

Introduction and Overview of China's Pilot Training Regime

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ABSTRACT: When operating in confined waters such as ports, channels and canals, the ship's master may not be familiar with the specific and up-to-date navigating conditions such as wind, current and tide. In this case, the master must rely on the knowledge and experience of local experts, the seaport and river pilots, to ensure the safety of the ship, crew and environment.

This paper provides an overview of the initial and periodic training required by pilots directed by the China Maritime Safety Administration in accordance with IMO's A.960 "Recommendation on Training and Certification and Operational Procedure Maritime Pilot Other Than Deep-Sea Pilot" and China's pilot training requirements. The paper then goes into details describing how pilot training is implemented in Dalian Maritime University (DMU), taking into account the course setting, class hour arrangement, theory and practical class distribution of different class pilots, as well as examining the equipment requirements, trainer's qualification, and trainee's seagoing experiences. Based on the results of the China's pilot training regime, recommendations will be made not only for improving China's pilot training program, but also where DMU's best practices may be implemented at other institutions engaged in pilot professional development.

1 INTRODUCTION

Entering and exiting the port is often considered the most dangerous portion of a ship's voyage due to the navigational hazards and traffic congestion. Captains of seagoing ships have no ways to always memorize and get accustomed to the meteorology, hydrology, topography and port operation practices of each port. Hence, they must request the assistance of local experts, harbor and river pilots, to advise for them. The pilots are specially engaged in guiding ships to enter, exit the port, and berthing operation without relieving the responsibility and duties of the captain. Every day pilots have to operate different ships from various countries, which involves an in-depth knowledge of ship operating characteristics and local waters, as well as the ability to work across cultures.

Maritime pilots play an important role in promoting maritime safety and protecting the marine environment and the high standards of pilotage services already established in China and many other States (IMO & IMPA, 2004). Since each pilotage area requires highly specialized experience and local knowledge on the part of the pilot, the International Maritime Organization (IMO) and International Maritime Pilots' Association (IMPA) did not intend to become involved with either the certification or licensing of pilots or the systems of pilotage practiced in various States, rather they laid out a set of standards to enable states and pilots to achieve the best possible outcome.

In China, this is achieved through the Maritime Safety Administration (MSA) of the People's Republic

of China, which is responsible for the certification or licensing of a maritime pilot through the testing and assessing of the experience, qualification and suitability of an applicant. MSA administers its maritime pilots' certification and licensing program through the "Regulations on pilot registration and qualification management for pilots of People's Republic of China (China MSA, 2013)" which incorporates IMO's Resolution A.960.

This paper provides an overview of the initial and refresher training required by pilots in China, followed by a description of how Dalian Maritime University (DMU) implements pilot training, addressing the physical learning environment (classroom and equipment), class hour arrangement, theory and practical class distribution of different class pilots. The qualification and experience of the trainers and trainees will also be discussed. Based on results of the China's pilot training regime, recommendations will be made not only for improving China's and DMU's pilot training program, but also where best practices identified at DMU can be implemented at other institutions.

2 CHINA'S PILOTAGE SITUATION

With the development of the global economy, China has an increasingly important impact global waterborne trade. According to international practices, as well as China's national regulations, foreign, as well as some Chinese, registered ships arriving and departing from China's ports, are required to take a pilot. This is not only required to guarantee the safety and reliability of ship and port schedules, and maintain public security and stewardship of the port environment, but also functions as a means to ensure the nation's sovereignty over territorial waters as well as performing a national defense security function.

China has 45 maritime pilot organizations and a total 1704 pilots, that include 926 first class pilots, 489 second class pilots and 289 third class pilots (CMPA, 2016). China's pilots comprise almost 14% of the world's pilots. Since 2011, China's pilots safely guide over 1000 ships a day in and out of Chinese ports (Table 1).

China's pilots are comprised to two basic groups, seaport and river port pilots, divided into three classes: first, second, and third class pilots. First class pilots represent the most experienced pilots, while the third class pilots are the least experienced. The relationship of pilot class and the size of ships they can pilot is described in table 2.

2.1 Professional requirements for pilot licenses

In China, taking part in pilot training is the precondition of attending pilot tests and assessments. Before pilot training, China's MSA will check the pilots' experience and service record, physical condition and the licenses they held in order to satisfy with the relevant requirements of corresponding classes.

