

Study on the Operation Safety of Sea Sightseeing Tourist Ships in the Waters of Kowloon Bay, Weihai

Guoxin Liu¹, Jianwen Ma^{2,3} and Yue Zhou¹

¹School of Shipping College, Shandong Jiaotong University, Weihai 264200, China

²School of International Business, Shandong Jiaotong University, Weihai 264200, China

³School of Merchant Marine, Shanghai Maritime University, Shanghai 201200, China

Abstract

With the rapid development of social economy, tourism as a tertiary industry has developed rapidly, and sea sightseeing has become a popular project in coastal areas. These areas not only meet the requirements of tourists, but also promote the rapid development of the regional economy and make a great contribution to the development of local tourism. Tourist ship operation is one of the important ways for people to enjoy the scenery of the sea and experience boat travel, but also faces many problems such as navigation safety. In recent years, tourism and aviation safety incidents at home and abroad have frequently attracted social attention, and strengthening tourism navigation safety supervision has become a top priority. This paper selects the operation safety of maritime sightseeing and tourist vessels in the waters of Weihai Jiulong Bay as the research object, starts from the analysis of the factors affecting the operation safety of sightseeing and tourism vessels in Kowloon Bay, and establishes a hierarchical model of the operational safety factors of tourist vessels in Weihai Jiulong Bay from the perspective of the "man-ship-environment-management" system. The grey correlation analysis method is used to study the risk factors affecting the operation safety of tourist ships, and corresponding improvement measures are proposed to improve the safety of maritime sightseeing tourism and the safety of tourists.

Keywords

Weihai Jiulong Bay; Sightseeing Cruise Ship; Operational Safety; Grey Correlation Analysis.

1. Introduction

In recent years, maritime tourism has become more and more popular and has become an important form of leisure. However, the frequent occurrence of sightseeing boat safety accidents at home and abroad tells us that the operation safety of sightseeing ships is an important factor affecting people's travel experience. At present, the sea sightseeing ships in Weihai City usually carry large passenger capacity, small size and low safety, and the whole industry has the problem of "small, scattered, weak and poor". Therefore, it is particularly important to carry out research on the operation safety of marine sightseeing cruise ships in Kowloon Bay. This paper will deeply discuss the operational safety of sightseeing vessels in the tourist waters of Kowloon Bay in Weihai City, analyze the factors affecting the operational safety of sightseeing vessels, and propose improvement measures for the factors with greater impact, so as to reduce the operational safety risks of sightseeing vessels.

In terms of theoretical research, Pillay and J.Wang of Liverpool John Moores University (2003) and Christiansen of the Norwegian University of Science and Technology (2005) wrote "Marine Traffic: Safety Management and Risk Analysis" [1] systematically describe the methods, procedures, relevant cases and connotations of maritime traffic safety assessment, and foreign

scholars Psarros et al. [2] After observing and analyzing the Turkish Strait, scholars Ozgecan et al. [3] pointed out the area with a high number of ship accidents in the region and put forward safety recommendations for ships navigating in the area, while the British scholar J.Wang first applied the FSA method to the water safety assessment, analyzed the prospect of its maritime assessment, and used the FSA method to analyze the relevant waters [4][5]. Other scholars have explored the risk evolution mechanism of water traffic accidents, identified the key causes of water traffic accidents from the latent, diffuse and occurrence stages of accidents, and carried out case studies[6-9]. Guo Zhenxing scholars investigated the safety situation of maritime tourism ships in Sanya, and put forward suggestions in many aspects through field investigation and analysis, and finally summarized a safe, convenient and efficient safety management model for tourist ships ; In the study of the safety management of marine tourism vessels in Beihai City, Li Ping analyzed the two guarantee factors of policies, regulations and supporting facilities, and put forward countermeasures and suggestions for the identification and control of safety risk factors and the provision of maritime public safety guarantees, while Zhang Di evaluated and predicted the risk of collision and docking accidents in the navigable waters of Tianjin Port. Chen Haihang made statistics and analysis of navigation safety accidents in the western waters of Xiamen, and proposed a plan and mechanism to improve navigation safety in the western waters[7-23] .

