

Analysis of the Influence of Seafarers on Water Traffic Safety

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Abstract

The rapid development of water traffic needs safety as a guarantee. In addition to the objective factors as a natural environment channel facilities, traffic conditions, management service level, ships, etc. the subjective factors of crew members on water traffic safety have become one of the most important influences at present. Based on the analysis of Water Traffic Safety Factors Based on Entropy Weight Method, it is concluded that natural environment factors, crew factors and ship factors are the most important. According to the statistical data of the international maritime community and the analysis of the causes of traffic safety accidents, human causes account for 75%~80% of the accidents, which has aroused the attention of the maritime community to the management of seafarers. This requires not only the management of the Maritime Administration, but also the attention of shipping companies, shipowners and individuals, so as to jointly create a professional management mode, so as to reduce accidents caused by human operation and mistakes. Based on the characteristics of crew members and the tasks of different crew members, this paper analyzes the impact of crew members on water traffic safety from their state and professional quality.

Keywords

Water Traffic; Crew; Security; Professional Quality.

1. Introduction

With the rapid development of economy and science and technology, the shipping industry has developed rapidly, and ships have also shown the characteristics of large-scale, rapid and specialized. In particular, the extensive application of emerging technologies in ship design and construction has improved the means of safety inspection. The safety of water traffic has been guaranteed in terms of hardware, but the safety problem has not been completely solved. With the increasing number of ships, the probability of maritime traffic accidents is also increasing. Water traffic accidents will not only cause property losses and casualties, but also may lead to environmental pollution and ecological balance destruction.

The factors affecting water traffic safety mainly include human factors, ship factors and environmental factors, among which human factors account for the main cause of accidents. Human factor usually refers to the adverse effect of human behavior or mission on the correct function or successful performance of this specific system. Although people do not want accidents subjectively, some people have developed various bad habits in their daily life and brought them into the operation, resulting in human errors, resulting in property losses, casualties and traffic accidents.

Because the education received by the crew and their respective maritime experience, self-control, judgment and personality are different, they will eventually adopt their own behavior for the same event, resulting in different results. The factors that affect the crew's safety behavior are mainly reflected in the knowledge, skills, experience, psychological and physical health of the crew.

2. Research Status

For water traffic safety, ship collision accidents are still the types of accidents with large number and large losses. To effectively avoid the occurrence of collision accidents, domestic and foreign scholars have studied the causes of ship collision accidents from multiple perspectives and aspects in depth, in which the ship crew factor accounts for a large proportion. The factors that cause crew members include social, psychological, physiological, subjective and other aspects.

Our research direction is mainly on the administration of crew members, including the registration of crew members, their qualifications, job performance, discipline, special social security and other aspects. China's administrative management of seafarers, industry self-discipline of seafarers, and intermediary services of seafarers should all be in line with the international management model and play an active and key role in the goal of trade globalization.

Gan Langxiong [1] and others analyzed the factors of water traffic safety based on the entropy weight method, and calculated the importance of the three categories of personnel, including maritime management personnel, pilots and crew members, to the influencing factors. In general, the natural environment factors, channel conditions, crew members and ship factors are the most important, followed by traffic conditions, and finally the management service level.

Zhou Ru [2] indicated in the Research on Risk Identification and Wind Direction Category Assessment of Water Traffic Safety Incidents in Chongqing that crew members are the main influencing factor of water traffic risks. The research found that the crew members engaged in water traffic in Chongqing are generally of low educational level, unreasonable age structure, weak safety awareness and other characteristics. The risk sources are divided into personality and psychological defects, physiological abnormalities, illegal driving Human operation errors, etc. It also analyzes that about 80% of the maritime traffic accidents caused by safety management can be controlled through effective management, and the occurrence rate of maritime traffic accidents caused by human factors can be reduced by strengthening safety education, troubleshooting of potential accidents, paying attention to crew recruitment, management of operating ships, management of monitoring centers, and food safety of passenger ships.