Table 1. Ships piloted in China in recent five years (MOT, 2016)

Year	Ships piloted	Average ships per day
2011	385110	1055.1
2012	373922	1024.4
2013	382315	1047.4
2014	374910	1027.2
2015	381505	1045.2

Table 2. Description of pilot class and ship size(MSA, 2013)

Pilot class	Ship length can be piloted
Seaport first class pilot	All vessels in the pilotage area
Seaport second class pilot	Vessels less than 250 meters in length in the pilotage area, except passenger vessels equal or more than 180 meters in length.
Seaport third class pilot	Vessels less than 180 meters in length in the pilotage area, except passenger vessels and bulk cargo carrier with class I dangerous bulk cargo
River port first class pilot	All vessels in the pilotage area
River port second class pilot	Vessels less than 200 meters in length in the pilotage area, except passenger vessels equal or more than 180 meters in length
River port third class pilot	Vessels less than 150 meters in length in the pilotage area, except passenger vessels and bulk cargo carrier with class I dangerous bulk cargo

Note: Local Maritime Safety Administration of Ministry of Transportation of the People's Republic of China can have special rules on the length and the type of vessel that the corresponding pilot can pilot according to the situation of jurisdictional area, includes port, channel, navigational environment and the situation of the pilot, and needs to apply to China MSA for the approval.

2.2 Physical fitness

In Each candidate for pilot's license should satisfy the MSA, China's competent pilotage authority, that his or her medical fitness, particularly regarding eyesight, hearing, and physical fitness, meets the standards required for the certification of masters and officers in charge of a navigational watch under the *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978*, (STCW 78) as amended, or such other standards as the MSA considers appropriate in accordance with IMO guidance for the certification and licensing of pilots (IMO & IMPA, 2004). China's MSA requires each applicant to satisfy the requirements of the "The standards of physical fitness of seafarers for safety watchkeeping at sea", which takes into full consideration the STCW 78, as amended.

2.3 Service requirements

Under China's MSA regulations (MSA, 2013b), for all classes of pilots, five years of good service record is the basic condition to attend the pilot training. Additionally, pilots are required to satisfy with the following requirements to qualify as an applicant for a license, listed by class of pilot license.

- 1 The minimum service required to qualify as an applicant for a seaport first class pilot license.
 - Hold a seaport second class pilotage license with a minimum of 36 months pilotage service, reach up to the minimum required mileage and ships, Or
 - Hold a license as an unlimited master with a minimum of 60 months unlimited master service, and have at least 12 months service as an apprentice pilot
- 2 The minimum service required to qualify as an applicant for a seaport second class pilot license
 - Hold a seaport third class pilotage license with a minimum of 36 months pilotage service, and reach up to the minimum required mileage and ships, Or
 - Hold a license as an unlimited master with a minimum of 12 months unlimited master service, and have at least 12 months service as an apprentice pilot.
- 3 The minimum service required to qualify as an applicant for a seaport third class pilot license.
 - Hold a license as an unlimited chief officer with a minimum of 12 months unlimited chief officer service, and have at least 12 months service as an apprentice pilot, Or
 - A graduate of an accredited Maritime College or University with a BSc in marine transportation, and holding a second officer’s license, recruited by a pilotage institute or association, and having a minimum of 18 months as an apprentice pilot.
- 4 The minimum service required to qualify as an applicant for a river port first class pilot license.
 - Hold a rivers port second class pilotage license with a minimum of 36 months pilotage service, reach up to the minimum required mileage and ships, Or
 - Hold an unlimited master or limited master license with a minimum of 60 months master service, and have at least 12 months service as an apprentice pilot.
- 5 The minimum service required to qualify an applicant for a license as river port second class pilot license.
 - Hold a river port third class pilotage license with a minimum of 36 months pilotage service, reach up to the minimum pilotage distance or pilotage ships as required, Or
 - Hold an unlimited master or limited master license with a minimum of 12 months master service, and have at least 12 months service as apprentice pilot.
- 6 The minimum service required to qualify an applicant for a license as river port third class pilot.
 - Hold a license as an unlimited or limited chief officer with a minimum of 12 months chief officer service, and have at least 12 months service as apprentice pilot, Or
 - A graduate of an accredited Maritime College or University with a BSc in marine transportation, and holding a second officer’s license, recruited by a pilotage institute or association, and having a minimum of 18 months as an apprentice pilot.
- 7 The minimum requirements to change geographic areas (seaport to seaport or river port to river port)

or pilotage areas (from seaport to river port, or river port to seaport).

