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Research on the Training of Aviation Logistics Talents in Civil Aviation Colleges and Universities Based on Analytic Hierarchy Process

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Abstract: In order to improve the quality of talent training and meet the development needs of the industry, the Analytic Hierarchy Process (AHP) is used to analyze and study the training status of logistics talents in civil aviation universities. A hazardous material air transportation hazardous material source evaluation system has been established, and the weights of various factors have been determined. This clarifies the importance of various factors in cultivating logistics talents in China's civil aviation universities. In addition, optimization strategies have been proposed for the important influencing factors, which have significant value in further optimizing the logistics talent training system of civil aviation colleges and meeting the demand of society for high-quality aviation logistics talent cultivation.

1. Introduction

With the acceleration of global economic integration, it has provided broad growth space for the development of China's aviation logistics industry. As an important pillar industry of the national economy, the rapid development of the civil aviation industry is also increasing the demand for logistics talents, and the cultivation of high-quality logistics talents is particularly important. To achieve the goal of becoming a strong civil aviation country, it is necessary to cultivate a large number of high-quality talents. In this context, civil aviation universities should focus on serving the strategic needs of the country's civil aviation power, combine industry development positioning and strategic goals, improve the quality of high-level talent training, promote the construction of a civil aviation power, and accelerate the high-quality development of civil aviation. Currently, civil aviation universities in China have made certain achievements in logistics talent cultivation, but there are also some problems.

Currently, many scholars have explored the training mode of logistics management talents. Foreign logistics education models often have their own characteristics. Japan is one of the countries with a high level of logistics modernization, and its education model emphasizes a "wide range", which forms an organic whole of various knowledge such as mathematics, physics, computers, logistics management, environmental economics, etc. The United States promotes "multi-level" logistics education, with the joint development of undergraduate, graduate, and vocational education. All logistics practitioners must receive vocational education and obtain vocational qualifications through exams before they can engage in aviation logistics work. The "modularization" of logistics education courses in the UK is prominent. The "dual system" of physics education in Germany is a typical feature. According to a survey, in 1989, only 10.4% of the employed population in Germany received higher education, while 68% received dual vocational education. The rest were employed through short-term vocational training. [1]

Xie Ruhe [2] believes that the cultivation of logistics professionals requires the integration of industry and management, and based on this, explores the requirements and norms for talent cultivation. Chen Dongqing et al. [3] proposed that introducing subject competitions into the cultivation of applied talents in this course can meet the talent needs of enterprises. Wu Jiaguang [4] studied based on employment and entrepreneurship abilities, focusing on improving comprehensive quality, continuously accumulating work experience to improve the talent cultivation mode of logistics management in universities, effectively improving students' employment and entrepreneurship abilities, and achieving the goal of cultivating high-quality professional talents. Song Mingzhen et al. [5] conducted a satisfaction sampling survey on undergraduate logistics students in Xinjiang and found that there is an urgent need for improvement in internship practices, logistics facilities and equipment, and course arrangements for talent cultivation in universities.

This project analyzes and studies the training status of logistics talents in civil aviation universities, collects and analyzes data on the curriculum, teaching staff, student abilities, and quality requirements of logistics majors in civil aviation universities, and understands the advantages and disadvantages of current civil aviation universities in logistics talent training. This article helps schools and enterprises better develop talent training plans and recruitment strategies to meet the industry's demand for high-quality talents, while providing decision-making basis for the government and relevant departments to promote talent cultivation and industry development in the civil aviation industry.

