

Development status and trends of China's air traffic management

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Abstract: *In the new era, the traffic management industry in China's civil aviation has ushered in a new stage of development. This article is based on the traffic management of China's civil aviation. On the one hand, it takes its development status as a starting point, and brings out some of the development problems currently facing, and gives corresponding solutions; On the other hand, on the basis of the current development situation, we look forward to the future development trend of China's air traffic control intelligence, and further analyze the development trend from two aspects of air traffic control services and airspace management.*

Keywords: *air traffic management, China civil aviation, development status, development trend*

1. Introduction

The civil aviation industry is an important strategic industry of the country, and air transportation is an important lifeline of the transportation system. With the rapid development of society and economy, the demand for air transportation continues to rise, and the work of civil aviation related departments such as the air traffic management department has become more and more arduous and complicated. Nowadays, it is inevitable that there will be some problems. To solve these problems, it is necessary to analyze and study the existing problems on the basis of understanding the status quo of the development of traffic management in civil aviation. In addition, with the rapid rise of the air transportation industry, the traffic management in China's civil aviation is also developing toward automation and intelligence. This puts forward higher requirements for China's current air traffic management, and at the same time brings more Opportunities and Challenges.

2. Development status of China's air traffic management

2.1. Introduce foreign air traffic management systems

Nowadays, China does not have a relatively mature air traffic management system, the corresponding scientific management technology is still in the initial stage of development, and the air traffic management evaluation system is not perfect. At present, an important problem in China's air management is the lack of a complete, sound and mature management system. Compared with developed countries, China's air traffic management system is still relatively backward, and whether the management system is established and sound is directly related to civil aviation. The pros and cons of air traffic management operations^[1]. The Chinese air traffic management department still adopts the foreign air traffic management operation system, which has the following characteristics: ① As the foreign civil aviation industry started relatively early, its industrial foundation and innovation capabilities are relatively more advantageous, and the air traffic management system is developing more comprehensively and rapidly. Foreign air traffic management systems are still able to ensure the efficiency and safety of aviation activities in the face of the continuous and substantial increase in air traffic and the relatively small airspace under management. ② At present, the air traffic flow statistics method adopted by the Chinese air traffic management department imitates the US ETMS air traffic management system, and also refers to the management mode of the European CFMU central flow air traffic system, and has introduced many advanced management technologies and methods. In this way, it can not only promote the development of modern air traffic management models, but also ensure the effectiveness of management and the safety of operations. ③ It is possible to efficiently manage airspace resources through the introduction of foreign air traffic management systems for reference. In addition,

the traffic management department of China's civil aviation is improving the system introduced abroad, and is developing an air traffic management system suitable for China's national conditions and airspace structure, actively implementing "politics and affairs separation, operation integration" and vertical management systems, and establishing a centralized and unified system. The civil aviation control operation system is designed to comprehensively improve the support capability of the air traffic control system, thereby further guaranteeing and promoting the development of the air traffic management industry, and promoting the healthy and vigorous development of the civil aviation industry.

2.2. Existing problems and limiting factors

China's civil aviation industry is in the early stage of development, and it is inevitable that it will encounter some problems and challenges, ranging from the standardization and timeliness of airport security inspections to the advanced nature and autonomy of aircraft accessories and technology. Even some problems that have not yet been exposed, we need to have a foresight to discover them in time and take effective measures immediately, so that the civil aviation industry can develop healthily and vigorously^[2]. The following is a list of some of the current problems and challenges facing traffic management in China's civil aviation:

(1) Work style needs to be improved

In the air traffic control system, there have been many incidents and even major accidents caused by the negligence of the controller and other reasons. For example, in the past few years, there have been situations in which a meeting was held while communicating with the incoming aircraft, and the controller did not judge the difference between the pilot's repeated instructions and the instructions due to distraction, which led to the occurrence of incidents. The above-mentioned various situations It should be paid attention to by the competent department, so as to ensure the orderly and safety of air traffic.

