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WORLD MARITIME UNIVERSITY

DISCUSSION OF THE MARITIME
EDUCATION SYSTEM IN CHINA

By

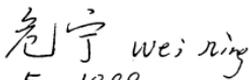
WEI, NING

People's Republic of China

A paper submitted to the faculty of the World Maritime
University in partial satisfaction of the requirements for
the award of a

MASTER OF SCIENCE DEGREE
in
MARITIME EDUCATION AND TRAINING
(MARINE ENGINEERING)

The contents of this paper reflect my personal views and
are not necessarily endorsed by the university.

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ABSTRACT

China is one of the first countries to send navigators across the world's oceans. About 600 years ago the Emperor of Ming Dynasty sent a Chinese fleet, which was led by a court officer named Zheng He, to sail around southern Asia and Africa. Unfortunately that voyage was only for the exchange of culture and not for trading.

Compared with her early exploration and navigation, China's maritime education was late. In 1911, the first Chinese maritime education system, the Shipping Management Section of the Shanghai South Sea Public Affairs Institute, was established in Shanghai. The specialties of the Institute included navigation and marine engineering. Since that time, China's maritime system has been making contributions to the national merchant fleet and Navy.

Today, to realize modernization is the main object of 1.1 billion Chinese people excited by long traditional civilization history. That is the great work in which shipping will play an important role.

As one expert on the Chinese economy says: "A national maritime education and training policy contributes to and forms a part of a rational shipping policy, which in turn contributes to and forms a part of a nation's economic development policy. This is particularly important in the case of China in her present historic drive for modernization and rapid economic development." The success of the

program depends largely on the development of science and technology as well as on the people who process and apply it. Education is the key.

To achieve this, we must have a clear understanding of the present maritime education system in China and we must know how to develop this maritime education system as a key to modernization.

This paper is devoted to describing, analysing and discussing the maritime education system in China and proposing some recommendations which are regarded as valuable to development of maritime education.

In order to do that, some topics of relevance to maritime education will be discussed in this paper such as shipping in China, which is described in Chapter one, and the general education system in China, which is described in Chapter two.

Chapter three introduces the existing maritime education system in China. Chapter four describes the seafarer certification and examination system in China.

In this paper, the maritime education systems in some developed countries are also introduced. It is hoped that the achievements of such countries will provide valuable ideas for the Chinese maritime education system.

I have made recommendations in the last Chapter which I hope will give ideas valuable to maritime education in my country.

SHIPPING IN CHINA

It is a general rule that developments in trade and economy push the development of the transport system. In return, the improvement in the efficiency of transport service will give stimulus to trade. Now, more than ever before, priority is given to the improvement of China's communications and transport system in order to keep abreast with the upsurge of the nation's economy. Emphasis on the development of China's communications and transport system is now one of the country's major policies for her economic development. As one mode of the total transport system, shipping and ocean shipping in particular, play a triple role in China's foreign trade expansion.

1.1. The Economic Growth and Foreign Trade of China

At the start of the 1980s, in order to conform to the new policy aimed at improving investment efficiency and expanding export. China modified the hitherto adhered to modernization plan, which was unbalanced because of heavy reliance on the heavy industry. At the end of 1982, China began to pursue the goal set in her long-term strategy toward attaining, by the year 2000, a four-fold increase

in the gross value of industrial and agricultural output which is the basis of the present plan to modernize the Chinese economy.

According to this long-term target, the gross industrial and agricultural output value, which stood at about 710 billion yuan in 1981 will increase to about 2800 billion yuan by 2000.

The Chinese economy grew at the rate of 6% to 7% over the period between the 1970s and the first half of the 1980s. Furthermore according to the latest date of 1987, the growth rate for the second-half of the 1980s is estimated at about 8%

Table 1:

Economic Growth Rate of China

Period	Average annual growth rate %
1961-1965	11.5
1965-1970	7.0
1970-1975	7.0
1975-1985	6.5
1985-1987	9.5

(from report of Chinese State Council)

The gross agricultural output value for 1987 reached 444.7 billion yuan, or an increase of 4.7% over the previous year, while the gross industrial output increased to about 1,378 billion yuan, or an increase of 16.3% from a year ago.

