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Comparative Study of Maritime Education and Training (MET) between China and Western Countries

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ABSTRACT. *Maritime education and training(MET) is of vital importance to the world shipping industry. This paper first compares MET between China and western countries from the perspectives of basic systems and modes. Then it explores enlightenment of MET in western countries to China's MET: understand the strategic significance of developing MET, be aware of the strategic position of seafarers, encourage more young people to devote themselves to navigation, innovate the system and mechanism of MET, and promote internationalization of MET.*

KEYWORDS: *maritime education and training(MET); China; western countries; comparative study*

1. Introduction

In 2016, China's Ministry of Transport issued the "China Seafarer Development Plan (2016-2020)". In the plan, it proposed to establish an application-oriented seafarer training mode to construct a high-quality crew talent team. The development of the crew team should meet the needs of the national strategy and shipping development. In the 13th five year plan for the development of China's marine economy, it is also clearly proposed to optimize the structure of marine fleet and improve the international competitiveness of container liner transportation. In the field of vocational education, the State Council issued the *Implementation Methods of National Vocational Education Reform* on February 13, 2019, which clearly specifies the training task of vocational education, talent training system and other related systems.

It can be seen that higher requirements have been put forward for the development of seafarers' vocational education. Therefore, it is necessary to draw lessons from the experience of MET system in developed countries.

2. Comparative analysis of MET between China and western countries

2.1 Comparison of MET system

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In view of the relationship between MET in a country's political and economic development and the characteristics of the relationship between educational cost input and social benefits, there are many similarities and differences in the system of MET across the world.

2.1.1 The nature and subordinate relationship of maritime colleges and universities

A significant difference among the maritime colleges and universities in the world is that most of them are directly set up and managed by the state or local government, while there are few private ones invested and managed by individuals. The main reason is that the history of MET is often closely related to the overall security and economic construction of the country. At the same time, the relationship between the high investment, high cost and social and economic benefits of this kind of education makes it difficult to develop private MET. At present, the private maritime schools which only exist in the Philippines and Malaysia are seriously restricted by the investment of education funds[1]. According to the situation of the vast majority of maritime colleges and universities in the world, the current subordinate relationship of maritime colleges and universities is mainly divided into the following types:

(1) Directly managed by the national transportation authority

Maritime colleges and universities in China, the United States, Russia, Denmark, Norway, Australia and other major shipping countries in the world are directly or predominantly controlled and managed by the national transportation authorities. Especially in some countries with a long history of navigation, most of them are directly controlled and managed by the national transportation authorities due to the particularity of their industries, historical traditions, special connections with shipping enterprises and special investment.

(2)National education department taking the major part while transportation department taking the minor part

Maritime colleges and universities in some countries, such as the Maritime College of Bremen Military University in Germany are mainly managed by the national education department, but also under the management of the Ministry of Transport. This management mode is that the Ministry of Education administers maritime colleges and universities according to the standard of general higher or secondary education, while the Ministry of Transport participates in the industry management by formulating seafarer standards, supervising education quality, large-scale training and equipment investment[2]. However, the biggest problem is the slow response to the constantly revised international conventions and standards, which seriously affects the development of domestic maritime industry. Whether in the developed countries or in the developing countries, the National Transportation Department has established a new way to establish a navigation vocational and

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technical school directly controlled by the transport department, such as Hamburg Maritime College in Germany.

(3) Directly managed by the national education department

In a few countries where the shipping industry is of no importance, there is no need to set up special maritime colleges and universities, but some small-scale navigation majors are included in the polytechnic schools. These schools are directly controlled and managed by the Ministry of Education.

2.1.2 Cultivation specification

According to the personnel training standards of the world's maritime colleges and universities, it can be divided into two categories: higher vocational education combined with degree education and maritime professional vocational and technical education. At present, most countries in the world adopt the form of their coexistence, such as the United States, the Netherlands, Norway, China, etc.. However, due to their different national conditions and needs, the situations in the above degree or vocational education are quite different. For example, in the United States, Poland and the Netherlands, the training of international seafarers mainly depends on higher vocational education combined with degree education, while in Norway and other countries, the training of international seafarers mainly relies on maritime vocational and technical education. In some countries, the training of international seafarers is basically or almost dependent on maritime vocational and technical education. For example, the maritime vocational and technical education in Denmark, Sweden and other Nordic countries, as well as the United Kingdom and other countries, is not linked with degree education[3]. The teachers of these institutions are not necessarily professors or lecturers. It is required that the faculty hold qualifications(such as captain and chief engineer) with real maritime experience.

