Research on Competency Model of Flight Operations Quality Assurance Personnel

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Abstract. In order to ensure the full matching of flight operations quality assurance personnel and positions, and to meet the post requirements, the job analysis method is used to study, and the competency model of flight operations quality assurance personnel is established in this paper. At the same time, the final competency model of airline flight operations quality assurance personnel is determined by questionnaire method and SPSS statistical tools analysis. The competency model includes 6 dimensions such as education level and work experience, basic competencies, attitudes, flight operations quality assurance specialty knowledge and skills, specialty knowledge, basic skills, which include 36 competency factors. These competency factors are arranged in order of importance. The competency model not only helps airlines to recruit, train, and motivate flight operations quality assurance personnel, but also provides a basis for employees' occupation development. What's more important is that personnel with these competency factors are more able to give full play to their professional expertise, analyze flight quality monitoring data, find safety risks, and provide a guarantee for the safety of civil aviation.

Keywords: Safety management · Human resource management · Flight operations quality assurance · Competency · Competency model

1 Introduction

Flight operations quality assurance is one of the internationally recognized important means of ensuring flight safety. It has been widely recognized by the world civil aviation industry, and its important role is self-evident. The level of flight operations quality assurance depends not only on the technical equipment used, but also on the technical capability level of the flight operations quality assurance personnel.

According to the scope and nature of flight operations quality assurance, it mainly includes decoding system management and maintenance, flight procedure development, flight data processing and analysis, flight quality analysis, flight data application, etc. These characteristics of work require that flight operations quality assurance personnel should have the appropriate professional knowledge and skills. However, the current professional background of flight operations quality assurance personnel has a wide variety of backgrounds, and rarely receives systematic flight operations quality

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assurance training. The level of professional skill is limited. Their application analysis of flight quality monitoring data is not deep enough, and flight operations quality assurance cannot be applied with high quality to improve the safety level of airlines and reduce operational risks [1].

At present, some scholars have carried out certain research on the competency model. The research objects are mainly concentrated on management staff [2–4], technical research and development personnel [5, 6], university teachers [7], Certified public accountant [8], Chinese entrepreneurs [9], civil servants [10] and so on. It can be said that all kinds of industry are studying the competency model of enterprise employees, indicating that it is very important to study the competency model of enterprise employees to better play their personal value to meet the needs of the post and contribute to the enterprise. However, at present, there is no research on the competency model of airline flight operations quality assurance personnel at home and abroad. This paper uses the job analysis method to construct the competency model of flight operations quality assurance personnel.

2 The Competency Model

The competency model is a collection of competency items that are required to perform a task well.

$$CM = \{Ci, |i = 1, 2, \ldots, n\}; \tag{1}$$

Among them, CM represents the competency model, Ci is the i-th competency item, and n represents the number of competency items.

Spencer et al. proposed the Iceberg Model after nearly two decades of research and application of competency [11].

As the part under the water surface of the iceberg, we usually refer to the "potential" of human beings. The depth from top to bottom is different, indicating that the degree of difficulty of being excavated and perceived is different. The deeper the water, the less likely it is to be excavated and perceived. The surface part, the knowledge, skills, and behavior of the human being, is easily perceived. The content of competency includes not only the potential part below the surface of the iceberg, but also the knowledge and skills part above the surface.

Based on the understanding of the competency concept [12], the author believes that although there are many competencies of individual employees, what the enterprise needs is not necessarily all the competencies of the employees. Therefore, the employee competency model is not defined or graded for all the competencies. However, according to the requirements of the position and the organization's environment, it is necessary to clarify the competency characteristics that can ensure the employees are qualified for the job and ensure their full potential, that is, the competency that employees should have in the job, which is commonly referred to as qualifications. They include academic qualifications, experience, knowledge, skills, basic abilities and attitudes.

3 The Research Methods

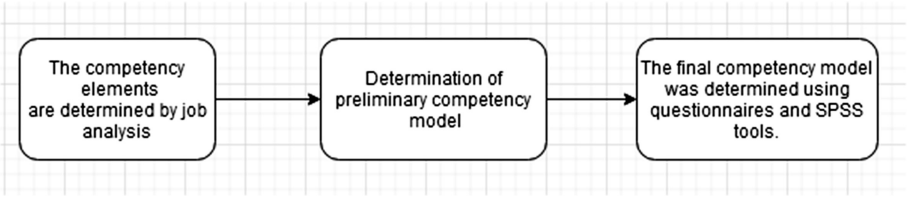

Fig. 1. Research flow chart

The job analysis method in the human resource management method is used to determine the competency model of airline flight operations quality assurance personnel. The job analysis method is mainly based on the analysis of the duties and job requirements of the airline flight operations quality assurance personnel, and then determines the competency requirements. The questionnaire is mainly for the preliminary competency model determined by the job analysis method, and the importance of each item in the competency model can be obtained, and then the competency item is selected, and the competency model of the flight operations quality assurance personnel is finally determined. The research process is shown in Fig. 1.

