Research on Prevention Strategy of Flight Accident in Aviation Sports Based on Regression Analysis

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Abstract. Flight safety is related to the development of aviation sports. The paper gives an overview of the regression analysis method. It systematically analyzes the main types of flight accidents in aviation sports, and obtains the types of factors that cause aviation sports flight accidents. The analysis method analyzes the factor data and proposes a prevention strategy for aviation sports flight accidents based on the analysis results.

1. Introduction
With the rapid development of aviation industry and the great influence of sports in the world, the term “aviation sports” has emerged. It refers to a sports activity carried out using aircraft or other equipment, especially in recent years. With the rapid development of China's general aviation industry, aviation sports have gradually moved from the professional competitions of the past to the society, and more and more projects have begun to be popularized by the public. At present, there are many accidents in the development of various types of aviation sports in China, which hinders their healthy and rapid development to a certain extent. Aviation sports are a dangerous and stimulating activity that is both challenging and tempting to endanger life in the event of an accident. Based on the analysis of various incentives for aviation sports flight accidents, this paper clarifies the factors that cause aviation sports flight accidents, and uses regression analysis to analyze the relationship between accident incentives and accident results, and some preventive measures are given, which makes us have a systematic and in-depth understanding and understanding of the causes of aviation sports flight accidents.

2. Overview of regression analysis
Regression analysis refers to the use of the principle of data statistics, mathematical processing of a large number of statistical data, and determine the correlation between the dependent variable and some independent variables, to establish a more relevant regression equation (function expression), and extrapolate the analysis method used to predict the change of future dependent variables. According to the number of dependent variables and independent variables: one-way regression analysis and multiple regression analysis; according to the functional expressions of dependent variables and independent variables are divided into: linear regression analysis and nonlinear regression analysis. The steps of the regression analysis method are as follows: 1. According to the existing data and relationship of the independent variable and the dependent variable, the regression equation is set; 2. The reasonable regression coefficient is obtained; 3. The correlation test is
3. Analysis of the causes of aviation sports flight accidents based on regression analysis

In this paper, the specific causes of various types of aviation sports flight accidents are taken as independent variables, and the results of aviation sports accidents are taken as the dependent variables. Explore the relationship between various factors and the extent to which various causes affect aviation sports accidents. The following steps were used for analysis according to the regression analysis method.

3.1. Determine the variable to establish a scatter plot

(1) Determine the variable
Through the analysis of the causes of aviation sports flight accidents at home and abroad in the past decade, the main causes of aviation sports flight accidents are as follows: bad weather, mechanical failure, operator matching (unit), ground support, management negligence, flight security (voyage), etc. In this study, weather accidents, machinery, operators, maintenance, ground support, management, flight support, air traffic control, and other responsibilities are determined as independent variables, and the accident results are used as dependent variables.

(2) Establishing a scatter plot

Figure 1 Scatter plot of weather reasons
Figure 2 Scatter plot of mechanical causes

Figure 3 Ground support reason scatter plot

Figure 4 Unit cause scatter plot
Figure 5 Scatter plot for the cause of the maintenance

Figure 6 Scatter plot for the management reason

Figure 7 Scatter plot of the cause of the flight
Through the analysis of scatter plots, it can be seen that the four factors of ground support, aircraft maintenance, and flight support and air traffic control are the highest correlation with accidents. Other factors such as weather accidents, machinery, operators, management and other factors are not so high, but it is also an important analysis object, cannot be ignored, however, in comparison, the above four factors are the key considerations.