2. Data Sources and Research Methods

2.1. Data Sources

2.1.1. Sub-section Headings

This paper investigates the influencing factors of the operation safety of tourist sightseeing ships in the waters of Kowloon Bay, this survey adopts the form of online questionnaire survey, and the questionnaire is distributed on the online platform, with the personnel engaged in marine work, training teachers and tourists as the survey objects, combined with the research direction of this paper, the basic information of personnel, safety awareness, influencing factors, and improvement measures are investigated in four parts, including occupation, understanding of the operation safety of sightseeing cruise ships, and the impact of human factors on the operation safety of tourist ships. The influence of ship factors on the operation safety of tourist ships, the factors of environmental factors on the operation safety of tourist ships, the factors of management factors on the operation safety of tourist ships, etc.

2.2. Method Selection

Since there are many risk factors in the operation of sightseeing cruise ships, and these factors can be both quantitative and qualitative, this paper introduces the indicators of "human-ship-environment-management" as the factor set, combined with the grey system theory, and uses the grey correlation analysis method to study the operation safety of sightseeing cruise ships has the following advantages:

- (1) Multiple indicators can be considered comprehensively: the grey correlation analysis method can quantitatively measure a number of factors that affect the operation safety of sightseeing cruise ships, and comprehensively consider the impact of these factors on the operation safety.
- (2) Low data volume requirements: Compared with other methods, this method requires a small amount of sample data, but can still obtain valid results, so even in the case of large errors and incomplete data, practical suggestions can be obtained.
- (3) Strong explanatory results: The results obtained by the grey correlation analysis method are directly presented on the numerical value, which can directly reflect the correlation and

correlation degree between the indicators, making the results more interpretable and helpful for decision-making.

Therefore, the use of grey correlation analysis to study the operational safety of sightseeing cruise ships can help us to more comprehensively and accurately evaluate the impact of relevant factors on the operational safety of sightseeing cruise ships, formulate relevant regulations on operational safety, and provide valuable decision-making suggestions in this field.

2.3. Analysis of Factors Affecting the Safety of Ship Operation

2.3.1. The Human Factor

People have subjective initiative and are the main body of navigation safety of tourist ships. According to the data analysis of safety accidents in the operation of sightseeing tourist ships in recent years, the main factor leading to the occurrence of ship accidents is the human factor. Studies have shown that 80% of ship accidents are caused by human actions. Among them, the human factor in the tourist ship is mainly composed of two parts: the crew and the tourists.

(1) Crew

The crew is a vital factor in the process of ship navigation, which plays a decisive role in the operation safety of the tourist ship, mainly including the professional skills, physical fitness and psychological quality of the crew. An analysis of the safety incidents that occurred in the waters of Kowloon Bay showed that the main reasons were that the operators did not operate the vessel in accordance with the requirements of the rules and did not sail in the prescribed navigation area. In addition, the age, professional skills, competency certificates, experience judgments, and psychological and physiological state of the crew of the tourist ship will have a great impact on the operation of the ship.

(2) Tourists

Accident investigations have shown that another cause of accidents on tourist boats is tourists, who mainly ignore safety warnings and codes of conduct, are physically not in the right condition to board the boat, excessive alcohol or drug abuse, overcrowding or improper movement.

(3) Other factors

Because tourist ships usually carry tourists in near-shore waters for sightseeing activities, and there is no separation zone in their specified navigation area, diving enthusiasts, surfing enthusiasts, and tourists catching up with the sea may carry out recreational activities near the sightseeing ship and some fishermen may also accidentally intrude into the navigation area of the tourist ship for fishing operations, the above factors greatly increase the risk of ship collision and accidents, and it is also a huge challenge for the pilot.