- Application for the test and assessment of changing geographic area, at least 6 months of apprentice pilot service of applicable area, and a minimum number of apprentice miles or ships as required by the local pilot association, Or
- Seaport pilots must take a test and an assessment equivalent to the same class of river port pilot (e.g. first class seaport pilot to first class river pilot), a minimum of 6 months as an apprentice river pilot, and a minimum number of apprentice miles or ships as required by the local pilot, Or
- River port pilots, regardless of class, can apply for the test and assessment of third class seaport pilot license, but need to have a minimum of 3 months of seaport apprentice pilot service, and a minimum number of apprentice miles or ships as required by the local pilot association.

3 COURSES REQUIREMENTS FOR PILOT TRAINING

The Department of Training and Certification of China’s MSA having taken into consideration of the functions and responsibilities of China’s pilots and IMO’s A.960 recommendations for pilot training, in order to develop a well-defined syllabus for each class of pilot licensure, as shown in Table 3. The training requirements address the characteristics and requirements for each class of pilot. The courses fall into two assessment categories: written assessments and practical assessments.

According to the IMO Resolution A.960 “Recommendations on training and certification and operational procedures for maritime pilots other than deep sea pilots”, pilot training should cover the study of IMO Standard Maritime Communication Phrases (SMCP), when the pilots are not native English speakers. In order to achieve and maintain a high proficiency of communication between pilot and bridge team, the China pilot training scheme must invest a significant amount of time incorporating verbal and written English and SMCP training across all levels of pilot training.

4 REQUIREMENTS FOR PILOT TRAINING INSTITUTES

China’s MSA has a strict certification regime for institutes that desire to implement and maintain a pilot training program. These requirements include the number and professional qualifications of trainers, trainers’ experience, and training location, equipment and facilities. Only institutes which satisfied with all requirements and receive approval from the China MSA are certificate to train pilots.

Table 3. Pilot training courses (MSA, 2013b)

Course Pilot class	Written Assessment Courses								Practical Assessment Courses		
	Ship Handling	Ship Collision Avoidance	Port, Hydrology and Meteorology	Duties and Maritime Laws	Marine Traffic Engineering	Pilot English	Ship Collision Avoidance and Ship Signals	Channel and Pilotage	Pilot Practice	Listening and Speaking of Pilot English	Incidents Investigation and Analysis
<i>Seaport Pilots</i>											
Third class	✓	✓	✓	✓		✓			✓	✓	
Second class	✓	✓	*	*		✓			✓	✓	
First Class	✓	✓			✓	✓			✓	✓	✓
Change of pilotage area			✓	✓					✓		
Change to river port pilot				✓			✓	✓	✓		
Refresher	✓		✓						✓	✓	
<i>River Port Pilot</i>											
Third class	✓			✓		✓	✓	✓	✓	✓	
Second class	✓			*		✓	✓	*	✓	✓	
First Class	✓				✓	✓	✓		✓	✓	✓
Change of pilotage area				✓				✓	✓		
Change to seaport pilot		✓	✓	✓		✓			✓	✓	
Refresher	✓						✓	✓	✓		

* Sea/river second pilot candidates who already have a third class pilot's license are exempt from these tests.

4.1 Trainers' qualification

China's MSA provide a clear outline in regards to trainer qualifications (MSA, 2013a). Each course concentration requires a subject matter expert on different aspects of the pilot's required knowledge and practice, such as Ship Handling. MSA recognizes, and makes allowances for, courses that reside outside the traditional expertise of seafarers, such as maritime law. If a theory trainer satisfies the requirements, they can also fill a practical trainer position. In addition, all trainers must be full-time employee of a certified pilot training institute. A trainer cannot be a part-time or temporary employee of the training institute.

The qualifications for trainers in various topics is outlined below (MSA, 2013).