3.2. Perform correlation analysis

Correlation analysis refers to the analysis of two or more related variable elements to measure the closeness of the two variable factors [2]. Correlation elements need to have a certain connection or probability to conduct correlation analysis. Relevance does not mean causality, nor is it simple personalization. Correlate analysis of the causes of the above-mentioned general aviation flight accidents, as shown in Table 1.

| Table 1 Correlation of flight accidents in aviation sports |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                  | Weather accident | Machinery       | Operator        | Management      | Ground support  | Locomotive      | Flight support  | Air traffic control | Responsibility to be determined | Other | Total |
| Weather accident | Pearson Correlation | .197            | .096            | .010            | .010            | .007            | .324            | .292            | .268            | .374            | .142            |
|                  | Significance (one side) | .010            | .096            | .010            | .010            | .007            | .324            | .292            | .268            | .374            | .142            |
| N                | 11               | 11              | 11              | 11              | 11              | 11              | 11              | 11              | 11              | 11              |

Pearson Correlation

|                  | Weather accident | Machinery       | Operator        | Management      | Ground support  | Locomotive      | Flight support  | Air traffic control | Responsibility to be determined | Other | Total |
| Weather accident | Pearson Correlation | .286            | .425            | .684            | -.683           | -.708**         | -.155           | -.186           | .210            | -.109           | -.355           |
|                  | Significance (one side) | .197            | .096            | .010            | .010            | .007            | .324            | .292            | .268            | .374            | .142            |
| N                | 11               | 11              | 11              | 11              | 11              | 11              | 11              | 11              | 11              | 11              |

Significance (one side)
|                           | N  | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
|---------------------------|----|----|----|----|----|----|----|----|----|----|----|----|
| **Operator**              |    |    |    |    |    |    |    |    |    |    |    |    |
| Pearson Correlation       |    |    |    |    |    |    |    |    |    |    |    |    |
| Significance (one side)   |    |    |    |    |    |    |    |    |    |    |    |    |
| N                         |    | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| **Management**            |    |    |    |    |    |    |    |    |    |    |    |    |
| Pearson Correlation       |    |    |    |    |    |    |    |    |    |    |    |    |
| Significance (one side)   |    |    |    |    |    |    |    |    |    |    |    |    |
| N                         |    | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| **Ground support**        |    |    |    |    |    |    |    |    |    |    |    |    |
| Pearson Correlation       |    |    |    |    |    |    |    |    |    |    |    |    |
| Significance (one side)   |    |    |    |    |    |    |    |    |    |    |    |    |
| N                         |    | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| **Locomotive**            |    |    |    |    |    |    |    |    |    |    |    |    |
| Pearson Correlation       |    |    |    |    |    |    |    |    |    |    |    |    |
| Significance (one side)   |    |    |    |    |    |    |    |    |    |    |    |    |
| N                         |    | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| **Flight support**        |    |    |    |    |    |    |    |    |    |    |    |    |
| Pearson Correlation       |    |    |    |    |    |    |    |    |    |    |    |    |
| Significance (one side)   |    |    |    |    |    |    |    |    |    |    |    |    |
| N                         |    | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| **Air traffic control**   |    |    |    |    |    |    |    |    |    |    |    |    |
| Pearson Correlation       |    |    |    |    |    |    |    |    |    |    |    |    |
| Significance (one side)   |    |    |    |    |    |    |    |    |    |    |    |    |
| N                         |    | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| **Responsibility to be determined** |    |    |    |    |    |    |    |    |    |    |    |    |
| Pearson Correlation       |    |    |    |    |    |    |    |    |    |    |    |    |
| Significance (one side)   |    |    |    |    |    |    |    |    |    |    |    |    |
| N                         |    | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| **Other**                 |    |    |    |    |    |    |    |    |    |    |    |    |
| Pearson Correlation       |    |    |    |    |    |    |    |    |    |    |    |    |
| N                         |    | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
Each value in the table is also the P value, showing the relationship between the two factors corresponding to the value, that is, the significant level. Generally, less than 0.05 is significant; if less than 0.01 is more significant; for example, P = 0.001 is a very high level of significance. From the data in the table, it can be seen that between the machinery and the maintenance, between the operator and the ground, the relationship between management and machinery, ground support, maintenance, ground support and maintenance, flight support and air traffic control. The coefficients are all below 0.5, indicating that there is a high level of significance between these factors, that is, the relationship between these reasons is the biggest.