Consequently, the gross value of industrial and agricultural production for 1987 reached 1822.7 billion yuan, which already exceeded the target for the year 1990. Thus the average annual growth rate of the industrial and

agricultural output value for the period 1980-1987 was at a fairly high level of 14%. The Chinese government is studying ways to lower the economic growth rate this year in view of its inflationary effects.

According to the announcement made by the Ministry of Foreign Economic Relations and Trade, China's exports for 1987 reached 34,600 million USD an increase of 12.1% over the previous year, while its imports for the same period registered 32,700 million USD, down 1.1% from the previous year. As a result, the trade deficit which lasted for the three previous years has now shifted to a surplus of 1,868 million USD. (The figures differ a little from the figures shown in Table 1.)

2.2 The Development of the Merchant Marine

According to Lloyd's statistics, tonnage of the Chinese fleet (100 GT and above) stood at 12,341 thousand GT (1,773 ships) in mid-1987, representing an increase of 60% from 772 thousand GT (247 ships) recorded in mid-1967, or 20 years ago. The average annual growth rate over this period was about 15%.

According to the report from China's Communication Ministry, tonnage of China's fleet marked a sharp increase at an average annual growth rate of about 23% during the 1970s. Even during the initial six years of the 1980s, when tonnage of fleets owned by advanced shipping countries fell off across the board, China saw its fleet growing at about 9% on an average annual basis.

As regards the trend in tonnage by ship type, the conspicuous characteristic since the beginning of 1980s is the increased tonnage of bulk carrier sectors. The tonnage of container ships masked a dramatic increase from

the mere 4000 GT (one ship) of 1980 to 495,000 GT (43 ships) in 1987, thereby accelerating the loading shares of cargoes for national vessels.

The tonnage breakdown of Chinese flag vessels by ship type as of mid-1987 (100 GT and upwards, Lloyd's statistics) is shown below:

Table 2:
Tonnage by type of ship.

Type of ship	No of ships	GT in 1000
tanker	189	17,755
bulk carrier	212	4,143
general cargo ship	885	5,155
container ship	43	495
cargo/passenger ship	19	141
dredger	41	155
fishing boat/carrier	124	64
ferry/passenger ship	56	172
support ship	31	24
tug boat	98	66
survey ship	28	54
others	47	116
Total	1,773	12,340

Among Chinese ships, the ocean-going fleet controlled by COSCO (China Ocean Shipping Co) has undergone phenomenal growth, rising from an initial 25 ships, totalling 229 thousand DWT in 1961 to 618 ships of 12,834 thousand DWT by 1986. (representing about 90% of the oceangoing fleet and 85% of the nations total merchant fleet).

COSCO owns the 9th largest fleet in the world now.

According to China's seventh five-year plan (1986-1990), COSCO has a goal toward increasing the tonnage of its fleet from the present level of 13 million tons to 20 million tons by the year 1990.

Table 3:
Tonnage of the fleet owned by COSCO

Type of ship	(as of May, 1988)	
	No. of ships	DWT in 1,000
cargo ship	342	4,370
bulk carrier	182	7,406
containership	60	375
Ro/Ro ship	15	160
tanker	15	497
passenger ship	4	26
Total:	618	12,834

(from report of COSCO)

INTRODUCTION OF GENERAL
EDUCATION IN CHINA

2.1. Structure of Chinese Education System

1) Primary and Middle Education

The Chinese education system comprises primary education, middle education, higher education and adult education. Primary schools enroll children at seven years of age, though the age of entry is gradually being changed to six years. The duration of primary schools is six years. General middle schools are divided into the junior stage and the senior stage, in most cases the former lasts three years and the latter two-three years in parallel. Middle specialized schools admitting junior middle-school graduates usually last four years. Vocational schools and polytechnic schools (training skilled workers) enroll junior graduates and offer three-year courses.

2) Higher Education

Undergraduate programs in universities or colleges generally require four-five years, while some medical colleges require six years. Short-cycle professional training colleges last two or three years.

China has recently adopted a system of academic degrees.

with the first bachelor's degrees being conferred on graduates in the spring of 1982. Only established higher schools offering four-year courses are qualified to confer degrees, as stipulated by the Academic Degrees Committee of the State Council.

There are two kinds of diplomas for higher learning in China.

Students who graduate from four-year courses in institutes are conferred 1st-class higher learning diplomas.

Students who graduate from two-year or three-year courses in institutes are conferred 2st-class higher learning diplomas.

