Fix wing: KingAir-200, Y5-B
Ordos General Aviation Co., LTD	Class I: Aerial Prospecting, Artificial Precipitation, Emergency Medical Service, Aerial Tour, Private and Commercial Pilot Training. Class II & III: Aerial Photography, Meteorological Sounding, Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Baotou, Neimenggu	rmb 50 million	Fleet size: 17. Y5-B, Y5, Y12, Diamond, KingAir
State Grid General Aviation Co., Ltd	Class I: Helicopter External Load Operation. Class II: Scientific Experiment, Aerial Inspections, Aerial Forest Conservation.	Beijing	rmb 21 million	National Grid Power Line Inspection & Mainenance

Hulunbeir General Aviation Co., LTD	Class I: Artificial Precipitation, Aerial Prospecting, Aerial Tour, Aircraft Management Service, Private and Commercial Pilot Training. Class II & III: Aerial Advertising, Scientific Experiment,Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Hailaer, Neimenggu	rmb 20 million	Fleet size: 6
Jinggong General Aviation Beijing	Class I: Aerial Prospecting, Artificial Precipitation, Aerial Tour, Aircraft Management Service, Private and Commercial Pilot Training. Class II & III: Aerial Photography, Aerial Advertising, Meteorological Sounding, Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Beijing	rmb 50 million	Cirrus SR-20G3 (2), Y-5 (2), Sikorsky S333 (1), S300 (1)
Taiyuan Aeronautics Photography Co., Ltd	Aerial Filming, Aviation Video Service, General Aviation Business Agent.	Taiyuan, Shanxi	rmb 56.3 million	Subsidiary of Eastern General Aviation
Shanxi Sanjin General Aviation	Class I: Onshore Oil Service, Artificial Precipitation, Emergency Medical Service, Aerial Prospecting, Aerial Tour, Private and Commercial Pilot Training, Charter Flight Service. Class II: Aerial Filming, Aerial Advertising, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections. Class III: Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation. Club: Sport Aviation Training,Sport Aviation Performance,Personal Entertainment Flight.	Datong, Shanxi	rmb 20 million	
Langfang Development Zone China Aviation Sport Clun Co., Foreign Hot Air Balloon	Club: (Restricted Airworthiness and Ligher-than-air Aiecraft)Private Pilot Training, Sports Aviation Training, Sports Aviation Performance, Personal Entertainment Flight	Langfang, Hebei	rmb 1 million	
Hebei Zhangjiakou Powered Parachute	Club: (Restricted Airworthiness and Ligher-than-air Aiecraft)Private Pilot Training, Sports Aviation Training, Sports Aviation Performance, Personal Entertainment Flight	Hangjiakou, Hebei	rmb 1 million	
Hebei Jinyan Air	Class I: Private and Commercial Pilot Training, Aircraft Management. Class II: Aerial Photography, Aerial Advertising. Class III: Aerial Photography. Club:Using Restricted Certificate Of Airworthiness Of Aircraft Engaged In The Private Pilot Training, Sport Aviation Training, Sport Aviation Performance, Personal Entertainment Flight.	Hebei	rmb 20 million	
Hebei Jinpeng Aviation Club	Club: (Restricted Airworthiness and Ligher-than-air Aiecraft)Private Pilot Training, Sports Aviation Training, Sports Aviation Performance, Personal Entertainment Flight		rmb 1 million	
Shijiazhuang Jihua General Aviation	Class I: Aerial Prospecting, Aerial Tour. Class II & III: Aerial Photography, Aerial Advertising, Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Shijiazhuang, Hebei	rmb 22.7 million	Subsidiary of China National Aviation Company Shijianzhuang Airplane Industry
Qinhuangdao Baiden Aviatino Sport	Club: (Restricted Airworthiness and Ligher-than-air Aiecraft)Private Pilot Training, Sports Aviation Training, Sports Aviation Performance, Personal Entertainment Flight	Qinhuangdao, Hebei	rmb 0.5 million	

CITIC General Aviation Co., Ltd	Class I: Onshore Oil Service, Offshore Oil Service, Helicopter Maritime Pilot Operation, Helicopter External Load Operation, Aircraft Management, Emergency Medical Service, Business Aviation. Class II & III: Aerial Photography, Aerial Advertising, Scientific Experiment, Aerial Inspections, Aerial Forest Conservation.	PEK，Tianjin, Harbin	rmb 92.92 million	Fleet size: 13 Fix wing, Rotary wing, Drigible
