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Research on Training Mechanism and Path of High-Quality Technical and Technical Talents of General Aviation in Guangdong-Hong Kong-Macao Greater Bay Area

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Abstract: Firstly, this paper analyzes the strengths, weaknesses, opportunities and challenges of general aviation personnel training in the Guangdong-Hong Kong-Macao Greater Bay Area. Based on the "triple helix theory," this paper analyzes the role of general aviation enterprises, colleges and research institutes in the talent training of the Guangdong-Hong Kong-Macao Greater Bay Area. It puts forward the general aviation personnel training mechanism of the Guangdong-Hong Kong-Macao Greater Bay Area. Finally, the paper used the "intelligent navigation" of the general aviation personnel training path of the Guangdong-Hong Kong-Macao Greater Bay area.

Keywords: Guangdong-Hong Kong-Macao Greater Bay Area; General Aviation; Talent; Path.

1. SWOT Analysis of General Aviation Personnel Training in the Guangdong-Hong Kong-Macao Greater Bay Area

1.1. Analysis of the Advantages of Talent Training Mechanism of the General Aviation Industry in the Guangdong-Hong Kong-Macao Greater Bay Area

The Guangdong-Hong Kong-Macao, Greater Bay Area, is at the forefront of Chinese coastal opening up, with the Pan-Pearl River Delta region as a vast hinterland for development. In recent years, relying on the opportunities to construct international aviation hubs and airport economic demonstration zones, it has gradually formed industrial chains agglomeration effects such as general aircraft manufacturing, general aircraft maintenance and manufacturing, general aviation aircraft leasing, and general aviation business services (FBO). Several leading general aviation enterprises have accelerated their accumulation and development, helping the development of the general aviation industry in the Greater Bay Area to enter the "fast lane." The Guangdong-Hong Kong-Macao, Greater Bay Area, is the most dynamic and competitive region for developing the Chinese general aviation industry. After over 30 years of reform and opening up, various aviation colleges and universities have significantly improved regarding teachers, educational conditions, hardware and software, academic atmosphere, personnel training and management. A group of high-level scientific and innovative talents and high-quality technical and technical talents have been gathered around the general aviation industry. A group of scientific and technological innovation platforms and talent training platforms have been established around the entire industrial chain in the field of general aviation, which has promoted the overall level of aviation colleges and universities, and also provided necessary advantages for the training of general aviation talents in the Guangdong-Hong Kong-Macao Greater Bay Area.

1.1.1. In the Field of General Aviation Personnel Training, Institutions in the Guangdong-Hong Kong-Macao Greater Bay Area Pay More Attention to the Integration of Disciplines

In the Guangdong-Hong Kong-Macao Greater Bay Area, civil aviation institutions, local institutions, undergraduate and postgraduate education, and higher vocational education pay more attention to continuously and dynamically optimizing the training process of professional talents according to the development trend of the general aviation industry, especially in recent years, the training of general aviation talents has been integrated with related disciplines, and the knowledge dimension of professional talents has been continuously expanded. Promote the mutual cross-penetration between basic vocational, professional knowledge, and self-innovation ability, achieve the dynamic fit between professional and industry development, and realize the all-around integration of elements on the supply side of talent training and the industrial demand structure.

1.1.2. In the Field of General Aviation Talent Training, Institutions in the Greater Bay Area Pay More Attention to Building a Distinct Talent Training Framework based on Their Characteristics

In the Bay Area, civil aviation institutions, local institutions, undergraduate and postgraduate education, and higher vocational education have a suitable talent training framework system for their development. Some institutions focus on technical competence training in general aviation and provide many high-quality technical and technical talents for the industry. Some colleges and universities pay attention to the cultivation of scientific research ability in the field of general aviation, forming a virtuous circle of teaching with scientific research and promoting teaching with scientific research to train a large number of outstanding scientific researchers for the industry; Some universities pay attention to the innovation of the teaching mechanism and system for the training of talents in the field of general aviation and open up innovative training paths for the training of talents in

general aviation in the Guangdong-Hong Kong-Macao Greater Bay Area.