Postgraduate education may be undertaken at two levels, leading to the award of a master's degree (a two-three years program) or a doctor's degree (another two-three years course above a master's degree is obtained).

3) Enrollment and Assignments of Higher Education.

The enrollment for higher education in China is controlled by the government under the unified state planning. The students, who have graduated from senior middle schools and passed the national examination which is held every year, are enrolled in universities or colleges.

The graduate assignments are also controlled by the government. Every year, the government makes a plan according to demand to assign all graduates from universities and colleges.

4) Adult Education

China has a fully developed system of adult education mostly run by factories, farms or other enterprises to raise the cultural and scientific level of their workers

while they are on the job. Originally most of these concentrated on basic literacy training, but now they provide education up to the highest level and are an important supplement to the regular system.

Other efforts being made to provide educational opportunities for young people who have not been able to enter the regular higher education system include the TV universities and various self-study programs associated with libraries. In both cases, students are able to take examinations organized by the Ministry of Education and receive appropriate qualifications and job assignments.

2.2. Administration and Finance

1) Administration

The Education system is administered by governments at different levels. Educational legislation is formulated by the National People's Congress. The Ministry of Education, a department of the State Council, is the central administrative institution of the management of education in the country.

There are education bureaus within all the provincial, municipal, and autonomous regional government systems. There are also higher education bureaus in some provinces.

Higher education institutions are controlled centrally and administered by provincial, municipal, and autonomous regional authorities as well as by various ministries under the State Council.

The Ministry of Education in Beijing has recently strengthened its guiding function over the content of education at all subjects and levels. In co-operation with other ministries and the institution of science, the Ministry of Education is also responsible for planning

research, drafting quotas of manpower, and overseeing the allocation of graduates to various sectors of the economy. In addition it administers the nationwide higher education entrance examinations. However, it has direct control of only a small number of educational institutions, mainly in higher education. A majority of the higher education institutions, mainly polytechnics or specialized schools, are either under the control of other state ministries appropriate to their subject content, or under provincial bureaus of education.

Primary and middle schools are administered mainly by educational departments at provincial, municipal and autonomous regional levels.

2) Finance

Education is financed by budget allocation from the state and local departments. In comparison with other developed and developing countries, China has been allocating a small portion of budget to education. It was reported that 1.59% of China's total income was set aside for education in 1971 and 2.09% in 1980.

There are no fees required for higher education.