Specifically, between the machinery and the maintenance, the maintenance work is responsible for the mechanical work of the aviation sports transport equipment, so the two have a high correlation; between the operator and the ground support, when the various types of aircraft in the aviation sports are taking off and landing, the operators must communicate with the ground support personnel. The two are inseparable, so the two have a high correlation; among the three factors of management and machinery, ground support and maintenance, there are management factors in all three factors, so they are highly correlated with management; between the ground support and the maintenance, the maintenance work definitely needs the support and assistance of the ground support, so the two have a higher correlation; between flight support and air traffic control, air traffic controllers and flight support personnel must communicate closely for flight safety, so the correlation between the two is high.

The correlation coefficients between the other combinations are not very obvious, indicating that they are either irrelevant or not related, so ignore this insignificant situation for the time being, mainly to analyze the situation with a high degree of significance. Therefore, according to the results of data analysis, when proposing preventive measures, it mainly proceeds from the following aspects: machinery, operators, maintenance, ground support, management, flight support and air traffic control.

### 3.3. Model Results Analysis

| model | R    | R square | Adjustment R square | Standard Estimated error |
|-------|------|----------|---------------------|--------------------------|
| 1     | 0.900a | 0.800    |                      |                          |

a. Predictors: (constant), responsibility to be determined, air traffic control, management, other, mechanical, operator, locomotive, flight support, weather accident, ground support.

The model summary is shown in Table 2. The judgment coefficient R square = 0.800, the goodness of fit is very high, indicating that the adopted independent variables have a high degree of influence on the dependent variable. The main independent variables are mechanical, operator, maintenance, ground support, management, flight support and air traffic control. The results of the regression analysis, under the various factors listed, some factors like weather accidents, the impact on flight
accidents is not strong, in the prevention of measures, can be ignored, and some factors, such as machinery, operators, maintenance, etc., must be taken into consideration, because similar factors have the highest impact on aviation flight accidents.

4. Preventive measures strategies for flight accidents in China's aviation sports

Through the above analysis and calculation, when conducting aviation sports accident prevention measures, it can be mainly carried out from these aspects.

Mechanical factors include mechanical assembly and mechanical maintenance. Mechanical assembly is the assembly of various types of aircraft for aviation sports according to the technical requirements of the design. Mechanical assembly is an important part of mechanical maintenance. The quality of assembly work is good for all kinds of aircraft of aviation sports. The workload of maintenance and maintenance plays an important role. This requires the practitioners to master the structure and working principle of various types of aircraft in aviation sports, and to master the principle of the engine. If the staff is slightly careless, whether in assembly or maintenance, it will have a serious impact on the safety of all types of aircraft in aviation sports. This requires strengthening the requirements and training of professionals.

Because the various types of aircraft in aviation sports have a long time in flight, the air traffic factor is ranked first in the sorting process. In the process of air traffic control, a small mistake of the controller will cause a flight accident, and they need to maintain a high pressure for a long time, and it is inevitable that there will be negligence. At this time, the probability of accidents of various types of aircraft in aviation sports will be high. If there is a mistake in the ground management, it is because the communication between the ground staff is not in place.

Flight support factors include communication and pre-flight confirmation. These two parts are reflected in the fact that before the take-off of various types of aircraft for aviation sports, flight support needs to confirm the maintenance work of various types of aircraft for aviation sports, as well as the confirmation of the various types of aircraft loads for aviation sports. Then, it has a lot to do with the work attitude of the staff, and the consequences are very serious. This requires a correct attitude.

As the actual controller of aviation sports flight, the operator is undoubtedly the most important for aviation sports flight safety. If the operator has a little operational error, a flight accident will occur.

The maintenance factors include the two parts of the maintenance field and the maintenance internal service. The work done by the maintenance is also the maintenance of various types of aircraft in aviation sports, which is similar to mechanical factors.

References

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