Research on the Theory of Navigation Pilot Sharing Mechanism and Network Sharing Platform Construction

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Abstract. Sharing of general aviation pilots is beneficial to the growth of pilots. It is beneficial to achieve the balance between supply and demand of general aviation pilots and reduce the cost to a certain extent. It is beneficial to improve the flight safety level of general aviation enterprises. With the continuous deepening of the reform of "distribution suit", there are fewer and fewer policy constraints on navigation development, which creates a favorable policy environment for navigation to "fly". However, under the background of loose policies, China's navigation development still faces many challenges, among which the high transaction cost of navigation industry is an important reason restricting navigation development. Among them, the cost of pilots accounts for the vast majority of the labor cost.

Keywords: Pilot Sharing mechanism, pilot sharing platform, cost reduction.

1. The significance and function of navigation pilot sharing

1.1. Conducive to the growth of pilots
Due to the relatively small volume of navigable flights in China, there are many aircraft types. It is relatively difficult for pilots to accumulate flight hours, and pilots have little mobility. Sharing navigable pilots can help pilots accumulate flight hours and promote their growth.

1.2. It is beneficial to realize the balance between supply and demand of pilots in general industry and reduce the cost to a certain extent.
The model of "sharing platform", the pilot sharing platform and the information platform based on Internet technology can greatly reduce the cost of information communication and achieve the matching between supply and demand with higher efficiency. With the expansion of navigable pilots, it is easy to form scale effect. Low transaction cost is one of the biggest characteristics shared by pilots. The reason why the sharing of navigation operation elements can reduce the cost is that the opportunity cost of idle pilots is almost zero, and for the owners, the benefit brought by sharing is extra income.

1.3. It is conducive to improving the flight safety management level of navigation enterprises
With the gradual lowering and opening of the entry threshold of general aviation, the safety management level of many navigation companies has not been improved correspondingly, and even low-level human-caused safety incidents have occurred many times. There is a big gap in safety management level...
between navigation companies. Through the pilot sharing mode, the supplier and demander of pilot sharing can establish the sharing mechanism of mutual review training program, mutual technical guidance and mutual safety review, which is conducive to improving the flight safety management level of general aviation enterprises.

2. The form of navigation pilot sharing
The main body of pilot sharing is composed of three parts: one is the provider and demander of pilots, the other is the online and offline trading platform connecting the two parties, and the third is the rules in the whole sharing process, including laws and policies, management and operation, technical means, etc. The sharing mode is as follows:

2.1. Internal sharing
Internal sharing refers to pilots sharing among different branches in the same legal entity.

2.2. External sharing
External sharing means that this unit provides shared pilots to other units for use.

3. Sharing mechanism of navigable pilots
(1) Regulatory policy mechanism
Rules and policies mechanism refers to the establishment and effective implementation of rules and policies. It is the core guarantee for pilots to share, and the most important foundation for unifying people's ideological understanding and carrying out sharing work. Based on the rules and policies, it can provide a good policy environment for the construction, operation and service, incentive and guidance, open evaluation, and rewards and punishments of the pilot-shared information platform. For example, establish a general standard and management regulations for evaluating pilot qualification.

(2) Organization and coordination mechanism
Organization and coordination mechanism is composed of development direction and planning formulation, examination and approval of relevant management systems, determination of shared performance appraisal results and operation of service award allocation scheme. It includes decision-making bodies related to major issues in coordination and sharing, and carries out specific work related to sharing. Such as strategic research, standards and specifications, data construction, platform development and user services, and information organizations that provide consultation, guidance and evaluation for shared top-level design and master plan.

(3) Management operation mechanism
Management and operation mechanism is the sum of rules and regulations such as maintaining the daily operation of open sharing work, promoting sharing services through communication and coordination, and assessing rewards. The management and operation mechanism involving sharing mainly includes two parts: one is the management rules and regulations system, and the other is the organization and implementation system. The management rules and regulations system include service procedures and norms, performance appraisal and reward measures and other regulations and systems. The organization and implementation system includes various management and service agencies.