(2) The degree of information sharing is not high

The degree of automation of my country's control traffic management system is not high, and there is a lack of effective information exchange, transmission and resource sharing among various subsystems. In addition, the advancement of air traffic safety information construction work is slow, and the information of various subsystems has not been effectively contacted and exchanged, making it impossible to share and use information in a timely manner. The existing safety management system lacks effective information and evidence when coordinating flight conflicts or investigating and analyzing other incidents. It is difficult to draw definite conclusions and relevant preventive measures are difficult to implement.

(3) The management system is not advanced enough

Compared with China, foreign air traffic management systems appeared earlier, and the corresponding traffic management systems are also more advanced. For example, the US air traffic control system is fully privatized and non-profit, which reduces the FAA's direct intervention in air traffic control and promotes air traffic control. System reform and innovation, thereby improving the operation and management efficiency of the aviation system, and creating conditions and an environment for rapid and cost-effective technological improvement. However, China's air traffic management implements a unified control and separate command system, that is, under the leadership of the National Air Traffic Control Committee, the national flight is managed by the Air Force, and the flight control areas of military and civil aviation are not unified, which makes the airspace structure unreasonable, Is not conducive to the healthy development of civil aviation.

(4) The overall quality of air traffic control personnel is poor

The overall quality of China's air traffic management personnel needs to be improved. Take the Southwest Air Traffic Management Bureau as an example. As of 2015, employees with a master's degree accounted for only 0.8% of the total number. At the same time, the relevant university education level needs to be further improved. For example, the Air Traffic Management School of the Civil Aviation University of China, the highest civil aviation institution in China, currently does not have doctoral training. The number of air management majors in China is still far behind that of developed countries such as the United States and France. In many cases, due to the lack of relevant professional knowledge of air traffic control practitioners, it is likely to cause irreversible huge losses.

2.3. The direction of reform and measures

(1) Strengthen the construction of work style

The establishment of a good work style requires employees to strengthen their safety awareness and unified thinking, and requires employees to have a clear understanding of the relationship between safety, safety and corporate benefits, and between employees' own behavior and safety. Employees should be regularly provided with extensive, focused, and flexible training and education, and the string of safety should be tightened ideologically; at the same time, rules and regulations should be strictly formulated to make work and management more standardized, procedural, and standardized^[3].

(2) Improve the air management system

China's current air traffic management system is based on foreign advanced management experience, but China's civil aviation development status and structure are somewhat different from those of foreign countries. The management system should be formulated in accordance with the actual development and management of domestic civil aviation management. Appropriately extract and combine the development experience of foreign air traffic management systems, so as to effectively avoid flight safety risks caused by improper air traffic management regulation and control, and improve the management system in line with the actual development of China's civil aviation^[4].

(3) Establish and improve a management system in line with China's air traffic control situation

Combining China's actual national conditions, combining the actual management of domestic civil aviation management with foreign management concepts, taking the essence and removing the dross, establish a complete management system that conforms to the actual operating conditions of China's civil aviation^[5]. The direction of the reform of the air traffic control system approved by the party group of the Civil Aviation Administration is enterprise. It should follow the requirements of modern enterprise management, adhere to the goal orientation, actively explore the enterprise management model, coordinate with the military, and establish a modern performance-based organization system.

(4) Attach importance to civil aviation higher education

China should attach importance to the higher education industry of civil aviation. The relevant civil aviation colleges and universities should devote themselves to cultivating high-quality, international, and interdisciplinary talents, attach importance to daily internships, consolidate a solid foundation, and increase discipline construction and foreign exchanges, and the standards for teachers should also be improved. It should be further improved, while adhering to the new development concept as the guidance, actively constructing a new development pattern, comprehensively enhancing core competitiveness, and striving to create first-class quality air traffic control practitioners.