CAAC Northwestern Regional Office				
Shanxi Tengfei General Aviation	Class II & III: Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation, Aerial Photography, Aerial Advertising, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections, Airdrop.	Xi'An, Shanxi	rmb 10.42 million	
Shanxi Joy Sky Aviaitn	Private Pilot Training, Sport Aviation Training, Sport Aviation Performance, Personal Entertainment Flight.	Xi'An, Shanxi	rmb 1 million	
Jinggong General Aviation Shanxi	Class I: Onshore Oil Service, Offshore Oil Service, Helicopter External Load Operation, Artificial Precipitation, Emergency Medical Service, Aerial Prospecting, Aerial Tour, Business Aviation, Private and Commercial Pilot Training, Helicopter Maritime Pilot Operation, Aircraft Management, Rental Service, Charter Flight Service. Class II: Meteorological Sounding, Aerial Photography, Aerial Advertising, Aerial Inspections. Class III: Aerial Forest Conservation.	Xi'An, Shanxi	rmb 50 million	
Gansu Dunhuang Fly	Class I: Onshore Oil Service, Artificial Precipitation, Aerial Tour, Emergency Medical Service, Aerial Prospecting, Helicopter Maritime Pilot Operation, Aircraft Management. Class II: Aerial Filming, Remote Sensing Survey, Aerial Advertising, Aerial Inspections, Meteorological Sounding, Scientific Experiment. Class III: Urban Firefighting, Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation, Personal Entertainment Flight.	Dunhuang, Gansu	rmb 5 million	Fleet size: 2
Gansu Dunhuang Fly Club	Club: (Restricted Airworthiness and Ligher-than-air Aiecraft)Private Pilot Training, Sports Aviation Training, Sports Aviation Performance, Personal Entertainment Flight	Dunhuang, Gansu	rmb 3.6 million	
Xi'An Helicopter Co., LTD	Class I: Onshore Oil Service, Offshore Oil Service, Emergency Medical Service, Aerial Prospecting, Aerial Tour, Business Aviation, Helicopter Maritime Pilot Operation, Aircraft Management, Rental Service, Charter Service, Aerial Advertising, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections, Aerial Forest Conservation, Aerial Photography.	Xi'An, Shanxi	rmb 30 million	
Shanxi Jinsheng General Aviation	Class I: Emergency Medical Service, Aerial Prospecting, Aerial Tour, Business Aviation, Private and Commercial Pilot Training, Aircraft Management, Rental Service, Charter Flight Service. Class II: Aerial Photography, Aerial Advertising, Aerial Inspections.	Ankang, Shanxi	rmb 50 million	

XI'An Zhongfei Aviation Club	Club: (Restricted Airworthiness and Ligher-than-air Aiecraft)Private Pilot Training, Sports Aviation Training, Sports Aviation Performance, Personal Entertainment Flight	Xi'An, Shanxi	rmb 10 million	
Qinghai Yuxiang General Aviation	Class I: Artificial Precipitation, Aerial Tour, Aerial Prospecting, Aerial Advertising, Private and Commercial Pilot Training, Emergency Medical Service, Charter Flight Service, Scientific Experiment. Class II: Aerial Inspections, Meteorological Sounding, Aerial Seeding. Class III: Aerial Photography, Aerial Forest Conservation, Aerial Plant Growth Regulator Spray, Sport Aviation.	Xining, Qinaghai	rmb 5 million	
Phoenix Flying College	Class I: Onshore Oil Service, Offshore Oil Service, Helicopter External Load Operation, Artificial Precipitation, Emergency Medical Service, Aerial Prospecting, Aerial Tour, Business Aviation, Private and Commercial Pilot Training, Helicopter Maritime Pilot Operation, Aircraft Management, Rental Service, Charter Service. Class II: Aerial Photography.	Guyuan, Ningxia	rmb 42.72 million	DA-40 (27), DA-42 (5), CJ1 (2)