(4) Technical support mechanism
Technical support mechanism is to use information technology to provide technical support for aircrew sharing, bring all qualified pilots into the platform for management, establish a network management platform, disclose pilots' flight experience, flight experience and flight status, provide online services, and gradually form a multi-level network service system. Establish and improve the record of pilot experience and sharing, and release pilot sharing system and sharing, pilot qualification, license, daily management and other information to the industry through the network management platform.
4. Pilot sharing platform construction
The navigation sharing elements platform will mainly use App for navigation enterprises, be compatible with Android system and Apple system, and realize sharing information release through the review of background webpage. The platform function modules are shown in the Figure 1.

![Diagram of Pilot sharing platform function module]

Figure 1. Pilot sharing platform function module

(1) Information distribution
Navigation enterprises use the shared information publishing function to publish information on the platform, and fill in and enter it according to the data fields reserved by the system. After entering and saving, click submit for approval. After the background manager completes the approval, it will publish according to the shared pool selected by the user. When the information is in the review stage, the general aviation enterprise can edit the pilot information at any time.

When the information is in the release stage, the general aviation enterprise can cancel the sharing operation. At this time, the information is in the review stage, and the enterprise can edit the pilot information at any time. When the information is in the release stage, the navigation enterprise can also mark the pilot as used. At this time, the pilot's information is normally displayed in the shared pool and marked as used, see Figure 2.
(2) Classification of pilot shared pool

Navigation enterprises participating in pilot sharing have two identities in the pilot sharing platform, one is the supplier of shared information, and the other is the demander of shared information. As a supplier, the information of pilots provided by enterprises is shared in the shared pool. As the demander, the enterprise can view the pilot information shared by other suppliers in each shared pool. You can also search for qualified pilot information through the information retrieval function, see Figure 3.

Figure 2. Shared information release function module

Figure 3. Pilots share pool classification
According to CCAR-91, CCAR135, CCAR290 (R3) and other applicable civil aviation regulations and advisory notices. Pilots are classified as follows according to two criteria: (1) According to the nature of flight activities, (2) Classification by aircraft, see Table 1 and Table 2:

**Table 1. Pilot classification standard I**

| No. | Nature of flight activities | Corresponding specific operation items | Remarks |
|-----|-----------------------------|----------------------------------------|---------|
| 1   | Passenger category          | Short-distance transport               | Business jet flight |
|     | Charter flight              | Business jet escrow                    | |
| 2   | Manned category             | Aerial tour                            | The use of civil aircraft to carry tourists for the purpose of viewing and sightseeing. |
|     | Manned category others      | Oil service, medical rescue, aircraft escrow, skydiving flight service, helicopter pilotage |
| 3   | Other categories            | Training                               | Business photo training, private photo training, instrument level training and sports photo training |
|     | Industry, agriculture, forestry and animal husbandry | Artificial precipitation, aerial prospecting, aerial photography, marine monitoring, fishery flight, electric power operation, aerial forest protection, aerial spraying, scientific experiment and meteorological detection |
|     | other                       | Aerial photography, aerial advertising, manned free balloons, air show flights, personal entertainment flights, urban firefighting, and aerial inspections |

**Table 2. Pilot classification standard II**

| No. | Model division |
|-----|----------------|
| 1   | Fixed wing     |
| 2   | Gyroplane      |
| 3   | Unpowered aircraft |

(3) Authentication of shared information

The pilot sharing platform does not verify the authenticity of the shared information submitted by users, and adopts the way of online publishing offline verification. The enterprise is responsible for providing pilot information, but it provides multiple verification channels in the platform, which directly or indirectly facilitates users to verify the authenticity of shared information by themselves. For example, the supplier uploads the verification file to the demander for downloading and viewing, embeds the pilot information interface query of CAAC, and online consultation (long-term planning) functions to facilitate the communication between the supplier and the demander, see Figure 4.
5. Conclusion
Experienced and excellent pilots are in short supply, and novice pilots lack opportunities for growth. These problems have become barriers that restrict the development of general aviation enterprises. Navigation pilot sharing refers to a new mode of integrating idle pilots of different navigation enterprises through the Internet platform, so as to realize the effective docking between the demand side and the supply side of pilots. It realizes pilot matching for the supplier and the demander through the network sharing platform, and provides convenience for all parties and solves the existing problems of all parties.

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