Table 2.1

Education System in China

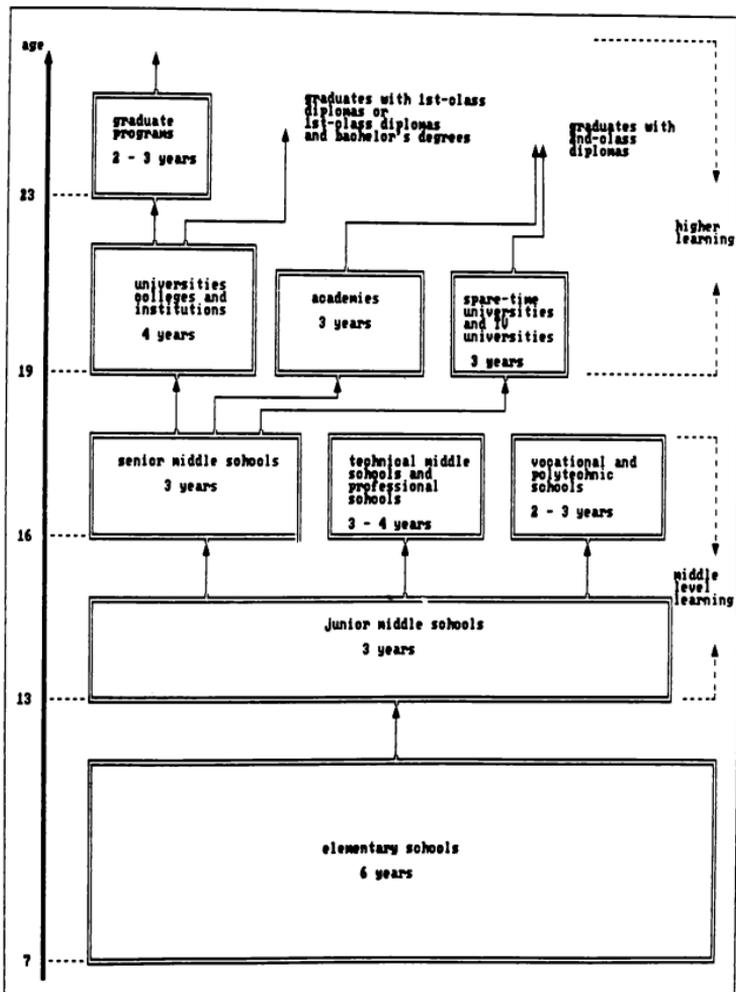
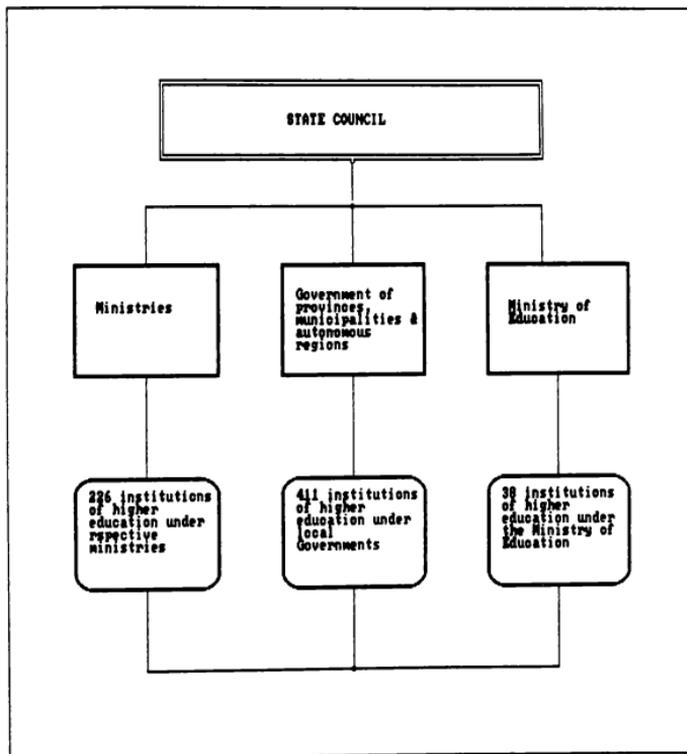


Table 2.2

Management System of Education in China



MARITIME EDUCATION AND
TRAINING SYSTEM IN CHINA

3.1 General Introductions

To ensure a steady supply of well qualified manpower for China's growing merchant fleet, applied industries and the related Administration, People's Republic of China set up her first Maritime Education Institution, Dalian Maritime University, in 1953. Since that time, some other marine academies and professional schools have been established by the government. All these institutes and schools belong to the Communication Ministry. Some of them are managed by shipping companies directly. So far these academies and professional schools have educated and trained a lot of personnel for Chinese maritime activities. For instance, from 1980 to 1985, there were 16,953 graduates from these maritime institutes. These graduates have been playing very important roles in China's maritime activities

3.2. Categories of Maritime Institutes

China's maritime education system provides education and training of seafarers and related shore personnel for the country's internal needs. These institutes are divided into five categories: university, academic, training college, professional school and technical school.

A. Universities

- Dalian Maritime University
- Shanghai Maritime Institute

Both Universities have four years courses and are entitled to award graduates a Bachelor degree. They educate both future seafarer officers and related shore personnel. The graduates who major in navigation will be awarded a 2nd mate certificate for unlimited navigation for 1600 GT and above after 12 months service on board. The graduates majoring in marine engineering will be awarded a 2nd assistant engineer certificate for 3000 KW and above after 12 months service on board.

B. Academies

- Jimei Navigation Academy
- Wuhan River Transport Academy

The former is responsible for educating future officers for ocean-going ships and have a three years course. Graduates will be awarded a 3rd mate certificate for unlimited navigation, 1600 GT and above or a 3rd assistant engineer certificate for 3000 KW and above respectively after they serve on board ships 12 months. The Wuhan River Transport Academy is responsible for educating future officers for river-going ships and also in a three years course.

C. Training College

-Qingdao Seafarers Training College

-Shanghai Seafarers College

Both are three years courses and provide training seafarers who have experience working on board. Graduates are awarded 3rd mate certificates for the unlimited navigation, 1600GT and above, or a 3rd assistant engineer certificate for 3000 KW above.