2. Analytic Hierarchy Process Analysis of the Current Situation of Aviation Logistics Talent Training in Civil Aviation Colleges and Universities

2.1. Evaluation and Analysis of the Current Situation of Aviation Logistics Talent Training in Civil Aviation Colleges and Universities

2.1.1. Establish a hierarchical structure model

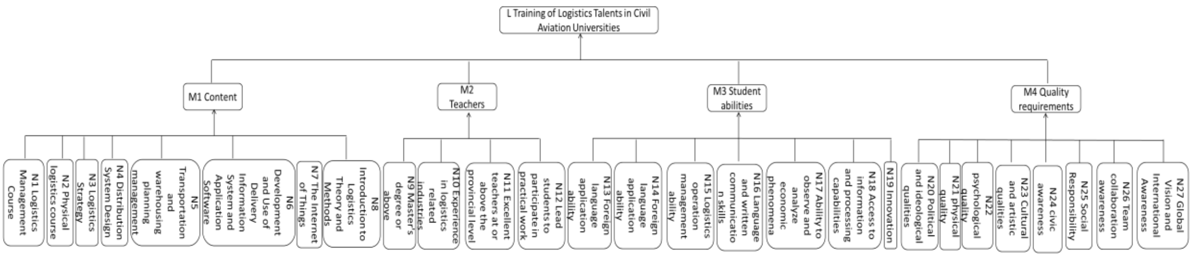

Figure 1: The hierarchical structure model of aviation logistics talent training system in civil aviation colleges and universities

In order to analyze and study the current situation of aviation logistics talent cultivation in civil aviation colleges and universities, based on statistical analysis data from professional teachers, subject leaders, and enterprise leaders, the factors that affect the cultivation of aviation logistics talents in civil aviation colleges and universities were analyzed. Four criteria layer elements were proposed, including course content, teaching staff, student abilities, and quality elements; A hierarchical structure model for the aviation logistics talent training system of civil aviation colleges and universities has been established around the refinement of benchmark layer elements, including 1 first level indicator, 4 second level indicators, and 27 third level indicators, as shown in Figure 1.

For the criterion level factors, the course content needs to take into account seven plan level factors: logistics management course, logistics physical course, logistics strategy, distribution system design, transportation and warehousing planning and management, Internet of Things technology, and logistics introduction theory and methods; The teaching staff includes four program level factors: a master's degree or above, experience in logistics related industries, outstanding teachers at or above the provincial level, and leading students to participate in practical work. Student abilities include seven program level factors: foreign language application ability, logistics system planning ability, logistics operation and management ability, language communication ability, economic phenomenon observation and analysis ability, information acquisition and processing ability, and innovation ability. The quality requirements include eight program level factors: political and ideological quality, physical quality, psychological quality, cultural and artistic quality, civic awareness, social responsibility, teamwork awareness, and global perspective and international awareness.

2.1.2. Analysis of Benchmark Layer Indicator Weights and Consistency Testing

Here, we combine the AHP tool to perform operations on the corresponding matrices. Compared to the overall goal of the talent cultivation system in this paper, we compare and analyze the criticality of different layers, construct a subsequent judgment matrix, and carry out the process of operational analysis. At this point, the M-layer elements are used as the reference layer. The final weight ranking is shown in Table 1.

Table 1: Weights and Consistency Test Results of Each Index in M-layer

	M1	M2	M3	M4	Weight(Wi)
M1	1	3	7	3	0.5252
M2	0.3333	1	5	1	0.2118
M3	0.1429	0.2	1	0.2	0.0513
M4	0.3333	1	5	1	0.2118
λmax=4.0732;CR=0.0274					

From the results of Table 1, it can be observed that M1 content (0.5252)>M2 Teachers (0.2118)>M3 Student abilities (0.0513)>M4 Quality requirements (0.2118). From the comparative analysis of different weights, it can be observed that the corresponding weight of Content in the four benchmark layers is the highest, with the weight ranking first, indicating that it is among the four talent cultivation elements. Therefore, in the reform of aviation logistics talent cultivation, course content should be selected as the main element. By fully utilizing the market demand of the economic environment and the opportunity for the country to vigorously develop aviation logistics talent education, we can overcome our own disadvantages and deepen the connotation construction. With strong support from national policies, we will construct a talent training system for aviation logistics, leverage professional advantages, and create distinctive brands.