Yu Yefang [3]'s "Crew Quality and Maritime Safety" discusses the importance of crew quality in the production safety of shipping enterprises, analyzes the relationship between crew quality and water safety, and expounds that crew should have good professional ethics and ideological quality, strong physique and energy, and necessary skills and professional knowledge. It also proposes to strengthen navigation education and training; Implement strict examination and evaluation system to improve personnel quality and eliminate adverse factors.

Li Shangfu [4] and others pointed out in the Research on the Influence of Crew Psychology on Ship Safety that people pay more and more attention to the analysis and research of factors affecting ship safety. With the deepening of research, it is found that the psychological quality of crew members is also crucial to ship safety. This paper analyzes on the psychological characteristics of the crew, expounds the particularity of their work and the special psychological phenomena under the emergency situation. It also summarizes five kinds of influencing factors, including navigation environment, living conditions, work pressure, marine risks and interpersonal communication. It is summarized and put forward to strengthen the psychological quality education of navigation students, establish the psychological quality education system of crew members, improve the hardware conditions of the ship's internal environment, and strengthen the role of self psychological counseling of crew members.

Yang Liu [5] found the main factors that affect the workload, such as individual factors, driving tasks, driving environment and ship working conditions, by sorting out and analyzing the influencing factors of crew workload in the Research Review of Crew Workload Detection Methods, and described the subjective evaluation method, task performance measurement method, physiological data detection method and other methods to evaluate crew workload. Finally, it is pointed out that the quantitative

study of physiological indicators and workload should be carried out, the comprehensive evaluation model of crew workload should be established, the impact of workload under the superposition of multiple factors should be studied, and a real-time monitoring system for crew compliance should be built.

Huang Qianjian [6] elaborated on the importance of water transportation to the national economy, society and people's life in On Crew Management and Water Traffic Safety. More than 90% of China's annual import and export trade goods are realized by sea transportation.

The International Maritime Organization and some developed shipping countries have studied the impact of human factors on water safety as an important management topic.

Li Chao [7]'s Analysis of Fatigue Causes of Ship Officer Based on Ergonomics and Research on Its Prevention and Control pointed out the relationship between human and environment, elaborated fatigue and its characteristics, and literature indicated that more than 55% of marine accidents caused by human factors were due to seafarers' fatigue. The relationship between fatigue and maritime safety is analyzed in detail. In addition to sleep and work intensity, age, family and emotion, interpersonal relationship, adaptability, ship noise, internal and external environment and other factors can also cause crew fatigue. It also points out the measures to prevent and control crew fatigue.

3. Specific Manifestations of Crew Members' Factors in Maritime Traffic Accidents

Human factors play a decisive role in water traffic accidents, which are specifically shown in:

- (1) The technical level is not solid, but arrogant and complacent. Some crew members with little technical fame, after obtaining some honors and positions, are complacent in praise, can't treat themselves correctly, have pride, and are negligent in their work, which is easy to make mistakes in ship handling.
 - (2) There is a fluke mentality. Some crew members have been relatively smooth. There has been no accident for decades, which will naturally lead to paralysis and fluke psychology, so as to relax vigilance and be careless in work, greatly increasing the probability of accidents.
 - (3) Operation error caused by tension. During the operation, due to the poor technical level, lack of confidence and nervousness, the crew became slow in reaction, and could not make correct judgments and decisions in the face of the sudden emergency, leading to a water traffic accident.
 - (4) A perverse mind. Some crew members overestimate their abilities, fail to listen to the correct opinions of others, and go their own way, which is likely to cause major water traffic accidents.
 - (5) Physiological fatigue. If the crew members do not get enough rest in their spare time, or the crew members are continuously working due to inadequate staffing, which makes them seriously tired, and their perception and reflection abilities are reduced, which seriously affects the judgment and operation of the crew members. Under such circumstances, water traffic accidents are easy to occur.
- It can be found from the above that human factors are very important in water traffic accidents, so it is imperative to improve the comprehensive quality of crew members.