2.3.2. Ship Factor

As a carrier and means of transportation for tourism activities, the safety of sightseeing cruise ships is one of the key factors affecting operational safety.

(1) Age of the ship

The age of a ship is closely related to the safety of navigation. During the use of sightseeing vessels, their equipment and facilities will gradually age and wear out over time, and gradually lose their original performance. When the ship is older and the ship equipment is older, it will be difficult for the ship to respond quickly and accurately in important emergency situations, which increases the risk of accidents.

(2) Ship scale

The passenger capacity and tonnage of a tourist ship can reflect the size and scale of the ship, as well as the maximum number of passengers it can carry. Sightseeing boats are usually short-

distance trips in offshore waters, which require greater adaptability to the environment and higher requirements for flexibility, so sightseeing boats are usually small ships. Smaller ships have simple maneuvering, good rudder efficiency, strong agility and strong range adjustability, but small sightseeing ships have low risk resistance, small targets are not easy to find, relatively low safety, relatively low comfort, and relatively limited load capacity.

(3) The seaworthiness of the tourist vessel

The seaworthiness status of a tourist sightseeing ship involves many aspects, such as equipment maintenance, safety facilities, certificate validity, etc. These factors affect its ability to meet the demand for passengers and ensure the safety of visitors.

2.3.3. Environmental Factors

Environmental factors are one of the main causes of human error, which have a certain impact on the judgment and operation of the pilots of sightseeing boats. The waters of Kowloon Bay in Weihai City are relatively complex navigable areas, which are affected by a variety of factors, including natural environment and navigable environment. Considering the dynamic nature of environmental factors, in this article, we will focus on analysing the natural conditions of the waters of Kowloon Bay and explore their impact on vessel operations.

(1) Visibility

Low visibility is one of the factors affecting the safety of ship navigation, which is usually caused by storms, snow, fog, haze and other reasons, and is known as the "invisible killer" of maritime navigation safety. When visibility is low, there is an increased chance of collisions or landings of sightseeing vessels.

(2) Wind

Wind is an important factor in the operational safety of sightseeing vessels. The stronger the wind, the stronger the drag on the sightseeing boat, and may cause the vessel to deviate from its original route or be pushed into a dangerous area, increasing the risk of safety accidents such as collisions. At the same time, changes in wind direction may also cause the ship's course to get out of control and drift.

(3) Waves

Waves are crucial to the safety of tourist vessels, and they can have a great impact on the safety of the hull and the handling of the ship, thus endangering the safety of the ship's navigation. Under the lateral action of the waves, the tourist boat will produce a violent rolling phenomenon. This kind of shaking can easily cause the ship to tilt excessively, resulting in waves on the deck, and it can also make it difficult for the crew and tourists to maintain a balanced position, which can easily cause safety accidents and even cause the tour boat to capsize. When a tourist boat sails in the case of headwaves or downwaves, it may produce longitudinal rocking and sagging, and when this amplitude is very large, it is easy to cause problems such as waves on the deck, flooding of the stern and bottom collisions. Therefore, when the waves are large, it will not only have a great impact on the navigation safety of sightseeing ships, but also bring major safety hazards to tourists.

(4) Traffic conditions

The traffic flow not only affects the navigation of the ship spatially, but also has an important impact on the driver's psychology, leading to errors in judgment and decision-making. In the process of sightseeing tour boat operation, other yachts and fishing boats may also intrude into its navigation area by mistake, especially in narrow waters, and the interaction with sightseeing cruise ships increases, increasing the risk of collisions, loss of control and other accidents.

2.3.4. Management Factors

Good management is essential for the safety of ship navigation, and although it is not the main influencing factor, it has a great impact on human factors, ship factors and some environmental

factors. Shipping companies need to establish a safety management system to ensure the safety of navigation of tourist ships. Among them, the safety management system includes the supervision and supervision of the allocation of ship safety officers, the safe driving of the ship, regular maintenance, etc., as well as the management of the ship by the operation department, the requirements for the seaworthiness of the ship, and the arrangement of ship personnel. Only by establishing a scientific and perfect safety management system can we ensure the safe navigation of tourist ships and minimize the risk of accidents.