D. Professional Schools

-Dalian Marine School

-Nanjing Marine School

-Guangzhou Marine School

-Shanghai Marine School

The graduates from these professional schools obtain qualifications to take part in the examination for 3rd mate for 1600 GT and above unlimited navigation or 3rd assistant engineer for 3000 KW and above after they serve on board ships for 12 months.

Among these professional schools above, Dalian Marine School runs three years courses and enroll senior middle school graduates. The others run four years courses and enroll junior middle school graduates.

E. Technical School

-Tianjin Mariner School

-Shanghai Mariner School

-Guangzhou Mariner School

These schools are for training ratings on board sea-going ships. Generally, courses are two years and enrollees are junior middle school graduates.

The institutes, colleges and schools that are mentioned above belong to the Ministry of Communication, some of

them are run directly by the China Ocean Shipping Company.

There are other marine schools that belong to local governments. These schools are mainly for training ratings and some officers on board offshore-going ships or river-going ships.

The students, who may be enrolled by universities, academies, professional schools and technical schools, must pass state examinations. Other students, who may be enrolled by seafarer colleges, must pass college examinations but not state examinations.

Table 3.1 shows the structure of the maritime education system in China.

3.3 DALIAN MARITIME UNIVERSITY

Dalian Maritime University is the largest Maritime University in China and is a comprehensive institution of higher learning. It embraces three categories - maritime transport, engineering and management (with stress on maritime transport). In 1960, it was established by the Chinese government as the key national institution of higher learning.

In 1983, the Asian-Pacific Region Maritime Training Center was established there jointly by the United Nations Development Program and the International Maritime Organization. In 1985, the World Maritime University Dalian Branch was officially founded in this university.

This university was formed in 1953 by the amalgamation of three establishments - the Northeast Navigation College, the Shanghai Nautical College and the Fujian Navigation School. It has been praised as the cradle of Chinese navigators. Tracing back to the time when the Shipping Management section of the Shanghai South Sea

Public Affairs Institute was formed, it has a history of 78 years. Since the amalgamation, it has nurtured over 10,000 undergraduates and post graduates for different shipping organizations of China, and they now are the backbone of the Chinese shipping enterprise. It has also trained hundreds of foreign students and technical personnel for over twenty developing countries and regions.

There are six specialized departments, 12 specialties, five professional training courses, and two research centers. The Department of Adult Education has also established a spare-time college and a correspondence college.

It has various buildings of some 200,000 square meters, among which are classroom buildings, laboratory buildings, a library, a natatorium, a planetarium, a computer station and an audio-visual teaching program center. It has a marine radar simulator, a diesel machinery space simulator, and laboratories for satellite navigation communication engineering, etc. It also has two 10,000-ton class ocean-going training ships, three workshops that serve teaching and scientific research, and a library with over half a million books. All these facilities provide good conditions for study.

1. Administration

Like other Chinese universities, Dalian Maritime university belongs to the government. It is led by the communication ministry. All enrollments, assignments for graduates and other academic plans are made according to the ministry policies.

The president of the university, who is appointed by the communication ministry, is in charge of the whole university. He is assisted by three vice presidents who

are responsible for different parts of his total duties.

The university has a very big administrative structure compared with similar universities in other countries. There are many offices and a large ratio of administration persons and workers to students, which is a common characteristic of institutes in China. Table 3.3 shows the main divisions and departments in Dalian Maritime University.

Cooperating with the education Affairs Division, every specialized department deals with administrative tasks concerning course study, such as course arrangement, textbooks, classrooms and shipboard training arrangements. Every specialized department is also responsible for assessing students who study in the department, issuing the report for their graduates and attending to other student management duties together with the Student Affairs Division.

The Residence and Catering Division manages the student restaurants and hostel. This division also manages the staff restaurant and is responsible for assigning and controlling a flat for every staff member.

All teaching faculty members are controlled by the Education Affairs division where other staff is controlled by the Personnel Division.

For every division there is a director who is the highest leader and has some deputy directors under him.

For every department a dean is the highest leader and he is assisted by two or three deputy deans. Every department consists of several teaching and research sections according to different subjects. Table 3.4, 3.5 and 3.6 show the structure of Navigation, Marine engineering and Basic Sciences departments. The management structure in Dalian Maritime University is also similar to other institutes and schools in China.