4 Determination of the Competency Model

4.1 Using the Job Analysis Method to Study Competency Requirements

Job analysis is the systematic process of determining the job nature, responsibility, authority, cooperation, working environment and qualification conditions of the required staff by conducting thorough investigation, collecting data, analyzing and sorting out the work positions in the organization, and formulating job description [13].

The research objective of this paper is to determine the competency model of flight operations quality assurance personnel, which can be applied to the research method of job analysis that focuses on the post capacity and competency.

Responsibilities of Flight Operations Quality Assurance Personnel. By investigating the duties of each airline's flight operations quality assurance, it is found that some companies will further subdivide the flight operations quality assurance work according to the different focuses of work, including flight quality monitoring, flight data processing, and flight quality analysis. Some companies have not subdivided. After investigation, it is concluded that the main job responsibilities of flight operations quality assurance personnel include the following.

(1) Develop various flight quality related regulations and procedures, such as the development and revision of monitoring items and standards;
(2) Flight data management, such as the implementation of flight data transmission, playback and backup, monitoring flight data collection and transmission, statistics

of each fleet monitoring rate, timely detection of data quality issues; management and maintenance related basic information.

(3) Development and maintenance of flight quality monitoring procedure.
(4) Flight data decoding processing and analysis.
(5) Interpretation and analysis of flight exceedance events.
(6) Write event statistics and trend analysis report, including daily, monthly, annual reports, etc., and unsafe events analysis report.
(7) Maintenance of flight quality monitoring decoding system.
(8) Data application and research, including the development and maintenance of various data application systems; responsible for the data extension and application work such as 3D animation production; participated in the research work of flight big data; mined the safety risk of flight manipulation and summarized the safety risk trend information.
(9) Organize flight quality monitoring meeting, QAR training, etc.

Determine the competency requirements according to the post duty. This paper analyzes the relevant job responsibilities of flight operations quality assurance personnel to determine the competency requirements. Table 1 is an example of flight data analysis to illustrate how to determine competency requirements based on job responsibilities.

Table 1. Example analysis

Classification of duties	Specific responsibilities	Competency requirements
Flight data analysis	1. Develop various flight quality related regulations and procedures a. Develop and revise monitoring items and standards b. Develop flight quality regulations and procedures c. Develop flight data analysis work procedures and exceedance event investigation procedures, etc.	1. Understand the relevant regulations of the Bureau's flight operations quality assurance; 2. Understand each aircraft type monitoring items and standards; 3. Understand the investigation procedures of the bureau's unsafe events; 4. Understand flight operations quality assurance workflow; 5. Understand the principles of flight data collection and transmission; 6. Understand flight operations knowledge; 7. Understand the principle of event triggering; 8. Ability to write a variety of analysis reports; 9. Ability to make 3D simulations;
	2. Flight data management a. The implementation of flight data transmission, playback and backup work b. Monitor the flight data collection and transmission, collect the monitoring rate of each fleet, discover data quality problems in a timely manner, issue rectification requirements and track improvement	

(*continued*)

Table 1. (*continued*)

Classification of duties	Specific responsibilities	Competency requirements
	3. Event analysis and preparation of reports, including daily, monthly, annual reports, and unsafe event analysis report; Carry out exceedance event investigation to ensure efficient flight data management and accurate event analysis	10. Ability to mine data applications; 11. Be able to identify safety risk points; 12. Impartiality; 13. Leadership skills; 14. Learning ability; 15. Have communication and collaboration skills; 16. Ability of statistical analysis; 17. Organizational ability; 18. Have the ability to train and guide; 19. Have writing ability;
	4. Data application and research, including participating in the development and maintenance of various data application systems, taking charge of data extension and application work such as 3D animation production, participating in the research work of flight big data, mining flight manipulation safety risk and summarizing safety risk trend information	
	5. To supervise and inspect the flight data analysis work of all departments of the company, to ensure that the company's flight data analysis work standards are unified and procedures are standardized, and to ensure that the flight data are timely and fully applied	
	6. Participate in relevant training at home and abroad, assist in organizing internal training of the company, coach the flight data analysis business of various departments of the company, and ensure the continuous improvement of the flight data analysis level of the company	

Preliminary Competency Requirements. The above is an example analysis of the relevant job responsibilities of flight operations quality assurance personnel. The author also analyzed other working elements of flight operations quality assurance. Due to space limitations, they are not listed here. Competency requirements are determined based on the job analysis of the flight operations quality assurance, the equipment and tools used, and their work environment. Combined with the results of the above analysis, the competency factors are divided into six categories, including basic

competency, attitude, flight operations quality assurance expertise and skills, business knowledge and basic skills. The specific contents are shown in Table 2. Table 2 shows the final competency model. The relevant content analyzed by the job analysis method is similar to the content in Table 2. Due to the limitation of space, the preliminary competency model analyzed here is not described in detail.