2.1.3. Analysis of scheme level indicator weights and consistency testing

We calculate the judgment matrix for the case layer and obtain the weights, maximum eigenvalues, and consistency testing indicators.The results are shown in Tables 2, 3, 4, and 5.

Table 2: Weights and consistency test results of scheme layers corresponding to M1

M1	N1	N2	N3	N4	N5	N6	N7	N8	Wi
N1	1	0.2	1	3	1	0.3333	3	7	0.1006
N2	5	1	5	7	5	3	7	9	0.3775
N3	1	0.2	1	3	1	0.3333	3	7	0.1006
N4	0.3333	0.1429	0.3333	1	0.3333	0.2	1	5	0.0437
N5	1	0.2	1	3	1	0.3333	3	7	0.1006
N6	3	0.3333	3	5	3	1	5	9	0.2177
N7	0.3333	0.1429	0.3333	1	0.3333	0.2	1	5	0.0437
N8	0.1429	0.1111	0.1429	0.2	0.1429	0.1111	0.2	1	0.0156
λmax=8.4197;CR=0.0425 <0.1									

By using relevant AHP analysis tools, the weights of the elements in this group of data were calculated. From Table 2, it can be observed that the consistency ratio corresponding to M1 is 0.0425, and a consistency ratio less than 0.1 indicates passing the consistency test. The weight results obtained are N2 (0.3775)>N6 (0.2177)>N1 (0.1006)=N3 (0.1006)=N5 (0.1006)>N4 (0.0437)=N7 (0.0437)>N8 (0.0156). Through weight comparison, it can be seen that the N2 (0.3775) logistics practice course has the highest weight, indicating that experts pay attention to the introduction and teaching of logistics related physical courses in the course content during the evaluation process.

Table 3: Weights and consistency test results of various indicators corresponding to M2

M2	N9	N10	N11	N12	Wi
N9	1	0.1111	3	0.1111	0.0656
N10	9	1	9	1	0.4483
N11	0.3333	0.1111	1	0.1111	0.0378
N12	9	1	9	1	0.4483
λmax=4.1533;CR=0.0574 <0.1					

By combining relevant AHP analysis tools, the corresponding weights of the elements in this group of information were calculated. From Table 3, it can be observed that the consistency ratio of M2 layer is 0.0574, and the consistency ratio does not exceed 0.1, indicating passing the consistency test. Through weight comparison, it can be seen that experience in the logistics industry and leading students to participate in practical work have the highest weight of 0.4483.

Table 4: Weights and consistency test results of each indicator corresponding to M3

M3	N13	N14	N15	N16	N17	N18	N19	wi
N13	1	0.2	0.2	1	1	0.1429	0.3333	0.0414
N14	5	1	1	9	5	0.3333	3	0.2194
N15	5	1	1	9	5	0.3333	3	0.2194
N16	1	0.1111	0.1111	1	5	0.3333	1	0.0581
N17	1	0.2	0.2	0.2	1	0.1667	0.3333	0.0336
N18	7	3	3	3	6	1	5	0.3478
N19	3	0.3333	0.3333	1	3	0.2	1	0.0804
λmax=7.7455;CR=0.0914 <0.1								

By combining relevant AHP analysis tools, the corresponding weights of the elements in this group of information were calculated. From Table 4, it can be observed that the consistency ratio between the M3 layer groups is 0.0914, and the consistency ratio does not exceed 0.1, indicating that the consistency test has been passed. The highest weight result formed is 0.3478, indicating

N18's ability to obtain information and process information. This reflects the importance of this capability for the logistics industry in the current information society. The logistics industry is an information intensive industry that requires continuous acquisition and processing of a large amount of information. For example, logistics companies need to obtain customer demand information, transportation information of goods, warehouse storage information, etc., in order to arrange transportation and storage reasonably. At the same time, logistics companies also need to process and analyze this information in order to timely discover and solve problems, improve logistics efficiency and service quality.