3. Modeling and Data Analysis

3.1. Grey Correlation Analysis of Influencing Factors of Tourist Ship Operation Safety

3.1.1. Grey Association Analysis Step

In grey correlation analysis (GRA), the calculation of correlation is at the core. The idea and method of the method are described below.

(1) Determine the analysis sequence

After using qualitative analysis, a dependent variable and multiple independent variable factors were obtained. When constructing the grey correlation degree model, the reference sequence composed of the data of the dependent variable is X_0' , the comparison sequence composed of the data of each independent variable is X_i' , and the comparison sequence composed of the data of the respective variables is X_i' ($i=1,2,3,\dots,n$), $n+1$ data series to form the matrix as follows:

$$(X_0', X_1', \dots, X_n') = \begin{bmatrix} x_0'(1) & x_1'(1) & \dots & x_n'(1) \\ x_0'(2) & x_1'(2) & \dots & x_n'(2) \\ \vdots & \vdots & \vdots & \vdots \\ x_0'(N) & x_1'(N) & \dots & x_n'(N) \end{bmatrix}_{N \times (n+1)} \quad (1)$$

$$X_i' = (x_i'(1), x_i'(2), \dots, x_i'(N))^T, i = 0, 1, 2, \dots, n$$

(2) Dimensionless variable sequences

In general, the dimensions and orders of magnitude of the original variables may be different, so they need to be dimensionless to ensure the reliability of the analysis results. Common dimensionless methods include the averaging method and the initial method, which can avoid ignoring the influence of low-order variables. This averaging is carried out using equation (2)

$$x_i(k) = \frac{x_i'(k)}{\frac{1}{N} \sum_{k=1}^N x_i'(k)} \quad (2)$$

The initial value is carried out using formula (3)

$$x_i(k) = \frac{x_i'(k)}{x_i'(1)} \quad (3)$$

$$i=0,1,2,\dots,n;k=1,2,\dots,N$$

The matrix formed by the factors after dimension lessness is

$$(X_0, X_1, \dots, X_n) = \begin{bmatrix} x_0(1) & x_0(2) & \dots & x_n(1) \\ x_0(1) & x_1(2) & \dots & x_n(2) \\ \vdots & \vdots & \vdots & \vdots \\ x_0(N) & x_1(N) & \dots & x_n(N) \end{bmatrix}_{N \times (n+1)} \quad (4)$$

(3) Finding the difference sequence, the maximum difference and the minimum difference

The absolute difference of the corresponding period is obtained from the first column (reference series) and the other columns (comparison series) in (4), and then the absolute difference matrix is obtained

$$\begin{bmatrix} \Delta_{01}(1) & \Delta_{02}(1) & \cdots & \Delta_{0n}(1) \\ \Delta_{01}(2) & \Delta_{02}(2) & \cdots & \Delta_{0n}(2) \\ \vdots & \vdots & & \vdots \\ \Delta_{01}(N) & \Delta_{02}(N) & \cdots & \Delta_{0n}(N) \end{bmatrix} \quad (5)$$

$$\Delta_{0i}(k) = |x_0(k) - x_i(k)| \quad (6)$$

$$i=0,1,2,\dots,n;k=1,2,\dots,N$$

The maximum and minimum numbers in the absolute difference matrix are the maximum and minimum differences;

$$\max_{\substack{1 \leq i \leq n \\ 1 \leq k \leq n}} \{\Delta_{0i}(k)\} \triangleq \Delta(max) \quad (7)$$

$$\min_{\substack{1 \leq i \leq n \\ 1 \leq k \leq n}} \{\Delta_{0i}(k)\} \triangleq \Delta(min) \quad (8)$$