2. Department and Course Specialties

a. The Department of Navigation

The specialty in ocean-going ships navigation is designed to educate, in conformity with the relevant international standards, future senior technical personnel. Upon successful completion students are awarded bachelor degrees for ship navigation, so that they are qualified to sail ocean-going ships, and they, on graduation, are able to work as 2nd officers on ocean-going ships.

The specialty of marine radio communication and radio navigation is designed to educate, in conformity with the relevant international standards, future senior technical personnel. Upon successful completion students are awarded bachelor degrees for marine radio communication and radio navigation, so that they can work as 2nd-class radio officers upon graduation.

b. Department of Marine Engineering

The specialty of marine engineering is designed to educate, in conformity with the relevant international standards, future senior technical personnel. Upon successful completion students are awarded bachelor degrees for marine engineering, so that they are qualified to work on board modern ships as 2nd assistant engineer.

c. Department of Marine Electrical Engineering Management

The specialty of marine electrical engineering management is designed to educate future senior technical personnel. Upon successful completion students are awarded bachelor degrees for marine electrical engineering so they are, on graduation, able to work as 2nd-class

marine electrical officer on board ships.

The specialties that have been described above are in the maritime transport category. The graduates from those specialties are going to work on board ships as senior seafarers.

Besides those, there are three departments that are designed to educate other kinds of future technical and management personnel with bachelor's degrees, who work on shore. These departments are described below

d. Department of Computer Science and Automatic Control

- Specialty of Computer and Application
- Specialty of Automatic Control
- Specialty of Managerial Information System

e. Department of Electronic Engineering

- Specialty of Electronic Engineering
- Specialty of Communication Engineering

f. Department of Maritime Law and Shipping Management

- Specialty of Shipping Management
- Specialty of Maritime Law
- Specialty of Maritime Administration

g. The University also has several two-year short courses. The graduates from these courses do not receive bachelor degrees, but they receive 2nd class higher learning diploma.

- Shipping Management
- Harbor Superintendence
- Ship's Political Work
- Education Management

These courses are designed to educate and train persons, most of whom come from shipping enterprises, to become

middle level management personnel.

h. Department of Postgraduates

Specialty for PhD degree:

Machinery Building and Repair.

Specialties for an MA degree:

Navigation Technology.

Marine Engineering.

Marine Electrical Engineering.

Marine Radio Navigation Technology.

Ship Machinery Building and Repair.

3. Enrollment Qualification and Study Duration

Undergraduates (four years full-time course) should be senior middle school graduates who have passed the annual national examination for higher learning.

Students (two years full-time course) should be senior middle school graduates who have passed the annual national examination for higher learning.

Postgraduates for the master degree (three years full-time course) should hold a degree or the equivalent and should have passed the annual national examination for the master degree study.

Postgraduates for the doctor of degree (two-three years course) should be master degree holders or the equivalent and have passed the examination for the doctor of degree study.

4. Academic Year and Practice

The academic year at Dalian Maritime University is divided into two academic semesters similar to other colleges and schools, which span about nine months.

All students follow similar programs of study for the first semester of their first academic year. During this period, students take basic courses in mathematics,

physics, chemistry, humanities and English. The content of each subject is different according to any major. From the second academic year, students begin to take specialized and basic specialized courses.

In the second academic year, the students who major in navigation and marine engineering get their first sea time program on board ships for about one month. They then take their main sea time program in the final academic year for about six-seven months.

The students who major in radio communication and electrical engineering also take their sea-time program on board ships for about six-seven months in the final academic year. At the same time, the students with other majors take their practice at training in factories or enterprises.

During the practice training, either shipboard or in factories, students apply the knowledge and skills learned in the classroom and write reports and a thesis that is regarded as a part of their qualification for their graduation.

Students will be considered for graduation, and receive diploma, degree and seafarer certificate after they have passed all examinations in the four years of studies and their thesis are accepted by academic authority.

5. Seafarer Certificate Awarded

Graduates of the ocean-going ships navigation major get a 2nd mate certificate after they serve on board ships for 12 months.

Graduates of the marine engineering major get a 2nd assistant engineer certificate after they serve on board ships for 12 months.