China Fly General Aviation Corporation	Class I: Aerial Prospecting, Artificial Precipitation, Aircraft Management. Class II & III: Aerial Photography, Aerial Advertising, Scientific Experiment, Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Airport Runway Calibration, Consulting.	Xi'An, Shanxi	rmb 30 million	Cessna 209, Cessma Citation, Cessna 172, Y-12, R-44
CAAC Xinjiang Regional Office				
Xinjiang Tianshan General Aviation	Class III: Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation, Aerial Photography.	Urumqi, Xinjiang	rmb 5 million	
Xinjiang Kaiyuan General Aviation	Class I: Onshore Oil Service, Emergency Medical Service, Business Aviation, Aerial Tour. Class II & III: Aerial Advertising, Scientific Experiment, Urban Firefighting, Aerial Inspections, Diseases and Insect control, Grassland Deratization, Aerial Forest Conservation, Aerial Photography.	Urumqi, Xinjiang	rmb 56.8 million	
Xinjiang Tianyi Helicopter Corporation	Class I: Emergency Medical Service, Aerial Tour, Onshore Oil Service. Class II: Aerial Photography, Aerial Inspections, Aerial Advertising, Urban Firefighting. Class III: Aerial Forest Conservation, Aerial Photography.	Shihezi, Xinjiang	rmb 21 million	2 helicopters
Xinjiang Tianxiang Aviation College	Private and Commercial Pilot Training.	Shihezi, Xinjiang	rmb 60 million	DA-20 (2), DA-40 (9), DA-42 (2)
Xinjiang General Aviation Co., Ltd Xinjiang Production and Construction Corps Aviation Business Administration	Class I: Onshore Oil Service, Artificial Precipitation, Aerial Remote Survey, Aerial Prospecting, Aerial Tour, Private Pilot Training, Aircraft Management, Rental Service, Charter Flight Service. Class II & III: Aerial Photography, Aerial Advertising, Meteorological Sounding, Aerial Inspections, Agriculture and Forest Service.	Shihezi, Xinjiang	rmb 90.22 million	Fleet size: 33. Y-12 (4), Y-5 (10), Y-5B (13), AT-402B (4), AT-504B (2)

CAAC Eastern Regional Office				
Jiangnan General Aviation	Class I: Aerial Tour. Class II & III: Aerial Photography, Meteorological Sounding, Scientific Experiment, Aerial Inspections, Aerial Seeding, Aerial Fertilizing, Diseases and Insect control.	Changzhou, Jiangsu	rmb 55 million	Y-12 (2), Y-5 (3)
Jiangsu Huaxi General Aviation	Class I, II & III	Wuxi, Jiangsu	rmb 100 million	
Jiangsu Huayu General Airline Co., LTD	Class I: Onshore Oil Service, Helicopter External Load Operation, Artificial Precipitation, Emergency Medical Service, Aerial Prospecting, Aerial Tour, Helicopter Maritime Pilot Operation, Aircraft Management, Rental Service, Charter Service. Class II & III: Aerial Photography, Aerial Advertising, Marine Monitoring, Fishery Service, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections, Aerial Forest Conservation.	Nanjing, Jiangsu	rmb 110 million	Augusta A119, Mi-171
Jiangxi Changjiang General Aviation	Aerial Photography, Aerial Advertising, Marine Monitoring, Fishery Service, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections, Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Nanchang, Jiangxi	rmb 10.5 million	
Qingdao Jiutian Flying Academy	Private and Commercial Pilot Training.	Qingdao, Shandong	rmb 20 million	Cseena 172 (17), DA-42 (3)
Qingdao Helicopter Co., Ltd	Helicopter External Load Operation, Emergency Medical Service, Aerial Prospecting, Aerial Tour, Private and Commercial Pilot Training, Helicopter Maritime Pilot Operation, Aircraft Management, Aerial Advertising, Marine Monitoring, Urban Firefighting, Aerial Inspections, Aerial Forest Conservation, Aerial Photography.	Qingdao, Shandong	rmb 52.38 million	
Shandong Airlines	Class I: Offshore Oil Service, Emergency Medical Service, Aerial Prospecting, Business Aviation, Aerial Tour. Class II & III: Aerial Photography, Aerial Advertising, Marine Monitoring, Aerial Inspections, Fishery Service.	Jinan, Shandong	rmb 50 million	
Shandong Huanghekou General Aviation	Class II & III: Aerial Photography, Aerial Advertising, Marine Monitoring , Fishery Service, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections, Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Dongying, Shandong	rmb 10 million	