(4) Calculate the correlation coefficient

The data in the matrix of absolute difference are transformed as follows:

$$\xi_{0i}(k) = \frac{\Delta(min) + \rho \Delta(max)}{\Delta_{0i}(k) + \rho \Delta(max)} \quad (9)$$

The matrix from which the correlation coefficient can be obtained is:

$$\begin{bmatrix} \xi_{01}(1) & \xi_{02}(1) & \cdots & \xi_{0n}(1) \\ \xi_{01}(2) & \xi_{02}(2) & \cdots & \xi_{0n}(2) \\ \vdots & \vdots & & \vdots \\ \xi_{01}(N) & \xi_{02}(N) & \cdots & \xi_{0n}(N) \end{bmatrix}_{N \times n} \quad (10)$$

In this formula: the value of the resolution coefficient ρ needs to be taken within (0,1), which is generally taken according to the actual situation of the data, and ρ is generally taken in 0.1~0.5. The smaller ρ is, the more the difference between the correlation coefficients, which is a positive number of no more than 1. The smaller, the larger, so it reflects the degree to which the i th comparison sequence and the reference series are related in the k -phase period.

(5) Calculate the degree of relevance

The correlation degree between the comparison series and the reference series is reflected by N correlation coefficients, and the correlation degree of and can be obtained by finding the average of the pairs

$$r_{0i} = \frac{1}{N} \sum_{k=1}^N \xi_{0i}(k) \quad (11)$$

(6) Correlation ranking

By ranking the correlation between the comparison and reference sequences, the degree of similarity between them can be quantified. If the comparison order and the datum order are plotted as a single curve, the correlation between the two curves is higher if they are similar in shape, and lower if the shape is different.

3.2. Grey Association Analysis Step

(1) Determine the analysis sequence

Assuming that the number of times of each occupation is the dependent variable, the data is based on the number of occupations as a reference series, and various influencing factors are used as independent variables, and the number of times of each occupation is used as an independent variable to form a comparison series (i=1, 2, 3,... , n) In addition, n is the number of influencing factors, where the value of n is 10, and there are n+1 data series together with the dependent variable, and the analysis sequence matrix is shown in Eq. (12):

$$(X'_0, X'_1, \dots, X'_n) = \begin{bmatrix} x'_0(1) & x'_1(1) & \dots & x'_n(1) \\ x'_0(2) & x'_1(2) & \dots & x'_n(2) \\ \vdots & \vdots & \ddots & \vdots \\ x'_0(N) & x'_1(N) & \dots & x'_n(N) \end{bmatrix}_{N \times (n+1)} \tag{12}$$

$$Xi = (x_r(1), x_r(2), \dots, x_r(N))^T \quad i = 0, 1, 2, \dots, 11$$

N is the length of the variable sequence, and the value here is 7

7 is the length of the variable sequence, which specifically represents the data of the seven different occupational groups selected by the independent variable

Table 1. Statistics on factors influencing the operational safety of sightseeing cruise ships

occupation t	Influencing factors	Crew expertise	Psychological and physiological state of the crew	Visitor safety awareness	Ship's own factors	Seaworthiness of the ship	Meteorological conditions	Hydrological conditions	Traffic conditions	Regulatory system of maritime administration	Safety management system of shipping companies
Trainees are trained at the school	344	143	76	233	54	184	179	201	160	32	27
Three mates	78	38	24	39	25	33	27	40	45	1	5
chief mate	36	22	6	11	19	12	9	14	24	0	5
captain	24	18	6	5	11	10	9	6	14	6	0
visitor	75	55	10	38	13	25	27	20	50	13	15
Teachers at school	45	37	7	12	20	5	12	8	40	1	2
Personnel of ship tour companies	23	13	4	8	8	9	9	10	14	1	2
	89	46	19	49	21	40	39	42	45	8	8

(2) Dimensionless calculations were performed for each sequence in Table 1

Using the averaging method and according to Eq. (2), the mean of each series can be calculated separately: 89, 46, 19, 49, 21, 40, 39, 42, 45, 8, 8. The averaging series can then be obtained by dividing the data in each column in Table 2 by their means, as shown in Table 2.