1.1.3. In the Field of General Aviation Personnel Training, The Guangdong-Hong Kong-Macao Greater Bay Area Pays More Attention to the Cultivation of the Practical Ability

It establishes a virtual simulation teaching platform based on the natural work environment. It continuously strengthens students' practical with the deepening of the intelligent development process of the Chinese general aviation industry, highlighting practical training ability has become a top priority, which is the organic combination of innovative consciousness and practical ability, and also an indispensable pillar to enhance students' practical training ability [1]. In the process of training talents, the Macao Bay Area colleges and universities strive to promote the informatization construction and reform of experimental teaching, make full use of modern computer technology, Internet technology and virtual simulation technology to build a complete virtual simulation practical teaching system in the field of general aviation, and deeply integrate practical teaching of general aviation with virtual simulation technology. It has systematically promoted the construction of experimental teaching informatization, the reform and development of experimental teaching, and the overall improvement of talent training quality.

1.2. Analysis of the Disadvantages of Talent Training in the General Aviation Industry in the Guangdong-Hong Kong-Macao Greater Bay Area

Throughout the process of high-quality development of the Guangdong-Hong Kong-Macao Greater Bay Area general aviation industry is the continuous expansion of high-quality talent teams at all levels, but in this process, the total number of talents in general aviation and structural shortages are still prominent. These problems affect the speed of high-quality development of the general aviation industry in the Guangdong-Hong Kong-Macao Greater Bay Area. The above problems emerge primarily due to the imperfect talent training mechanism of the general aviation industry in the Guangdong-Hong Kong-Macao Greater Bay Area. From the perspective of the requirements for the development of the general aviation industry in the Guangdong-Hong Kong-Macao Greater Bay Area and the market demand for talent at this stage, the disadvantages are mainly reflected in the following aspects:

1.2.1. The Dynamic Mechanism of General Aviation Personnel Training in the Guangdong-Hong Kong-Macao Greater Bay Area is Insufficient

Due to the scale of industry development, the influential market demand for general aviation jobs is not apparent. As the Guangdong-Hong Kong-Macao Greater Bay Area has not yet formed an industrialized general aviation market service system, it cannot have an apparent micro-level statistical demand like public transport aviation, and the demand for talent is still only at the macro level, not specific to the detailed job level.

1.2.2. The Guangdong-Hong Kong-Macao Greater Bay Area General Aviation Personnel Training Mechanism has not Formed a Sound Operation

The lack of effective communication and connection among institutions in the Guangdong-Hong Kong-Macao Greater Bay Area, limited free flow of cooperation factors, imperfect cooperation system and mechanism, and lack of top-level design for cooperation has led to a lack of motivation for high-quality talent training.

1.2.3. The Guarantee Mechanism of the General Aviation Personnel Training Mechanism in the Guangdong-Hong Kong-Macao Greater Bay Area is Not Perfect

Limited by the lack of a sound legal and regulatory system, the training of general aviation talents in the Guangdong-Hong Kong-Macao Greater Bay Area lacks legal protection in all aspects, such as the lack of transparent laws and regulations on the training, use and evaluation of general aviation talents, resulting in the chaos of the agricultural science and technology talents market.

1.3. Opportunity Analysis of Talent Training Mechanism for the General Aviation Industry in the Guangdong-Hong Kong-Macao Greater Bay Area

The new development pattern with the domestic, great cycle as the main body and the domestic and international double cycles promoting each other is a very forward-looking strategy that provides the direction for high-level personnel training in the general aviation industry [2]. First, the strategy of the "double cycle" new development pattern helps to effectively connect the quantity and quality of personnel training with the current situation and future development needs of the general aviation industry; Second, the strategy of the new development pattern of "double cycle" is conducive to the construction of personnel training structure and the coordination mechanism of general aviation industry development; Third, the strategy of "double cycle" new development pattern helps to enhance the reasonable degree of talent training and industrial development, and form a benign development pattern between talent and industry; Fourth, the strategy of the "double cycle" new development pattern helps to effectively build a training system for high-quality technical and skilled personnel in the field of general aviation and achieve high-quality development of education.