The training of senior seafarers (operation level and management level) is based on the higher maritime vocational education, while the training of ordinary seafarers (support level) is based on the secondary maritime vocational and technical education, which has become a recognized training mode all over the world. However, in some backward developing countries, the training of seafarers still relies on the secondary maritime vocational and technical education.

2.1.3 Examination and certification management

Examination and certification in MET is a special field subject to many international conventions. With the exception of a few countries, most countries put MET examination and certification under one government authority. Generally speaking, the examination of seafarers by MET institutions is conducted by the Ministry of Transport, while the competency certificate of the crew is managed by the Maritime Safety Bureau of the Ministry of Transport. The United States, Russia, Germany and the Netherlands are of this type. However, in a few countries, such as

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Denmark, Sweden and Norway, the above functions are also managed by the Maritime Safety Standards Bureau of the Ministry of Transport.

2.1.4 Source of school funds

MET is a special education field. Its financial support is quite different from other higher and secondary education with the following obvious characteristics. Taking the United States and Germany for example, the annual expenditure is generally one third higher that that of ordinary schools. Maritime education institutions are strongly supported by shipping enterprises. The practice of enterprise funded and commissioned training of students is more popular in the world, such as in Australia, Germany, Denmark and Norway. The investment of practice equipment to the school by enterprises is essential. Generally speaking, the construction of large-scale equipment of maritime colleges and universities has all or part of the investment from enterprises, especially the modern navigation training simulator equipment[4].

2.2 A comparison of the modes of MET

Due to the different objectives and methods of training talents in maritime colleges and universities all over the world, there are also great differences in education modes. Throughout the development history of modern world maritime education for more than 100 years, its education and training mode can be basically divided into three categories: consistent training mode, (segmented)sandwich training mode and comprehensive training mode.

2.2.1 Consistent training mode

Consistent training mode is a traditional method, represented by the majority of the countries in the world including the United States, Russia and China. In addition to consistent training, the most significant feature of this mode is that it combines maritime vocational and technical education with internationally recognized degree education. Generally, students enter maritime colleges and universities right after graduation from high school for three to five and a half years. During their study, appropriate marine internship should be arranged, but not more than one year. After graduation, the students will take part in the national certificate of competency test for officers or take part in the examination of courses required for the certificate of competency recognized by the competent government departments. Those who pass the examination will receive both the graduation certificate and the senior qualification certificate. Graduates who have been on probation for one or a half years in a shipping company and meet the required requirements can obtain the competency certificate of duty officer or engineer.

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2.2.2 Segmented (sandwich) training mode

The basic feature of the segmented (commonly known as "sandwich") training mode is that students' learning is generally divided into three stages, namely, learning, maritime practice plus internship, and re-learning, represented by Australia, Norway and the United Kingdom. High school graduates or vocational school graduates study in maritime colleges for one to one and a half years. The first thing they learn is the comprehensive learning and training of sailors and machinists, Secondly, navigation and marine engineering students will learn their specific knowledge respectively. At the end of the first stage, students must go on board for about one year's internship and practical work to obtain the required maritime qualifications. The length of work on board depends on one's own needs, and the state only sets a minimum time limit. After completing the necessary maritime experience,they can go back to school to complete their final studies in order to obtain the professional and technical qualification certificate of the officers. In the Nordic countries, high school graduates usually go to shipping companies as apprentices and primary seafarers for one to three years to obtain basic sea age, and then return to vocational schools to study professional courses for two years. After passing the examination, they can obtain the competency certificate of duty pilot or engineer. Graduates continue to return to work in shipping companies for several years. If they want to be promoted to management level, they must go back to university for at least one year before they can obtain the certificate of chief officer or chief engineer.

2.2.3 Comprehensive training mode

The comprehensive training mode is one of the most modern training modes of navigation technical personnel. At present, it is only used in a few developed countries such as Holland and France, and there are also a small number of training in Germany, Japan and the United States. The main feature of this mode is the combination of navigation and marine engineering. The graduates can work both in the bridge and the engine room. Graduates can apply for either a officer's certificate or an engineer's certificate after completing the required maritime experience. In the Netherlands, it is a complete integration, that is, graduates become duty officers after completing the required maritime experience, which includes not only the work content of the officer, but also the work of the engineer. The first-class captain is a senior technical talent who knows both navigation technology and marine engineering. The training cycle of comprehensive driving system is relatively long and difficult. However, graduates have strong employment adaptability, especially adapt to the development of ships to a high degree of automation. In France, it takes at least four years to complete a study cycle, excluding maritime internships. In the Netherlands, it takes longer.