Shandong General Aviation Service Co., Ltd	Class II & III: Aerial Photography, Aerial Advertising, Marine Monitoring, Fishery Service, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections, Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Dongying, Shandong	rmb 10 million	

Nanshan Jet	Class I: Onshore Oil Service, Offshore Oil Service, Helicopter External Load Operation, Artificial Precipitation, Emergency Medical Service, Aerial Prospecting, Aerial Tour, Business Aviation, Private and Commercial Pilot Training, Helicopter Maritime Pilot Operation, Aircraft Management, Rental Service, Charter Flight Service.	Yantai, Shandong	rmb 100 million	Fleet size: 8. C605, Globle Express, G450, G550
Shanghai Haohai General Aviation	Class I: Onshore Oil Service, Offshore Oil Service, Helicopter External Load Operation, Artificial Precipitation, Emergency Medical Service, Aerial Prospecting, Aerial Tour, Helicopter Maritime Pilot Operation, Aircraft Management, Rental Service, Charter Flight Service. Class II: Aerial Photography, Aerial Advertising, Marine Monitoring, Fishery Service, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections. Class III: Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Shanghai	rmb 80 million	
China Eastern Airlines Executive Air	Class I: Emergency Medical Service, Business Aviation, Private and Commercial Pilot Training, Aircraft Management, Rental Service, Charter Service.	Shanghai	rmb 50 million	Fleet size: 12
Shanghai Eastern General Aviation Enterprise Group Co., Ltd	Class I: Private And Commercial Pilot Training, Aircraft Management, Aerial Tour. Class II: Aerial Photography, Aerial Advertising, Urban Firefighting, Aerial Inspections.	Shanghai	rmb 26.25 million	
Shanghai Heli General Aviation	Class I: Aircraft Management, Private and Commercial Pilot Training. Class II: Aerial Photography, Aerial Advertising, Marine Monitoring, Fishery Service, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections. Class III: Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Shanghai	rmb 20 million	S-300C, S-333, MD-902, S-76, S-92, AC313, AC311, AC310
Deer Jet	Class I: Onshore Oil Service, Offshore Oil Service, Helicopter External Load Operation, Artificial Precipitation, Emergency Medical Service, Aerial Prospecting, Aerial Tour, Helicopter Maritime Pilot Operation, Aircraft Management, Rental Service, Charter Flight Service, Business Aviation.	Shanghai	rmb 950 million	
Kingwing General Aviation	Class I: Aircraft Management, Rental Service, Private Pilot Training, Helicopter Maritime Pilot Operation, Helicopter External Load Operation, Emergency Medical Service. Class II: Aerial Photography, Marine Monitoring, Aerial Inspections, Aerial Advertising. Class III: Aerial Forest Conservation, Aerial Plant Growth Regulator Spray. Sport Aviation Training, Sport Aviation Performance, Personal Entertainment Flight.	Shanghai	rmb 150 million	Helicopter: S-76C++, EC135, MD600N, R22, S300CBi

Shanghai Skyway General Aviation Co., LTD	Class I: Helicopter External Load Operation, Emergency Medical Service, Helicopter Maritime Pilot Operation, Aircraft Management. Class II: Aerial Photography,Aerial advertising, Marine Monitoring, Aerial Inspections. Class III: Aerial Plant Growth Regulator Spray, Aerial Forest Conservation. Sport Aviation Training, Sport Aviation Performance, Personal Entertainment Flight.	Shanghai	rmb 20 million	
Shanghai Avieye General Aviaiton Co., LTD	Class I: Onshore Oil Service, Emergency Medical Service, Aerial Prospecting, Aircraft Management. Class II: Aerial Photography, Aerial Advertising, Marine Monitoring, Aerial Inspections, Fishery Service, Meteorological Sounding, Scientific Experiment, Urban Firefighting. Class III: Aerial Plant Growth Regulator Spray, Aerial Forest Conservation. Sport Aviation Training, Sport Aviation Performance, Personal Entertainment Flight.	Shanghai	rmb 20 million	