(3) Find the sequence difference, the maximum difference and the minimum difference

The shorter the distance between the corresponding points in the two sequences, the more similar and correlated the trend between them. As a result, consistency and relevance increase, and vice versa. Table 2 shows the results by calculating the distance between the various influencing factors and the number of influencing factors facing the operational safety of sightseeing vessels in the corresponding period. According to the corresponding formula, the maximum and minimum numbers in the absolute difference matrix are the maximum difference of 1.3 and the minimum difference of 0.

Table 2. Table of dimensionless statistical values of factors influencing the operational safety of sightseeing cruise ships

occupation t	Influencing factors	Crew expertise	Psychological and physiological state of the crew	Visitor safety awareness	Ship's own factors	Seaworthiness of the ship	Meteorological conditions	Hydrological conditions	Traffic conditions	Regulatory system of maritime administration	Safety management system of shipping companies
Trainees are trained at the school	3.1	4	3.8	4.8	4.6	3.3	4.6	4.7	3.2	2.5	4
Three mates	0.8	0.1	0.8	0.8	0.8	0.6	0.7	0.9	0.9	1.1	1.2
chief mate	0.4	0	0.4	0.2	0.3	0.6	0.2	0.3	0.4	0.9	0.3
captain	0.3	0.7	0.3	0.1	0.2	0	0.2	0.1	0.2	0.5	0.3
visitor	1.1	1.6	0.8	0.7	0.6	1.8	0.7	0.4	1	0.6	0.5
Teachers at school	0.8	0.1	0.5	0.2	0.1	0.2	0.3	0.2	0.8	0.9	0.4
Personnel of ship tour companies	0.2	0.1	0.3	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.2

Table 3. Absolute difference

occupation t	Δ_{01} (t)	Δ_{02} (t)	Δ_{03} (t)	Δ_{04} (t)	Δ_{05} (t)	Δ_{06} (t)	Δ_{07} (t)	Δ_{08} (t)	Δ_{09} (t)	Δ_{10} (t)
Trainees are trained at the school	0.7	0.2	1	1.3	0.8	1.2	1.1	0.6	0.2	0.5
Three mates	0	0.4	0	0.3	0	0.1	0.1	0.1	0.7	0.2
chief mate	0.1	0.1	0.2	0.5	0.1	0.2	0.2	0	0.4	0.2
captain	0	0	0.2	0.2	0.1	0.1	0.2	0.1	0.4	0.3
visitor	0.3	0.3	0.1	0.2	0.2	0.1	0.4	0.2	0.8	1
Teachers at school	0.4	0.1	0.3	0.4	0.4	0.2	0.3	0.3	0.4	0.3
Personnel of ship tour companies	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.1

Table 4. Correlation coefficient

occupation t	ξ_{01} (t)	ξ_{02} (t)	ξ_{03} (t)	ξ_{04} (t)	ξ_{05} (t)	ξ_{06} (t)	ξ_{07} (t)	ξ_{08} (t)	ξ_{09} (t)	ξ_{10} (t)
Trainees are trained at the school	0.16	0.39	0.12	0.12	0.14	0.10	0.11	0.18	0.39	0.21
Three mates	1.00	0.25	1.00	1.00	1.00	0.57	0.57	0.57	0.25	0.39
chief mate	0.57	0.57	0.39	0.39	0.57	0.39	0.39	1.00	0.57	0.39
captain	1.00	1.00	0.39	0.39	0.57	0.57	0.39	0.57	1.00	0.30
visitor	0.30	0.30	0.57	0.57	0.39	0.57	0.25	0.39	0.30	0.12
Teachers at school	0.25	0.57	0.30	0.30	0.25	0.39	0.30	0.30	0.57	0.30
Personnel of ship tour companies	0.57	0.57	0.39	0.39	0.57	0.57	0.57	0.57	0.57	0.57