4. Measures to Improve Crew Quality

As the ultimate implementer of water transportation, crew members shoulder the responsibility of creating a good water traffic safety environment and escorting the national economic development and social harmony and stability. Therefore, it is necessary and urgent to improve the crew's quality. We can improve crew quality through the following aspects:

- (1) Strengthen crew quality training and management mechanism

Human factors in water traffic safety are the focus of accident prevention at present. Therefore, it is necessary to strengthen the prevention of various links and strengthen the crew quality training and management mechanism. When selecting drivers, attention should be paid to the psychological

factors of the candidates, which can reduce the errors caused by the psychological factors of drivers to a certain extent. Reduce the impact of fatigue on drivers, establish reasonable work and life rules, take adequate rest and sleep, and enrich the spare time life of crew members. Reduce the mistakes caused by the skill factors of the drivers, establish a supervision mechanism for crew training, certificate issuance and tracking management, strengthen the operation of the safety management system, strengthen the training management, improve the training quality, and pay attention to the requirements for knowledge updating and aquatic qualifications of the crew, so as to improve the competency of the crew. Improve the management ability of senior officers and make them have good comprehensive quality.

(2) Continuously deepen the reform of navigation education and comprehensively promote quality education

Maritime colleges and universities should try to attract outstanding high school graduates to join the maritime team. As the education reform has been intensified, education has been introduced to the market, and colleges and universities have expanded their enrollment, senior high school graduates have more choices when choosing colleges and majors. In addition, the examinee do not know about maritime majors. Especially in economically developed regions, the number of candidates applying for maritime majors has decreased, and it is difficult to recruit high-quality students, which will inevitably affect the quality of crew education. In order to attract outstanding high school graduates to join the navigation team, the state should give more preferential policies to navigation colleges in terms of enrollment, students in school and graduates' treatment. Maritime colleges and universities should expand publicity to enable more candidates to understand navigation and love navigation. It is urgent to deepen the reform of navigation education from the source, comprehensively promote quality education and improve the quality of navigation education.

(3) Strengthen the supervision and management of crew education and training institutions

With the rapid development of science and technology, ships and their instruments and equipment are becoming more and more modern, the size of ships and the density of maritime navigation are increasing, and the cargo carried by ships is becoming more specialized and complex. All these require that crew members constantly learn new knowledge and skills, and adapt to the requirements of new situations. The training of crew members covers a wide range of subjects: in-service crew training and preparatory crew training. From its nature, it can be divided into mandatory training and non mandatory training courses. From the training content, it can include physical training, psychological quality training, professional ethics training, professional knowledge training, skills training, practical operation training, etc. In terms of form, it can be divided into onshore training and onboard training. From the time arrangement, it can be divided into regular training and irregular training.

The quality of crew training involves the equipment of crew education and training institutions, the faculty, the management of crew education and training institutions themselves and the supervision and management of maritime authorities, and this supervision and management is very important. The maritime institution shall, in strict accordance with the requirements of the relevant training, examination and certificate issuance methods, strengthen the supervision and management of the crew education and training institutions, strictly control the quality system of the crew education and training institutions, truly implement the existing regulations, ensure sufficient training hours, ensure that teachers teach according to the requirements of the training program, and let the crew really learn the contents of the training program, Let the training quality of crew education and training institutions go up to a new level, and let the quality of trained seamen go up to a new level.

5. Conclusion

The quality of the crew is directly related to the safety of ships and water traffic, and improving the quality of the crew has always been the subject of the shipping industry. The 21st century is an era of vigorous development and utilization of the oceans and the global shipping industry. It is an

indispensable duty for those engaged in navigation to strengthen the quality of crew members. This paper discusses personal understanding of crew quality and some views and practices on strengthening crew quality training and practice, tries to discuss with peers in the shipping industry, and puts forward some suggestions for improving crew quality. We should use the new requirements of the times to constantly promote the innovation of ideas and management, rely on modern information technology, build a scientific management model, adhere to people-oriented, comprehensively improve the comprehensive quality and ability of the crew, and ensure water traffic safety. This is not only an inevitable choice for the development of shipping industry, but also an important guarantee to ensure safe production on water.

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