NUAA International Flying Academy	Private and Commercial Pilot Training.	Nanjing, Jiangsu	rmb 20 million	King Air C90, R22, Bell 206
Zhejiang Xinzhou General Aviation Co., Ltd	Class I: Onshore Oil Service, Artificial Precipitation, Emergency Medical Service, Aerial Prospecting, Aerial Tour, Aircraft Management, Rental Service, Charter Flight Service. Class II: Aerial Photography, Aerial Advertising, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections.	Hangzhou, Zhejiang	rmb 50 million	
Zhejiang Donghua General Aviation	Class I: Emergency Medical Service, Aerial Prospecting, Aerial Tour. Class II & III: Aerial Photography, Aerial Inspections, Scientific Experiment, Aerial Advertising, Marine Monitoring, Aerial Seeding, Aerial Fertilizing, Aerial Weeding, Diseases And InsectsControl.	Yiwu, Zhejiang	rmb 16 million	
Anhui Dinghong General Aviation Co.,Ltd	Class I: Onshore Oil Service, Emergency Medical Service, Aerial Tour, Aircraft Management. Class II: Aerial Photography, Aerial Advertising, Marine Monitoring, Fishery Service, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections. Class III: Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation, Aerial Photography.	Hefei, Anhui	rmb 20 million	
CAAC Southwestern Regional Office				
Sichuan Aling Ner Aviation Co., Ltd	Class I: Business Aviation, Rental Service, Charter Service, Aerial Tour, Aircraft Management. Class II & III: Aerial Photography, Aerial Advertising, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections, Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation. Club: Sport Aviation Training, Sport Aviation Performance, Personal Entertainment Flight.	Chengdu, Sichuan	rmb 15 million	
Chengdu Chuangyi General Aviaiton Sport Flight Co., Ltd	Club: Sport Aviation Training, Sport Aviation Performance, Personal Entertainment Flight.		rmb 10 million	
Chengdu Jiezutianxia Tech Development Co., Ltd	Club: Sport Aviation Training, Sport Aviation Performance, Personal Entertainment Flight.		rmb 1 million	

Guizhou Shuangyang General Aviation	Class I: Aerial Prospecting, Aerial Tour. Class II & III: Aerial Photography, Aerial Advertising, Marine Monitoring, Fishery Service, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections, Agriculture and Forest service.	Anshun, Guizhou		
Sichuan Tianyi Flying Club	Club: Sport Aviation Training, Sport Aviation Performance, Personal Entertainment Flight.	Chengdu, Sichuan	rmb 1.08 million	
Sichuang Tri Star General Aviation Co., Ltd	Class I: Onshore Oil Service, Artificial Precipitation, Emergency Medical Service, Aerial Prospecting, Business Aviation, Rental Service, Charter Service. Class II & III: Aerial Photography, Aerial Advertising, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections,Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Chengdu, Sichuan	rmb 50 million	
Chongqing Shenzhou Aviation Sports Club	Club: Sport Aviation Training, Sport Aviation Performance, Personal Entertainment Flight.	Chongqing	rmb 0.5 million	
Sichuang Xihua General Aviation Co., Ltd	Class II: Aerial Photography, Aerial Advertising, Scientific Experiment, Urban Firefighting, Aerial Inspections. Class III: Aerial Seeding, Aerial Forest Conservation.	Chengdu, Sichuan	rmb 10 million	
Yunnan Hexie General Aviation Co., Ltd	Class I: Onshore Oil Service, Helicopter External Load Operation, Artificial Precipitation, Aerial Prospecting, Helicopter Maritime Pilot Operation. Class II: Aerial Photography, Aerial Advertising, Marine Monitoring, Fishery Service, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections. Class III: Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation,Aerial Photography.	Kunming, Yunnan	rmb 50 million	