1.4. Challenge Analysis on Talent Training Mechanism of the General Aviation Industry in the Guangdong-Hong Kong-Macao Greater Bay Area

To achieve high-quality development of the general aviation industry in the Guangdong-Hong Kong-Macao Greater Bay Area, it is necessary to continuously improve the quantity and quality of talent in the industry. Compared with the talent allocation of the general aviation industry in developed countries, there is room for further improvement in both quantity and quality of the general aviation industry talents in the Guangdong-Hong Kong-Macao Greater Bay Area. First, the scale and quantity of highly skilled innovative talents are insufficient to meet the needs of industrial development; Second, the regional distribution of industrial talent resources is unbalanced, and most of them are concentrated in Guangzhou, Zhuhai, Shenzhen and other regions, and the northwestern part of Guangdong lacks regional talent resources. Third, small and medium-sized general aviation enterprises lack strategic talent awareness and strategic planning; Fourth, the total amount of talent in some general aviation enterprises is less, the loss is severe, and the stability is poor.

2. General Aviation Talent Training Mechanism for Guangdong-Hong Kong-Macao Greater Bay Area based on the "Triple Helix Theory."

2.1. Meaning of General Aviation Talent Training Mechanism in the Guangdong-Hong Kong-Macao Greater Bay Area

The process of talent training involves the interaction, mutual influence and mutual coordination of all links to achieve the orderly operation of the talent process and finally make the talent training goal realized with high quality. The talent training mechanism of the general aviation industry in the Guangdong-Hong Kong-Macao Greater Bay Area includes the government, colleges, enterprises, students and other social factors. The process and way of interaction among various elements constitute the talent training mechanism of the general aviation industry in the Greater Bay Area. This mechanism expresses the action process among various subjects as the power, transport capacity, and guarantee mechanisms.

2.2. Principles for the Establishment of Talent Training Mechanism for the General Aviation Industry in the Guangdong-Hong Kong-Macao Greater Bay Area

2.2.1. The Demand-oriented Principle

Demand-oriented means that each operating body in the machine should take demand as the driving force and use it as the standard for formulating goals. Both schools make teaching plans according to social needs and government policies or teachers according to the needs of students. Reasonable curriculum arrangements need to be demand-oriented. Driven by demand, the effective operation of the mechanism is an important guarantee to cultivate the healthy operation of the mechanism.

2.2.2. The Principle of Environmental Coordination

This principle refers to the interaction of subjects such as schools, teachers, and students. Without the influence of the government and other social factors, schools are not "ivory towers," but with the government, enterprises, and the market constitutes a unified whole. Therefore, the construction of agricultural science and technology personnel training mechanisms should ensure this mechanism only with coordination can ensure the regular interaction of each subject.

2.2.3. The Principle of Resource Coordination

This principle means that the training process of general aviation talents in the Guangdong-Hong Kong-Macao Greater Bay Area involves some resources, including teachers, students themselves, various types of financial support and hardware support provided by the government, and the school's infrastructure. Therefore, in constructing the mechanism, attention should be paid to the overall arrangement of these resources, reasonable allocation and use of resources. Thus, it can provide a resource guarantee for training high-quality talents in general aviation.