(4) Calculate the correlation coefficient

The data in Table 3 of the absolute difference are converted by equation (9) to obtain Table 4 of the correlation coefficients. When calculating the correlation coefficient according to equation (9), the value of ρ is very important, which determines the difference between the correlation coefficients, because 1.3, its value is large, in order to make the difference between the correlation coefficients significant, this takes $\rho=0.1$. Thus, the correlation coefficient in Table 4 can be calculated by the following equation :

$$\xi_{0i}(t) = \frac{0.3}{\Delta_{0i}(t) + 0.29}$$

(5) Calculate the degree of relevance

By using equation (11), the arithmetic mean of each arithmetic is calculated, that is, the correlation coefficient series between each influencing factor factor factor and the operational safety factors of sightseeing cruise ships in Kowloon Bay waters, and the correlation degree of influencing factors of tourist ship operation safety is obtained, such as the correlation degree of lack of professional rescue knowledge training

$$r_{01} = \frac{1}{7}(0.16 + 1 + 0.57 + 1 + 0.3 + 0.25 + 0.57) = 0.55$$

The correlation degree between the series is expressed by these 10 correlation coefficients, and the correlation degree between the influencing factors and the influencing factors of the operation safety of tourist vessels can be obtained by averaging

The degree of correlation between other influencing factors and the safety of tourist vessel operations can also be calculated one by one, and the results are shown in Table 5.

Table 5. The degree of correlation of factors influencing the operation safety of sightseeing cruise ships

Influencing factors	Crew expertise	Psychological and physiological state of the crew	Visitor safety awareness	Ship's own factors	Seaworthiness of the ship	Meteorological conditions	Hydrological conditions	Traffic conditions	Regulatory system of maritime administration	Safety management system of shipping companies
Relevance	0.55	0.52	0.45	0.29	0.50	0.45	0.37	0.51	0.26	0.33

Through the study and analysis of the influencing factors of the operation safety of tourist ships, the correlation between the factors of each influencing factor and the influencing factors of the operation safety of tourist ships was calculated, and there were 10 main influencing factors, which were arranged in the following order.

Crew professional skills (0.55) > psychological and physiological state of the crew (0.52) > traffic conditions (0.51) > seaworthiness of ships (0.50) > safety awareness of tourists (0.45) ≥ meteorological conditions (0.45) > hydrological conditions (0.37) > safety management system of shipping companies (0.33) > the ship's own factors (0.29) > maritime administration system (0.26)

According to the data results, among the risk factors faced by the operation safety of Kowloon Bay sightseeing tourism vessels, the training of professional skills of crew, the psychological and physiological state of crew members, and traffic conditions are the three factors that have the greatest impact. In general, the influence of human factors still occupies the most important influencing factor, followed by environmental factors, and the influence factors of ship and management are relatively small in the correlation with the influencing factors of the operation safety of sightseeing cruise ships in Kowloon Bay.

4. Conclusion

In this paper, the grey correlation analysis method in the grey system is used to study the operational safety of the Kowloon Bay marine sightseeing cruise ship. For the complex system of safety evaluation of tourist ship operation, the grey correlation analysis method is more comprehensive and intuitive than other methods, and is more suitable for the analysis of influencing factors. In this paper, the introduction of geographical environment, the selection of research methods, and the establishment of a comprehensive evaluation system are used to evaluate the operational safety of sightseeing tour boats in Kowloon Bay waters. This paper analyzes the influencing factors of the operation safety of marine sightseeing cruise ships in Kowloon Bay waters from four aspects: people, ships, environment and management, and proposes improvement measures.

The innovation of this paper is to study the operation safety of sightseeing tourist ships in the waters of Weihai Jiulong Bay, enrich the practice of water navigation safety research, and also promote the application of grey correlation analysis method in water safety assessment. It is hoped that this paper can play a role in promoting the research on the operational safety of offshore tourist vessels, and I wish the development of Weihai's maritime tourism industry better and better.

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