Yunnan General Aviation Co., Ltd	Class I: Helicopter External Load Operation, Artificial Precipitation, Aerial Prospecting, Helicopter Maritime Pilot Operation. Class II: Aerial Photography, Aerial Advertising, Marine Monitoring, Fishery Service, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections. Class III: Aerial Forest Conservation.	Simao, Yunnan	rmb 50 million	Bell 206 (3)
Yunnan Tengchong Huoshan Aviaiton Club	Sport Aviation Training, Sport Aviation Performance, Personal Entertainment Flight.	Tengchong, Yunnan	rmb 1 million	
CAAC Central Southern Regional Office				
Anyang General Aviation Co., Ltd	Class I: Emergency Medical Service, Aerial Prospecting, Private and Commercial Pilot Training, Aircraft Management. Class II: Aerial Photography, Aerial Advertising, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections. Class IIIAerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation, Aerial Photography.	Anyang, Henan	rmb 20.46 million	

Guangdong Baiyun General Aviation Co., Ltd	Class I: Emergency Medical Service, Aerial Prospecting, Aircraft Management, Private Pilot Training. Class II: Aerial Photography, Aerial Advertising, Marine Monitoring, Fishery Service, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections. Class III: AAerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation, Aerial Photography.	Yangjiang, Guangdong	rmb 20 million	
Guangdong Province General Aviation Co., Ltd	Class I: Onshore Oil Service, Helicopter External Load Operation, Emergency Medical Service, Aerial Prospecting, Private Pilot Training, Helicopter Maritime Pilot Operation, Aircraft Management, Rental Service, Charter Service, Business Aviation, Aerial Tour. Class II: Aerial Photography, Aerial Advertising, Marine Monitoring, Fishery Service, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections. Class III: Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation, Aerial Photography.	Zhuhai, Guangdong	rmb 20 million	
Guangzhou Suilian Helicopter General Aviation Co., Ltd	Class I: Onshore Oil Service, Helicopter External Load Operation, Artificial Precipitation, Emergency Medical Service, Aerial Prospecting, Helicopter Maritime Pilot Operation, Private and Commercial Pilot Training, Aircraft Management. Class II: Aerial Photography, Aerial Advertising, Marine Monitoring, Fishery Service, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections. Class III: Diseases and Pest Control, Aerial Forest Conservation.	Guangzhou, Guangdong	rmb 20 million	Rotary wing: 10, including Schweizer 300, R44, R22, Bell 206, Bell 407
Hainan Aviation Academy	Private and Commercial Pilot Training.	Sanya, Hainan	rmb 20 million	
Donghai Jet	Business Aviation, Aircraft Management, Rental Service, Charter Service.	Shenzhen, Guangdong	rmb 250 million	C605 (1), C300 (5)
Kings General Aviation	Aircraft Management, Helicopter External Load Operation(Electricity Construction and Maintenance), Aerial Inspections(Electricity), Aerial Prospecting, Aerial Photography, Aerial Advertising, Aerial Forest Conservation.	Shenzhen, Guangdong	rmb 40 million	
Business Aviation Asia Ltd	Business Aviation, Aircraft Management, Rental Service, Charter Flight Service.	Shenzhen, Guangdong	rmb 100 million	
Citic Offshore Helicopter Co., Ltd	Class I: Onshore Oil Service, Offshore Oil Service, Artificial Precipitation, Emergency Medical Service, Aerial Prospecting, Helicopter Maritime Pilot Operation, Rental Service, Charter Service, Business Aviation, Aerial Tour, Helicopter External Load Operation, Aircraft Management, Private Pilot Training. Class II & III: Aerial Photography, Aerial Advertising, Marine Monitoring, Fishery Service, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections, Aerial Forest Conservation.	Shenzhen, Guangdong	rmb 513.6 million	

Henan Lanxiang General Aviation	Class II & III: Aerial Photography, Aerial Advertising, Marine Monitoring, Fishery Service, Scientific Experiment, Urban Firefighting, Aerial Inspections, Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Zhengzhou, Henan	rmb 20 million	