2.3. The Basis for the Establishment of a Talent Training Mechanism for the General Aviation Industry in the Guangdong-Hong Kong-Macao Greater Bay Area

The Guangdong-Hong Kong-Macao Greater Bay Area general aviation talent training mechanism, the Greater Bay Area needs to closely integrate the industry's demand for talent and the current situation of talent training. All the subjects involved in the whole process need to coordinate and keep in close contact with each other to build a suitable training mechanism. It mainly involves the following two aspects: On the one hand, it is necessary to attach great importance to the critical role of the government in building the talent training mechanism for the general aviation industry in the Guangdong-Hong Kong-Macao Greater Bay Area. As one of the essential participation factors in the training mechanism, the government has important strategic significance for the training of general aviation industry talents in the Guangdong-Hong Kong-Macao Greater Bay Area, from the development strategy of designated industrial talents to specific supervision and security. Therefore, it is necessary to think about the construction of a talent training mechanism for the general aviation industry in the Greater Bay Area from the perspective of the government to better utilize the development needs of the general aviation industry in the Greater Bay Area and cultivate more high-quality talents to support the development of the industry [3].

On the other hand, the establishment of the talent training mechanism for the general aviation industry in the Guangdong-Hong Kong-Macao Greater Bay Area should conform to the characteristics of the Times of high-quality development of the country and the strategic characteristics of developing from a civil aviation power to a civil aviation power. Based on the development stage of Chinese civil aviation, the civil aviation personnel training mechanism in each era has distinct characteristics of The Times. Only the Guangdong-Hong Kong-Macao Greater Bay Area general aviation industry personnel training mechanism that conforms to the characteristics of The Times can cultivate high-quality talents that meet the requirements of the modern development of the general aviation industry in the Greater Bay Area.

2.4. Establishment of a Talent Training Mechanism for the General Aviation Industry in the Guangdong-Hong Kong-Macao Greater Bay Area

2.4.1. Functions of Government

Governments at all levels in Guangdong-Hong Kong-Macao Greater Bay Area, as direct participants in the talent training of the general aviation industry, should be guided by "precise policies," move from "unscientific" to "scientific" and from "relying on experience" to "relying on science" in the formulation of general aviation industry policies, and open new bureaux and develop new chapters in the perspective of talent training and support policies for the general aviation industry. Make efforts in all aspects of precision research, precision manufacturing, precision policy and precision evaluation. Actively mobilize the enthusiasm and initiative of the general aviation industry talent training institutions, scientific research institutes, enterprises, industry associations and other parties, consider all parties' interests,

and formulate relevant laws, regulations and policies. Ensure the healthy operation of the general aviation personnel training mechanism in the Guangdong-Hong Kong-Macao Greater Bay Area.

First of all, because of the situation that the development of the talent market of the general aviation industry in the Guangdong-Hong Kong-Macao Greater Bay Area has not fully adapted to the economic and social development, and the talent market has not entirely broken the shackles of free travel and blindness, governments at all levels in Guangdong-Hong Kong-Macao Greater Bay Area should give full play to their leading role in helping institutions grasp the direction of development. Through administrative, economic and legal means to provide the relevant guarantee mechanism for the personnel training of the general aviation industry in the Greater Bay Area; Secondly, to do an excellent job in the Guangdong-Hong Kong-Macao Greater Bay Area general aviation industry personnel training coordinator [4]. As the media between other social groups and agricultural colleges and universities, the government should fully bridge and link and provide more social support for developing colleges and universities. Third, governments are also watchdogs. In addition to formulating relevant laws, regulations and policies to support the development of the general aviation industry in the Guangdong-Hong Kong-Macao Greater Bay Area, the government also needs to formulate a relevant evaluation system to evaluate and supervise the teachers and educational achievements of the institutions providing general aviation personnel training, to promote better the enrichment of the achievements of general aviation personnel training in the Greater Bay Area.