Graduates of the marine radio communication major get a 2nd-class radio officer certificate after they serve on

board ships for 12 months.

Graduates of the maritime electrical engineering major get a 1st-class electrical engineer certificate after they serve on board ships for 12 months.

6. Total Student Enrollment

There are around 3500 undergraduates who study in Dalian Maritime University at present: about two-thirds of them major in ocean-going ship navigation, marine radio communication, marine engineering and marine electrical engineering.

7. Staff

In Dalian Maritime University, there are around 1700 staff members. Among them, there are about 800 teaching faculty including 36 professors, 193 associate professors and 339 lecturers.

Teachers in the university come from two main sources. Those in charge of teaching basic science courses, humanities and foreign languages, mainly graduate from general universities. Others, who are in charge of teaching specialistic courses, mainly graduate from maritime universities. Recently, the university has preferred her teachers to hold master degrees and above. This is regarded as a way to improve teacher quality. The university has employed some advanced degree holders as teachers, but there are still many young teachers employed from university graduates as the number of postgraduates are too few for China's needs.

8. World Maritime University, Dalian Branch

The World Maritime University, Dalian Branch was established in 1985. Its aim is to train navigation and shipping management personnel, for the developing

countries in the Asian and Pacific region, promote friendship between these countries and develop their shipping enterprises. The President of the Dalian Maritime University, Mr.Chen Zuwei, a member of the Board of Governors of the World Maritime University, was appointed to concurrently hold the post of president of the Dalian Branch.

Since its establishment, dozens of students from more than ten countries and areas in the Asian and Pacific region such as Malaysia, Pakistan, Thailand, Sri Lanka, Samoa and Hong Kong have studied here. The teachers are Chinese and foreign professors and experts from the navigation education circles or navigation circles.

The Branch has a building covering a floor space of 3,500 square meters, providing accommodation for teachers and students. The Branch will become a center for the training of advanced personnel of shipping management for developing countries, and also a center for scholars and experts to carry out teaching and academic activities and to promote friendship.

3.4 Introduction of Other Maritime Institutions in China

Because it is impossible to introduce every one of China's maritime institutions in detail, only some of the main institutions are introduced briefly here.

It should be noticed that the certificate, which will be talked about in this part, means an unlimited navigation area for 1600 GT and above for navigation section and 3000 KW and above for marine engineering section. A detailed description about the certificate will be presented in the next chapter.

1. SHANHAI MARITIME INSTITUTE

The Shanghai Maritime Institute is located at Shanghai city, the biggest seaport in China. This institute was founded in 1959 and is headed by the Communication Ministry of the Government.

A. Departments and Course Specialties

- a) Navigation Department
 - Marine Navigation Technology
- b) Marine Engineering Department
 - Marine Engineering
- c) Water Transport Economics Department
 - Shipping Managerial Engineering
 - Shipping Economics
 - Shipping Finance and Accounting
- d) Ocean Shipping Department.
 - Maritime Law
 - Ocean Shipping Business.
 - English Language.
- e) Electronics and Automation.
 - Ship Electrification and Automation
 - Computer Technology and Its Application
- f) Port Machinery.
 - Design and Manufacturing of Port Machinery.
- g) Basic Science Department.
- h) Shipping Economics Research Center.

B. Enrollment and Study Duration

- Undergraduates (four years full-time courses) are senior middle school graduates who have passed the annual national examination for higher learning.
- Postgraduates for Master Degree (three years full time courses) are holders of bachelor degree or the equivalent who have passed the annual national examinations for

master degree studies.

C. Total Student Enrollment.

- Undergraduates: about 3000.
- Postgraduates: over 100.

D. Academic Degrees Awarded.

- Bachelor degree and 1st-class higher learning diploma in all the 11 specialties.
- Master degrees in some specialties.

E. Seafarer Certificate Awards.

- 2nd Mate Certificate for the navigation graduates.
 - 2nd Assistant Engineer Certificate for the marine engineering graduates.
- after they serve on board for 12 months.

F. Teaching Faculty.

- nearly 600 including 31 professors 132 associate professors and 280 lecturers.

G. Teaching Equipment and Installations.

- Over 40 laboratories and centers.
- two training vessels.
- one training factory.

2. JIMEI NAVIGATION ACADEMY

The Jimei Navigation Academy was founded in 1920 and is located at Xiamen City, a southeast seaport in China. This academy specializes in navigation and marine engineering technology.