- 1 Pilot Duties, Maritime Laws, Port Hydrology and Meteorology trainers need to satisfy with one of the following conditions.
 - Have a pilot major senior professional title with a minimum of five years first class pilot service experience, Or
 - Have an associate senior professional title or higher, with a minimum of six months of seagoing experience as chief officer, and have at least five years of teaching experience.
- 2 Ship Handling and Collision Avoidance trainers need to satisfy one of the following conditions.
 - Have at least five years of seagoing experience as unlimited master and have a minimum of two years of teaching experience, Or
 - Have an associate senior professional title or higher in the marine transportation field, and have a minimum of two years of seagoing experience as an unlimited master.
- 3 Pilot English trainers need to satisfy with one of the following conditions.
 - Have a bachelor degree or higher and associate senior professional title of English

major, with a minimum of six months of seagoing experience, or

- Have a minimum of one-year seagoing experience as unlimited master and have at least one year of professional English teaching experience;
- 4 Trainers in practical assessment courses need to satisfy with one of the following conditions.
 - Have a minimum of five years of seagoing experience as unlimited master, or
 - Have a minimum of six months of seagoing experience as chief officer, and have at least three years of large vessel simulation teaching experience.

4.2 Place, equipment and facility requirements for training place

China MSA provides precise requirement for training place, equipment and facilities required for pilot training institutes (Table 4). If the training institute cannot comply with the requirement, China MSA has the right to suspend certification and close the pilot training institute.

4.3 Introduction to China's pilot training institutes

There are three pilot certified training institutes in China: Dalian Maritime University (DMU), Shanghai Maritime University (SHMU) and Wuhan University of Technology (WHUT). DMU and SHMU are certified to train seaport pilots, and WHUT is responsible for the river pilot training of China. Pilot training is conducted two times a year. Seaport pilot training is held at DMU in April and at SHMU in September. River pilot training is conducted at WHUT in May and October each year (MSA, 2012).

Table 4. Equipment and facility requirements for pilot training (MSA, 2013)

NO.	Place, equipment and facility	Requirement
1	Multi-media classroom	One classroom accommodating a minimum of 40 trainees
2	Navigational Chart	40 charts minimum, one chart per trainee
3	Chart desk	40 desks minimum, one desk per trainee
4	Radar simulator	1 set, minimum of 3 own ships RADAR/ARPA stations, used for collision avoidance training.
5	Large ship-handling simulator	1 set meeting the IMO's Maritime Simulator's Function Standards
6	Simulation Visuals based on ECDIS	At least two simulation visuals for each port, hydrology and meteorology condition can be changed
7	Equipment and facilities for English listening and speaking	Minimum 40 sets
8	Audio-Visual equipment and facilities for maritime English listening, speaking	Minimum 40 sets

Table 5. Pilot training arrangements in China (Compiled by authors from MSA data)

Year	Training Item	Date	Place
2014	Seaport pilot	April – July	DMU
	River port pilot	Sept- Dec	SHMU
		May- July	WHUT
		Oct- Dec	WHUT
2015	Seaport pilot	April - July	DMU
	River port pilot	Sept- Dec	SHMU
		May- July	WHUT
		Oct- Dec	WHUT
2016	Seaport pilot	April - July	DMU
	River port pilot	Sept- Dec	SHMU
		May- July	WHUT
		Oct- Dec	WHUT

5 PILOT TRAINING IN DMU

5.1 Introduction to DMU

Dalian Maritime University (DMU) is located in southwestern Dalian, a coastal city in northeastern China on the Liaodong Peninsula. The University is the only maritime institution of higher learning under China's Ministry of Communications. DMU is internationally recognized as a center of excellent for maritime education and training as recognized by the International Maritime Organization (IMO).

The University consists of 14 colleges and departments, with 16 educational and scientific research unites including Navigation College, Marine Engineering College, Information Science and Technology College, Transportation and Management College, Transportation Engineering and Logistics College, School of Law, Environmental Engineering College, Humanities and Social Science College, Foreign Languages College, Department of Mathematics, Department of Physics, and Department of Physical Education (DMU, 2016). Currently, the

University has 3 post-doctoral programs, 14 doctoral programs, 66 master's degree programs, and 45 undergraduate programs. The University is authorized to confer MBA, MPA, J.M, and Master of Engineering degrees, professional master's degree.

The current student population of DMU is approximately 23,000. Since 1953 DMU has educated and trained nearly 90,000 advanced professionals and technical authorities for the country. Additionally, Up to now more than 4,000 overseas students and advanced professionals from over 70 countries and regions have been enrolled in DMU's Bachelor's, Master's, and PhD degree programs.

There are additional buildings for maritime training and research, survival training, swimming pool, planetarium and libraries. DMU also has a training dock and over 40 laboratories for maritime instruction, training, and research including full mission ship-handling and engine room simulators. DMU also owns and operates two ocean-going training vessels of over 10,000 dead-weight tonnage.