Table 5: Weights and Consistency Test Results of Various Indicators Corresponding to M4

M4	N20	N21	N22	N23	N24	N25	N26	N27	wi
N20	1	5	1	9	7	3	0.3338	9	0.2128
N21	0.2	1	0.3333	9	1	0.3333	0.1111	1	0.0490
N22	1	3	1	9	3	1	0.3333	7	0.1517
N23	0.1111	0.1111	0.1111	1	0.1111	0.1111	0.1111	0.1111	0.0115
N24	0.1429	1	0.3333	9	1	0.3333	0.1111	3	0.0538
N25	0.3333	3	1	9	3	1	0.3333	7	0.1322
N26	3	9	3	9	9	3	1	9	0.3568
N27	0.1111	1	0.1429	9	0.3333	0.1429	0.1111	1	0.0321
λmax=8.9597;CR=0.0972<0.1									

By combining relevant AHP analysis tools, the corresponding weights of the elements in this group of information were calculated. From Table 5, it can be observed that the consistency ratio between the M4 layer groups is 0.0972 (less than 0.1), indicating passing the consistency test. The highest weight result obtained is 0.3568, indicating N26 team collaboration awareness. In the training of logistics professionals in civil aviation colleges, the weight of team collaboration awareness is the highest, which reflects the importance of this quality in the current logistics industry. Team collaboration awareness refers to the awareness and ability of individuals to actively cooperate with others, coordinate actions, and achieve goals together in a team. In the logistics industry, team collaboration awareness is very important. Logistics enterprises need close cooperation between various departments and employees in order to achieve efficient and accurate logistics services. Therefore, logistics professionals need to have a strong sense of teamwork, be able to establish good communication and cooperation relationships with others, and work together to complete logistics tasks.

2.1.4. Sorting analysis of scheme layer

The Analytic Hierarchy Process (AHP) overall ranking is used to grasp the weight of relevant elements in the hierarchical structure towards the overall goal, as well as their mutual influence with the upper level elements. The result of a single ranking of all levels in this layer is used to calculate the combined weight of the elements in this layer, thus completing the process of hierarchical overall ranking. In the hierarchical sorting process, it is necessary to proceed in order from top to bottom, and finally calculate the weight of the lowest level element, which is the priority of the decision plan, as shown in Table 6.

Based on Table 6, it can be found that in the weight analysis of the scheme layer, the main weight rankings are as follows: The top ranked is N2, a logistics physical course with a weight of 19.83%.The second ranked is N6, IoT technology, with a weight of 11.43%.Ranked third is N10, with experience in logistics related industries at 9.49%; N12, leading students to participate in practical work, 9.49%. Ranked fourth is N26, with a team collaboration awareness of 7.56%.

Ranked fifth is N1, with a logistics strategy of 5.28%; N3, Logistics Management Course, 5.28%; N5, Transportation and Storage Planning Management, 5.28%. Ranked sixth is N20, with political and ideological qualities at 4.51%. Ranked seventh is N22, with a psychological quality of 3.21%. Ranked eighth is N25, with a sense of social responsibility of 2.8%. Ranked ninth is N7, the development and use of distribution information systems and application software, with a rate of 2.29%; N4, Distribution System Design, 2.29%. Ranked tenth is N18, with information acquisition and processing capabilities at 1.78%.

Table 6: Sorting Results of Scheme Layers

Lower level elements	Conclusion value (weight)
N2	0.1983
N6	0.1143
N10	0.0949
N12	0.0949
N26	0.0756
N1	0.0528
N3	0.0528
N5	0.0528
N20	0.0451
N22	0.0321
N25	0.0280
N7	0.0229
N4	0. 0229
N18	0.0178
N9	0.0139
N24	0.0114
N14	0.0112
N15	0.0112
N21	0.0104
N8	0.0082
N11	0.0080
N27	0.0068
N19	0.0041
N16	0.0030
N23	0.0024
N13	0.0021
N17	0.0017

2.2. Optimization Strategy of Aviation Logistics Talent Training System in Civil Aviation Colleges and Universities

Through the analysis of the structural model of the aviation logistics talent training system in civil aviation colleges, it is known that logistics physical courses, Internet of Things technology, logistics related industry experience, and leading students to participate in practical work have become four key factors that need to be paid attention to. In order to reform and optimize the talent training system for logistics majors in civil aviation colleges, the following optimization strategies are proposed.