2.4.2. Functions of the School

Colleges and universities are the main body of general aviation personnel training in the Guangdong-Hong Kong-Macao Greater Bay Area and the primary implementers of general aviation personnel training behavior. Therefore, colleges and universities play a significant role in the training of general aviation personnel. On the one hand, all kinds of institutions in the Greater Bay Area that carry out general aviation personnel training should establish a dynamic adjustment mechanism for related majors in the field of general aviation following industrial development and industrial demand, explore new professional directions promptly according to the development of the industry, and close down some backward and old majors. On the other hand, all kinds of institutions in the Greater Bay Area that carry out general aviation talent training should strengthen the connotation construction, especially in the aspects of professional setting, curriculum arrangement, teaching evaluation, student demand feedback, and so on, to ensure the quality of the talents cultivated.

2.4.3. Functions of Enterprises and Related Social Institutions

All general aviation enterprises, social organizations and institutions in the Guangdong-Hong Kong-Macao Greater Bay Area play a significant role in developing talent training mechanisms. First of all, industrial enterprises should make full use of their advantages, provide technical backbone and productive practice teaching base for colleges and universities, and actively participate in college talent training. Professional orientation, personnel training program formulation, curriculum resources development, experimental training conditions construction, and teaching team construction should appear in the figure of industrial enterprises to achieve the coherence and timeliness of technical talent training. Secondly, related social organizations are intermediary and self-regulatory industry management organizations [5]. In the market economy environment, all kinds of social organizations play the leading role in the internal management of the industry, the link between enterprises and the government, self-discipline, service, coordination and supervision, and acting as the government's advisers and assistants. Industry associations should serve as a bridge and link for efficient cooperation between enterprises, colleges and governments, which fundamentally guarantees the quality of applied talents training in colleges and universities, promotes the technological development and progress of industry enterprises, and forms a good situation of mutual benefit and the win-win situation between government, industry associations, colleges and enterprises.

2.5. Operation of the Talent Training Mechanism for the General Aviation Industry in the Guangdong-Hong Kong-Macao Greater Bay Area

The talent training mechanism of the general aviation industry in the Guangdong-Hong Kong-Macao Greater Bay Area has systematic characteristics. It is necessary to give full play to the functions of various mechanism elements, straighten out the relationship between relevant subjects, and build a corresponding talent training operation mechanism. In this operation mechanism, the institutions in Guangdong-Hong Kong-Macao Greater Bay Area, as the main body of training, constitute the internal elements of the general aviation talent training mechanism. In contrast, the government, enterprises and related social organizations constitute the external elements of the general aviation talent training mechanism.

Based on the "three spiral" theory, the operation mode of each element in the mechanism should be as follows: The government should formulate related policies and provide various kinds of support through administrative means, economic means and legal means, and create a policy environment and legal environment conducive to the talent training of the general aviation industry in the Guangdong-Hong Kong-Macao Greater Bay Area to ensure the smooth operation of the talent training mechanism; Schools are the core of the entire training mechanism, the theme of general aviation personnel training, and the leading implementer of the training behavior. Teachers, students and various main elements of the teaching process should be integrated to form a coordinated and unified action to form a mechanism conducive to the Greater Bay Area general aviation personnel training. Enterprises and related social institutions the factors provide the necessary conditions and soil for the training of general aviation talents in the Guangdong-Hong Kong-Macao Greater Bay Area. Affected the direction of general aviation talent training has also created conditions for the growth of general aviation talents.