5.2 Theory courses arrangement

In compliance with the requirement for pilot training intuitions and as outline in "Regulations on Examination and Certification of Competence for Seafarers of the People's Republic of China" (MSA, 2011) and considering feedback from pilots and their associations, DMU selected several captains and professors with rich seagoing experiences and academic knowledge to conduct pilot training and developed a set of syllabi for pilot training arranged by pilot classification. The syllabi and proposed instructors' names and qualifications are submitted to the China MSA to be vetted and approved prior the implementation of training scheme.

Examining the DMU pilot training courses' class hours distribution of different class pilot (Table 6) and the DMU main contents of training courses (Table 7), it can be seen that DMU's pilot training program complies with the IMO A 960. It should be noted that China must spend a significant amount of time on English studies in order to ensure pilots can effectively communicated with in the international maritime environment.

5.3 Practical courses arrangement

Practice is the most effective method to consolidate theory and is an important method to improve a pilot's understanding and proficiency. The ability to train and assess pilot trainees in a simulated practical environment has led to improvements in the ability control and prediction ship motion under a variety of circumstance and conditions. By placing students in situations they may rarely experience is a key component of the training. The practical experience is to enhance by the ability to replaying simulations and letting the trainees discuss and critically analyze their actions and decisions, an important aspects of pilot training.

To facilitate the practical learning experience, DMU divides trainees into teams of four with five

teams comprising a training group. Each group is assigned four trainers that consist of two primary trainers and two assistant trainers.

The main trainers are required to hold master license extensive seagoing experiences. They are responsible for task introduction, requirements during navigation, and facilitating the briefing and debriefing sessions. The assistant trainers assist the main trainers in carrying out the plan by providing an interactive simulation establishing and changing the environment settings (sea state, weather, etc.) and traffic conditions, as well as taking on the roles of traffic services and other ships. Through the use of lead and assistant trainers, DMU able to not only satisfy with the regulatory requirements pertaining to trainers' qualification and develop a pool of future lead trainers, but also enhance the quality of experiential training.

6 DISCUSSION OF BEST PRACTICES AND RECOMMENDATIONS

There are two practices that set DMU apart from other training institutes. The first is the use of feedback from pilots and pilot associations. By encouraging both solicited and unsolicited feedback, the DMU pilot training program is able to make small adjustments in the training plans to reflect the developments in technology, international regulations, and capabilities of pilots and mariners.

The second best practice is the use of assistants to not only enhance the realistic training experience, but also develops pool of professional lead trainers.

Table 6. DMU Seaport pilot training courses' class hour distribution (Navigation College, 2016)

Courses	Third class pilot	Second class pilot	First class pilot
Ship Handling	60	58	56
Ship Collision Avoidance	66	56	50
Port, Hydrology and Meteorology	Setting according to specific circumstance	Setting according to specific circumstance	
Duties and Maritime Laws	32	32	
Marine Traffic Engineering			62
Pilot English	48	48	48
Pilot Practice	80	80	100
Listening and Speaking of Pilot English	72	72	72
Incidents Investigation and Analysis			120
Total Class Hours	292	346	508

Table 7. DMU Pilot training courses main contents (Navigation College, 2015)

Course Name	Main Contents
Ship Handling	Ship handling for piloting, anchoring, berthing, and unberthing Manoeuvring with and without tugs and emergency situations Factors affecting ship performance such as wind, current, tide, channel configuration, water depth, and the interaction of ships with the bottom and bank including squat Manoeuvring behavior of the types of ships Limitations imposed by particular propulsion and steering systems Use and limitation of various type of tugs Emergency and contingency plans Bridge equipment and navigational aids Pilot Card
Ship Collision Avoidance	International Regulations for Preventing Collisions at Sea, 1972 National and local navigational safety and pollution prevention rules Information of lights Fog signals, Racons, Radio beacons and other electronic aids Light vessels, buoys and beacons System of buoyage
Port, Hydrology and Meteorology	General set, rate, rise and duration of the tides Wind Current Anchorage
Duties and Maritime Laws	International conventions of navigation safety and pollution prevention; Master-Pilot relationship Operation procedures Embarking and disembarking procedures
Marine Traffic Engineering	Communication and availability of navigational information Systems of radio navigational warning broadcasts and the type of information Traffic separation schemes, vessel traffic services and vessel management systems
Pilot English	IMO SMCP Communication with the master, other vessel, management department and so on
Ship Collision Avoidance and Ship Signals	International Regulations for Preventing Collisions at Sea, 1972 National and local navigational safety and pollution prevention rules Information of lights Fog signals, Racons, Radio beacons and other electronic aids Light vessels, buoys and beacons
Channel and Pilotage	Channels, shoals, headlands and points Depths of water throughout the area Course and distances of the area