4.2 Determination of Competency Model

The Questionnaire Survey. The above competency model is compiled into a questionnaire, which contains 36 competency elements in total, and includes the definition and behavioral performance of these competency elements at the end of the questionnaire. The five-point scale is adopted to assign values to these competency elements from "very important" to "not important" from 5 to 1. The questionnaire also included the education and work experience that flight operations quality assurance personnel should have to be qualified for their positions.
The subjects are the flight operations quality assurance personnel of the airline company and the personnel who are familiar with the flight operations quality assurance work (including superior leaders and subordinate employees). A total of 30 personnel. A total of 30 questionnaires were issued, 28 of which were valid, with an effective rate of 93.3%.

The Data Analysis. This article uses SPSS statistical software for data analysis.

Reliability Test of Questionnaire. The questionnaire reliability was measured by the alpha reliability coefficient. The Scale in SPSS was used to calculate the alpha reliability coefficient. The results showed that the Alpha coefficient of this questionnaire reached 0.8976 and the standard coefficient was 0.8913. ($0.7 \leqq$ Cronbach alpha coefficient < 0.9, very reliable) this indicates that the consistency of this questionnaire is very high, and the measurement results are reliable, which can be used to continue the following statistical analysis.

Descriptive Statistical Analysis. Descriptive statistical analysis is mainly an average analysis of the importance of competency factors. According to the average analysis of all competency factors' importance to work in the total sample, the average score of 36 competency factors is between 3.04 and 4.96. This indicates that the contribution of these competency factors to work performance is above the medium level. Therefore, these competency factors are retained.

The importance score (average score) of competency elements in each dimension was added, and then the average value was calculated, that is, the importance degree of each dimension, and then the value was normalized, that is, the weight of each dimension. The specific results are shown in Table 2. Similarly, the specific competency factors are normalized to obtain the corresponding weight, and the results are shown in Table 2.

According to the result of questionnaire, the expert group and the airlines flight operations quality assurance personnel of superior leadership to discuss, finalized, qualified for flight operations quality assurance position requirements: (1) for system management and data processing personnel, need a bachelor's degree or above, major in civil aviation related business and above 1 years work experience; (2) for data analysts, a bachelor's degree or above is required, with at least 3 years of experience as a captain.

Determination of Competency Model. Based on the above analysis results, the competency model of the airline flight operations quality assurance personnel is finally determined. See Table 2. The serial number in the competency factor is the order of importance of each sub-dimension.

Table 2. The competency model of the airline flight operations quality assurance personnel

Competency category (Weight)	Competency factor (Weight)
Education and work experience	1 Bachelor degree or above, working experience in civil aviation related business for 1 year or more; (system management and data processing personnel) 2 Bachelor degree or above, 3 years or above experience as captain. (data analysts)
Basic Competency (0.198)	1 Language communication ability (0.107); 2 Statistical analysis ability (0.107); 3 Team awareness (0.098); 4 Coordination ability (0.098); 5 Collaboration ability (0.098); 6 Organizational ability (0.089); 7 Good physical quality (0.089); 8 Learning ability (0.084); 9 Logical analysis ability (0.084); 10 Leadership ability (0.071); 11 Training and guiding ability (0.071);
Attitude (0.216)	1 Conscientiousness (0.188); 2 Confidentiality (0.188); 3 Responsibility (0.180); 4 Impartiality (0.158); 5 Carefulness (0.158); 6 Initiative (0.128);
Professional knowledge and skills of flight operations quality assurance (0.205)	1 Monitoring items and standards (0.118); 2 Write various analysis reports (0.118); 3 Proficient in flight data decoding software (0.114) 4 Flight data acquisition and transmission principle (0.109); 5 Principle of event detection (0.100); 6 Civil Aviation Administration and the company's flight operations quality assurance regulations (0.090); 7 Write a monitoring procedure (0.090); 8 Application of flight operations quality assurance in safety management systems(0.090); 9 Making 3D simulations(0.090); 10 Understand risk management knowledge (0.081)
Business knowledge (0.193)	1 Flight operations knowledge (0.193); 2 Flight procedures (0.193); 3 Meteorological knowledge (0.168); 4 Airspace(0.151); 5 Navigation (0.151); 6 Airport operational knowledge (0.143)
Basic skills (0.188)	1 Proficiency in computer operation and computer related knowledge (0.379); 2 Have writing skills (0.328); 3 Have a certain level of English listening, speaking, reading and writing (0.293)

5 Conclusion

Through the job analysis method to study the competency model of flight operations quality assurance personnel, and using the questionnaire method, using SPSS statistical tools to analyze and determine the competency model of airline flight operations quality assurance personnel. The model includes six dimensions of academic qualifications and work experience, basic competency, attitude, professional knowledge and skills of flight operations quality assurance, business knowledge, basic skills, and a total of 36 competency factors. In addition to academic qualifications and work experience, these five dimensions are ranked as attitude, professional knowledge and skills of flight operations quality assurance, basic competency, business knowledge and basic skills.

Each airline can refer to the competency model of flight operations quality assurance personnel established in this paper to build the competency model of the company. The model is conducive to airlines to carry out human resource inventory, clarify the gap between current capacity reserve and future requirements. A benchmarking system has been established to help airlines better select, train and motivate employees who can contribute to the building of their core competitive advantages [14].

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