3. Development Trends of Air Traffic Management in China

3.1. Development trend of air traffic control services

Track-based operation management the track-based operation mode (TBO) is based on the mastery of the four-dimensional trajectory of all aircraft in the airspace, especially the mastery of the future trajectory, so as to ensure the separation of aircraft and the efficiency of the air transportation system. The entire aircraft is "visible, controllable and reachable". This mode of operation can effectively reduce the interval between arrival aircraft arriving at the convergence point, thereby increasing airspace capacity; it can provide controllers and pilots with more efficient trajectory recommendations, thereby reducing the time interval between arrival aircraft arriving at the convergence point. Optimize the flight profile of entering and leaving the port, which greatly improves the airspace utilization rate while ensuring safe intervals.

The intelligent decision support platform uses computer technology and big data processing capabilities to establish data-based optimization decision support tools, including the detection and resolution of flight conflicts in different flight environments; the autonomous separation maintenance system has the ability to autonomously maintain aircraft separation under the management of the pilot, When flying under complex conditions, autonomously propose warning judgments and relief suggestions, and make optimization and choices; flight arrival and departure sequencing system, for complex terminal systems, such as multi-runway, multi-airport, realizes intelligent and dynamic optimization sequencing, and provides Sort results out. Through the improvement of automation and intelligent systems, the

control work is transformed from active management to auxiliary monitoring.

3.2. Development trend of airspace management

The Air Traffic Management Committee has accelerated the process of opening up low-altitude airspace. Following the working principles of “expanding consensus, setting aside arguments, focusing on integration, and pragmatic advancement”, and in accordance with the requirements of the “Overall Plan for Air Traffic Control Adjustment and Reform Work” of the National Air Traffic Management Commission, the overall reform plan, laws and regulations, airspace planning, and resolution of airspace tensions in busy areas should be solidly promoted. Issues, “low, slow and small” flight management, the actualization of the Air Traffic Management Committee’s office, and the pilot project of refined airspace reform in the central and southern regions.

Establish a military-civilian integration development mechanism in the field of air traffic control operations. Clarify the development direction of the deep integration of military and civil aviation for a period of time, further improve the coordination mechanism, improve working procedures, and form a good pattern of clear military and civil aviation responsibilities, efficient operation, strong supervision, and win-win development.

Through the establishment of a reference airspace model, a clear evaluation index system, and the establishment of an airspace planning evaluation and monitoring system, an effective and reasonable assessment of the airspace planning scheme and operational efficiency can be carried out. Establish a civil aviation operation efficiency assessment and incentive mechanism, so as to effectively improve the use efficiency of civil aviation's available airspace.

The future development of globalization and intelligence of China's air traffic management has become an irreversible trend. At present, we must clearly understand the positive and negative characteristics of globalization and intelligence. The history of China for decades since the founding of the People’s Republic of China has proved that self-reliance is What does not work is to insist on reform and opening up, integrate its own construction into the process of globalization, and then combine its own national conditions to take the air traffic management development path with Chinese characteristics^[6].

4. Conclusion

Since the founding of New China, China's civil aviation has a history of about 70 years. During this period, China's civil aviation management grew out of nothing, experienced three rounds of major system reforms, and has formed a relatively mature control model^[7]. Through the above exploration of the problems faced by China's air traffic management, we can understand that China's civil aviation industry is in the process of rapid development, with both thorny issues and development opportunities. A sound air traffic management system can effectively ensure the normal operation of aircraft. The air traffic safety management system of China's civil aviation has basically taken shape, but there are still some problems that hinder the development of China's civil aviation. To solve the various problems faced in development, we need to start from multiple aspects, develop and learn externally, cultivate constraints internally, continuously improve the work level of the civil aviation traffic safety management system and the quality of practitioners, and improve the corresponding system. Effectively promote the development of the civil aviation industry, promote social and economic development, and achieve the great goal of a civil aviation power.

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