3. Training Path for General Aviation Talents in Guangdong-Hong Kong-Macao Greater Bay Area based on "Smart Navigation"

3.1. Changes in Talent Training Brought About by "Smart Navigation

From the perspective of job changes, it is found that with the gradual deepening of the intelligent work of the general aviation industry, the digital and intelligent development of the civil aviation industry has entered the fast lane. The development of the general aviation industry is bound to focus on the three unchanged themes of safety, efficiency and service. New changes have also occurred in the professional positions corresponding to general aviation. Change one, active security business model [6]. Active safety management uses a multi-level safety management system combined with new technology for real-time monitoring of safe operation status, pre-analysis of possible risks, and rapid emergency response skills in case of a loss caused by safety accidents. Apply the Internet of Things, big security data, biometrics and new intelligent monitoring technologies to unified management of passengers, general aircraft, vehicles and the safety management area of each territory, and improve technical defense, physical defense and civil defense. Its core is to create a general aviation intelligent operation of the overall solution so that the elements (people, vehicles, cargo, baggage, environment, aircraft and flight area) are in a real-time monitoring state, and the relevant information is integrated, removed and analyzed. Change two, collaborative operation control system. General aviation operations involve government departments, air traffic control, upstream and downstream airports, airlines and other industry entities. It is necessary to monitor operation data through more accurate automated data monitoring means and apply predictive models to improve the ability to foresee events. Collaborative decision-making should consider all sub-processes along the process chain, and each operation process should actively cooperate to improve the overall operation performance and ensure the accuracy of operation plan formulation and adjustment. Change three: end-to-end passenger service for the whole process. The use of big passenger data to achieve personalized services for passengers, identify passenger needs in advance, pre-preparation of service products, and provide differentiated services for passengers. The new service model and technical means are integrated to realize the perception of passengers' individual needs, service planning, self-service process processing and dynamic identification navigation management.

From the perspective of the quantity and quality of talent training, it is found that the current talent training based on the concept of "smart navigation" can not meet the new requirements of intelligent construction and high-quality development for talent training. With the further advancement of the intelligent process of general aviation, the skill requirements of various positions are higher. The complexity of the operation process of general aviation and its high requirements on safety and efficiency determine that all types of personnel must have high professional quality, exquisite business level, strong communication, coordination and management level, and emergency handling ability in case of abnormal situations. The cultivation of post ability must improve the quality of personnel training according to the post requirements and adapt to the new requirements of post skills. At the same time, with the construction of intelligent navigation and the application of new technologies and new concepts, the policy direction and security challenges of the airport have changed, and the structural elements of the supply side and the industrial demand side of talent training must be fully integrated, deeply integrated with the industry and enterprise production and education from the aspects of talent training, experiment and training, scientific and technological research, and achievement transformation, so as to meet the following challenges to talent training: First, the traditional personnel training can not keep up with the pace of the intelligent development process of general aviation, and can not keep up with the update and development of new technologies, new equipment and new management concepts in the construction of intelligent general aviation; Second, the traditional professional course content has not realized the knowledge content such as the perception of passenger's individual needs, service planning, self-service process processing and dynamic identification navigation management.

3.2. Construction of General Aviation Talent Training Path

Strengthen the scientific and technological support for talent, increase the investment in talent training, and consolidate the human resource element guarantee for the development of the general aviation industry. Firstly, strengthen the top-level design, establish and improve policies such as talent introduction, use, flow, and incentive guarantee, and form a complete and supporting policy system. Secondly, improve the carrier platform for the work of general aviation talents, strengthen cooperation with universities and research institutes, carry out work in general aviation technology innovation, promote the combination of production, learning and research, and promote technology transfer and achievement transformation. Thirdly, innovate talent management, standardize the talent management and evaluation system at all levels of general aviation, realize the gentle flow of various types of talents in general aviation, and attract more high-level talents to participate in the development process of the general aviation industry. Fourthly, create an excellent environment to prioritize the development of general aviation talents and create a cultural, growth, and entrepreneurial environment for general aviation industry talents. Fifthly, formulate a strategic plan for the development of general aviation talents in the Guangdong-Hong Kong-Macao Greater Bay Area, cultivate talents needed for industrial development, formulate a hierarchical talent plan and further carry out talent training according to the scale of talent demand for the general aviation industry in the Guangdong-Hong Kong-Macao Greater Bay Area. Sixthly, to encourage, support and guide institutions in the Guangdong-Hong Kong-Macao Greater Bay Area to set up new majors in the field of general aviation at different levels and in a targeted manner, cultivate high-quality technical and technical talents, comprehensively improve the quantity and quality of high-quality composite talents in the general aviation industry, and achieve mutual promotion and coordination between talents and the industry.

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