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3. Enlightenment of seafarer education and training in western countries to China's MET

3.1 Deeply understand the strategic significance of developing MET

Maritime education undertakes the important mission of training maritime professionals, and plays a fundamental, overall and leading role in the development of shipping industry. The sustainable development of MET is an important part of China's marine strategy and an important guarantee for the development of shipping industry. The 21st century is an ocean century. Mankind will further develop and utilize the ocean. At the same time, there is no doubt that the competition for marine resources will be more intense. MET should make greater contributions to the cultivation of talents and play a greater role in the development and utilization of the sea, the consolidation of coastal defense and the protection of national maritime rights and interests[5].

3.2 Fully understand the strategic position of seafarers

Seafarers, as the most active, core and precious element in ocean transportation, play an irreplaceable role in the whole industry chain. The United States has always regarded seafarers as an important strategic resource and the merchant fleet as the fourth armed force, which is an integral part of the national foreign trade transportation and global strategy. In recent years, China has begun to recognize and strengthen the management of seafarers as a strategic resource. However, it is not enough in legislation, policy support and measures implementation. The main reason is that the whole society has not reached a consensus and has not given seafarers a society that is commensurate with their contributions The association and economic status do not have a deep understanding of the new historical responsibility of shipping and seafarers under the new historical conditions. If we do not change this understanding and practice, we will not be able to adapt to the changing environment and pattern, and we will not be able to fulfill the heavy responsibilities of our seafarers under the new historical conditions.

3.3 Encourage more young people to devote themselves to navigation

With the focus of world economic development gradually shifting from the west to the East, the large-scale and high automation of ships, and the young people in developed countries who want to work and live in a comfortable environment on shore and are not willing to work on ships, the actual working time of most seafarers in Europe and the United States has been greatly shortened, and there is a shortage of navigation technical talents, and this trend is still developing. China is still a developing country, but with the development of economy, it has shown a similar trend. Therefore, the Chinese government should take precautions and make plans in advance.

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Therefore, it is suggested that relevant government departments should adopt a series of corresponding policies and measures: in the face of the rapid development of science and technology, the training plan of maritime talents must be more flexible and consider the mufti-directional flow of personnel, and can not be limited to the learning and training of navigation skills. In many European and American countries, the maritime education is not only closely linked with the degree of universities, but also the course content tends to be highly integrated. The standard of advanced navigation technology talents forms a multichannel mode of interdisciplinary and cross industry training of compound talents.

3.4 Encourage more young people to devote themselves to navigation

The mission of MET is to train maritime professionals, whose employment and employment market are directly related to the development of education itself. After more than 50 years of development, China's ocean fleet has occupied an important position in the international shipping market. However, with the continuous expansion of the scale of the open registration fleet and the maturity of the international seafarer labor market, China's ocean fleet development and personnel training, as well as seaman's employment and other aspects need continuous innovation in the system and mechanism.

3.5 Promote internationalization of MET

The development of MET and training is deeply influenced by the international shipping industry. The globalization of the shipping industry determines that the MET must be internationalized. The internationalization of maritime education is, first of all, the internationalization of educational concepts. To participate in the global shipping industry competition, we must integrate the international, transnational cultural and global concepts into the maritime education, followed by the internationalization of education subjects, educational resources, student exchange, teacher construction, training mode, education system and so on. The core of the internationalization of maritime education is the internationalization of training objectives and training modes.

We should change the concept of education, carry out student exchanges, teacher exchanges, and even Sino-foreign cooperation in running schools. Chinese foreign cooperation in running schools is an important form of internationalization of maritime education. Chinese foreign cooperative education can not only introduce foreign school running ideas and modes, but also make up for the shortage of education funds by using foreign capital injection and tuition income from domestic and foreign students.

4. Conclusion

After decades of development, China's MET has made remarkable progress. Compared with developed countries, China has both advantages and disadvantages. At present, most countries in the world still adopt the mode of consistent training and segmented training mode, but developed countries such as Holland are planning and developing comprehensive training mode. With the development of science and technology, an increasing amount modern and intelligent information technology will be used in the field of ship navigation technology, and the comprehensive training mode is bound to usher in a new wave of development. Of course, there are also many problems in the process of reform. After all, the training mode of comprehensive driving involves many changes in many aspects, such as the setting of education and training plan, the structure and content of teaching curriculum outline, and so on. Many plans and contents need to be re-formulated and adjusted, and the training time may also change accordingly, which conflicts with the current educational system and teaching equipment It needs to be updated according to the formulation of the new outline. The development and utilization of marine simulators, the formulation of international standards on simulators, and the employment problems after graduation in the future should be considered and paid attention to.

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