However, there are several shortfalls. As noted several times above, a significant amount of time is required to be spend on maritime English, primarily the SMCP. However, the requirements do not take into the actual usage of the SMCP. In an unpublished qualitative study on master-pilot communications in the United States, it was found that many US seafarers had never been exposed to, or even knew of, the SMCP (Desrosiers, 2016), making the use of the SMCP of limited use.

This may present a problem for pilots when interacting with native English speakers. A pilot using SMCP-based maritime English may experience communication difficulties when one party is using the SMCP and the other is not.

This also exposes another weakness in maritime English training in that both English and non-English speakers have a variety of accents and pronunciations. Thus, while a non-native English speaker may have mastered the content of the SMCP, the pronunciation may impede effective communication.

Table 7. Pilot training courses main contents in DMU (continued)

Course Name	Main Contents
Pilot Practical	Ship handling BRM
Listening and Speaking of Pilot English	Emergency and contingency plans; IMO Standard Maritime Communication Phrases; Communication with the master, other vessels, Vessel Traffic Service, Port and terminal management, etc.
Incidents Investigation and Analysis	IMO Code for the investigation of marine casualties and incidents

Pilots are also exposed to a variety of nationalities and cultures when boarding vessels. They have very little time to acclimate themselves to a particular ship and crew, which lead to errors resulting from cultural misunderstandings. Unfortunately, neither IMO's A.960 nor MSA regulations require training in cross cultural communications.

These problems could be addressed by DMU's use of assistant trainers. While MSA requires trainers to be full-time employees of the certified training institution, the provision does not apply to assistant trainers. Through the use of assistant trainers, DMU as well as SHMU and WHUT, could leverage part-time maritime professionals to allow pilot trainees to experience and non-standard maritime English and accents.

7 CONCLUSION

The IMO, through A.960, does not direct mandatory elements for the certification or guidance of maritime pilots. Rather, the IMO has published recommendations on the training, certification and operational procedures for maritime pilots. As a result, and in full consideration of IMO's A.960

resolution, China's MSA has developed a detailed set of regulations for the provision of pilot training and certification to meet the needs of the various classes of pilots, focusing on a quality regime that takes into consideration aspects of course syllabi, class hour arrangements, the distribution of theory and practical instruction. The MSA has also taken into the consideration the educational environment, ensuring that quality is maintained in regards to training equipment and facility requirements, trainer's qualification, and trainee's service experiences. Dalian Maritime University, as a training institute, according with her specific condition, has developed an efficient and effective pilot training program that integrates the theoretical and practical elements of pilot training while ensuring an exceptional training experience.

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REFERENCES

- CMPA. (2016). China Maritime Pilots Association. Retrieved from www.chinapilotage.org
- Desrosiers, R. (2016). *Effective Bridge Communications: Maritime English and Cognition*. North Carolina State University. Raleigh, NC.
- DMU. (2016). Dalian Maritime University. Retrieved from www.dlmu.edu.cn
- IMO, & IMPA. (2004). *Recommendations on Training and Certification and Operational Procedures for Maritime Pilots other than Deep-Sea Pilots*. (A960). London, UK: International Maritime Organization.
- MOT. (2016). Port Economy. Retrieved from www.moc.gov.cn
- MSA. (2011). *Regulations on Examination and Certification of Competence for Seafarers of the People's Republic of China*. Beijing, China: Marine Safety Agency.
- MSA. (2013a). *Administrative Rules of Seafarers' Training in the People's Republic of China*. Beijing, China: Marine Safety Administration.
- MSA. (2013b). *Regulations on pilot registration and qualification management for pilots of People's Republic of China*. Beijing, China: Marine Safety Agency.
- Navigation College. (2015). DMU Pilot training courses main contents Dalian, China: Navigation College of DMU.
- Navigation College. (2016). DMU Seaport pilot training courses' class hour distribution Dalian, China: Navigation College of DMU