2.2.1. Logistics Practice Course

When teaching logistics physical courses, theory should be combined with practice, and new technologies and models should be continuously introduced, emphasizing the importance of norms and standards. With the continuous improvement of environmental awareness, green logistics has also become an important development direction in the logistics industry. Therefore, in the physical logistics course, attention should be paid to the development trend of green logistics, and at the same time, case teaching should be strengthened to enable students to improve their problem-solving ability through case analysis and discussion, and focus on cultivating their innovative thinking and ability. The implementation of these strategies can make logistics physical courses more practical, comprehensive, and forward-looking, better meeting the learning and career development needs of students.

2.2.2. IoT technology

When teaching Internet of Things technology, it is necessary to strengthen the teaching of basic knowledge, including the definition, characteristics, architecture, and technology of the Internet of Things. The Internet of Things technology has strong practicality, therefore, attention should be paid to practice and application, integrating Internet of Things technology into aviation logistics scenarios, and introducing the application and implementation methods of Internet of Things technology in the field of aviation logistics.

The Internet of Things technology involves a large amount of data and information. Therefore, when teaching Internet of Things technology, emphasis should be placed on security and reliability, and attention should be paid to the latest technological trends and development trends. We can also collaborate with enterprises to jointly develop the application and implementation methods of Internet of Things technology in the field of aviation logistics.

2.2.3. Leading students to participate in practical work

Schools can develop practical guidance plans to encourage teachers to lead students in practical work, including the time, location, content, methods, and other aspects of practice, so that both teachers and students have clear guidance directions. Schools can strengthen the assessment of practical activities, develop detailed assessment standards and methods, and ensure the effectiveness and quality of practice. Schools need to actively cooperate with enterprises and provide more practical opportunities for students. By collaborating with enterprises, teachers can lead students to participate in practical work, gain a deeper understanding of the actual situation and needs of aviation logistics, and improve their practical abilities and professional qualities. Schools can strengthen practical safety measures to ensure the personal and property safety of students during the practice process. Provide practical subsidies to motivate teachers to lead students in practical work. It is also possible to implement the construction of a "dual teacher" teaching staff, which includes a talent team with both qualifications as university teachers and experience in the logistics industry. By introducing and cultivating "dual qualified" teachers, we can directly enhance the logistics related industry experience of the teaching staff and better lead students to participate in practical work.

Through the above optimization strategies, the effectiveness and quality of the teaching staff leading students to participate in practical work can be effectively improved, providing strong support for cultivating high-quality aviation logistics talents. At the same time, these strategies can also support and promote each other, jointly building a more comprehensive aviation logistics talent training system.

3. Conclusions

This chapter conducts a survey and analysis of the current situation of aviation logistics talent cultivation in civil aviation colleges and universities. It regards the aviation logistics talent cultivation system in civil aviation colleges and universities as a complex system, analyzes the environmental factors of the school, explores the main problems in the reform of the aviation logistics talent cultivation system in civil aviation colleges and universities, proposes four key factors that need to be paid attention to: logistics physical courses, Internet of Things technology, logistics related industry experience, and leading students to participate in practical work. Based on the evaluation results, corresponding optimization measures are proposed to further study and optimize the aviation logistics talent cultivation mode and reform strategy in civil aviation colleges and universities, build a new system for aviation logistics talent cultivation in civil aviation colleges and universities, and provide important reference basis for cultivating high skilled aviation logistics talents that can meet social needs.

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