Hunan Hengyang General Aviation Co., Ltd	Class II & III: Aerial Photography, Aerial Advertising, Meteorological Sounding, Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Hengyang, Hunan	rmb 10.35 million	
Chutian General Aviation Co., Ltd	Class II & III: Aerial Photography, Aerial Advertising, Marine Monitoring, Fishery Service, Meteorological Sounding, Scientific Experiment, Aerial Inspections, Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Jingzhou, Hunan	rmb 10 million	
Hubei Yinyan General Aviation Co., Ltd	Artificial Precipitation, Aerial Photography, Aerial Advertising, Fishery Service, Urban Firefighting, Aerial Inspections,Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Jingzhou, Hubei	rmb 20 million	
Hubei Sky-Blue International Aviation Academy Co., Ltd	Private and Commercial Pilot Training, Aircraft Management.	Wuhan, Hubei	rmb 60 million	
Jingmen General Aviation	Class II & III: Aerial Photography, Aerial Advertising, Marine Monitoring, Fishery Service, Meteorological Sounding, Urban Firefighting, Aerial Inspections, Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Jingmen, Hubei	rmb 19 million	
Tongcheng General Aviation	Emergency Medical Service, Aerial Prospecting, Aircraft Management, Aerial Photography, Aerial Advertising, Marine Monitoring, Fishery Service, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections, AAerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Jingzhou, Hubei	rmb 5 million	
China Southern Helicopter	Class I: Onshore Oil Service, Offshore Oil Service, Helicopter External Load Operation, Artificial Precipitation, Emergency Medical Service, Aerial Prospecting, Aerial Tour, Helicopter Maritime Pilot Operation, Aircraft Management, Private Pilot Training, Business Aviation. Class II: Aerial Photography, Aerial Advertising, Marine Monitoring, Fishery Service, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections. Class III: Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Zhuhai, Guangdong	rmb 817.56 million	
Wuhan Feiren Aviation Club	Personal Entertainment Flight.	Wuhan, Hubei	rmb 1 million	

Wuhan Helicopter Group Corp.	Class I: Helicopter External Load Operation(Electricity Inspection), Emergency Medical Service, Aerial Prospecting. Class II & III: Aerial Photography, Aerial Advertising, Marine Monitoring, Fishery Service, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections,Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Wuhan, Hubei	rmb 20 million	
Hainan Asia-Pacific General Avaiton Co., Ltd	Private Pilot Training, Sport Aviation Training, Sport Aviation Performance, Personal Entertainment Flight, Aerial Photography, Aerial Advertising, Marine Monitoring, Fishery Service, Meteorological Sounding, Scientific Experiment, Aerial Inspections, Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Sanya, Hainan	rmb 20 million	
Zhongshan Eagle General Aviation	Aircraft Management,Aerial Prospecting,Private Pilot Training,Aerial Photography,Aerial Advertising,Meteorological Sounding,Marine Monitoring, Scientific Experiment,Urban Firefighting,Aerial Inspections,Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Aerial Forest Conservation.	Zhongshan, Guangdong	rmb 20 million	
Zhuhai Aviation Industry Development Group Co., Ltd	Aircraft Management,Private Pilot Training,Personal Entertainment Flight.	Zhuhai, Guangdong	rmb 20 million	
China Aviation Industry General Aircraft Co., Ltd, Zhuhai General Aviation	Aerial Prospecting, Artificial Precipitation, Aerial Tour, Aerial Photography, Aerial Advertising, Marine Monitoring, Fishery Service, Meteorological Sounding, Scientific Experiment, Urban Firefighting, Aerial Inspections, Aerial Seeding, Aerial Fertilizing, Aerial Plant Growth Regulator Spray, Aerial Weeding, Diseases and Pest Control, Grassland Deratization, Aerial Forest Conservation.	Zhuhai, Guangdong	rmb 98.4 million	