A. Department and Course Specialties.

- a) Navigation Department.

- Seagoing Navigation Technology:

I. three years programs for senior middle school graduates.

II. five years program for junior middle school graduates.

III. one years program for future chief mates and captains.

- Chief Steward.

b) Marine Engineering Department.

- Marine Engineering

I. three years program for senior middle school graduates.

II. five years program for junior middle school graduates.

III. one years upgrading program for future second engineers and chief engineers.

c) Basic Science Department

B) Enrollment

- Senior middle school graduates for program I, who have passed the annual national examinations for higher learning.

- Junior middle school graduates for program II, who have passed the annual national examinations for senior middle technical schools.

- Existing ocean-going ship watchkeeping officers for program III.

C. Total Student Enrollment.

- about 1120.

D. Academic Degrees Awarded.

- Diploma of 2nd-class higher learning.

E. Seafarer Certificate.

- 3rd Mate Certificate for navigation graduates, and
 - 3rd Assistant Engineer Certificate for marine engineering graduates and
 - 2nd-class Electricians Engineer Certificate for ship electrical graduates,
- after they have served on board ships for 12 months.

F. Teaching Faculty.

- Around 250 including 127 lecturers, 32 professors and associated Professors.

G. Teaching Equipment and Installations.

- Over 20 laboratories and training stations,
- four training vessels, and
- one factory.

3. QINGDAO SEAFARERS TRAINING COLLEGE

This college was established in 1976, and is located at Qingdao city, a eastern seaport. The college trains seafarers who have working experience and specializes in ocean-going vessel navigation technology, marine engineering and shipping management.

A. Departments and Course Specialties.

- a) Navigation Department.
 - Marine navigation.
 - Shipping Telecommunication.
- b) Marine Engineering.
 - Marine Engineering.
 - Ship Electrical Equipment Management.
- c) Ocean Shipping Management Department.

- Ocean-Shipping management.
- Ocean- Shipping accounting.
- d) Basic Science.

B. Enrollment and Study Duration.

- Students are senior middle school graduates (or equivalents) and marine school graduates, who have no less than two years of sea experience or related shore working experience.
- The course is a three years full-time program.

C. Total students

- around 800.

D. Academic Awarded.

- 2nd-class diploma of higher learning.

E. Seafarer Certificate.

- 3rd Mate Certificate for navigation graduates.
 - 3rd Assistant Engineer Certificate for marine engineering graduates.
 - 2nd-class Radio Officer Certificate for shipping Telecommunication graduates.
 - 2nd-class Electrical Engineer Certificate for ship Electrical graduates.
- after they serve on board ships for 12 months.

F. Teaching Faculty

- Around 200 including 93 lecturers, 27 professors and associate professors.

G. Teaching Equipment and Installations.

- Over 30 laboratories and training stations.
- Marine Simulation Center.

- Computer Center.
- one training factory.

4. DALIAN MARINE SCHOOL

The Dalian Marine School is located at Dalian City. This school was founded in 1950 and is a senior professional middle school.

A. Department and Course specialties.

- a) Navigation Department.
 - Navigation technology.
 - Ship Radio Technology.
- b) Marine Engineering Department.
 - Marine Engineering.
 - Ship Electrics.
- c) Basic Science Department.

B. Enrollment and Study Duration

- Senior middle school graduates who have passed the annual national middle technical school entrance examinations.
 - 2-year full-time program.

C. Total Students Enrollment.

- around 720.

D. Academic Awarding

- Diploma of middle technical school.

E. Seafarer Certificate.

- Graduates, after they serve on board ships for 12 months are qualified to take part in the examination for:
- 3rd Mate Certificate in navigation.

- 3rd Assistant Engineer Certificate in marine engineering.
- 2nd-class Radio Officer Certificate in ship radio technology.
- 2nd-class Electrical Engineer Certificate in ship electricity.

F. Staff.

- total 400 staff members including 130 teaching faculty.

G. Teaching Equipment and Installations.

- six laboratories.
- one training vessel for unlimited navigation area.
- one training factory.
- one seafarer training center for fire fighting, maneuvering of lifeboats and craft, survival at sea and medical first aid at sea.

Table 3.1

Structure of Maritime Education in China

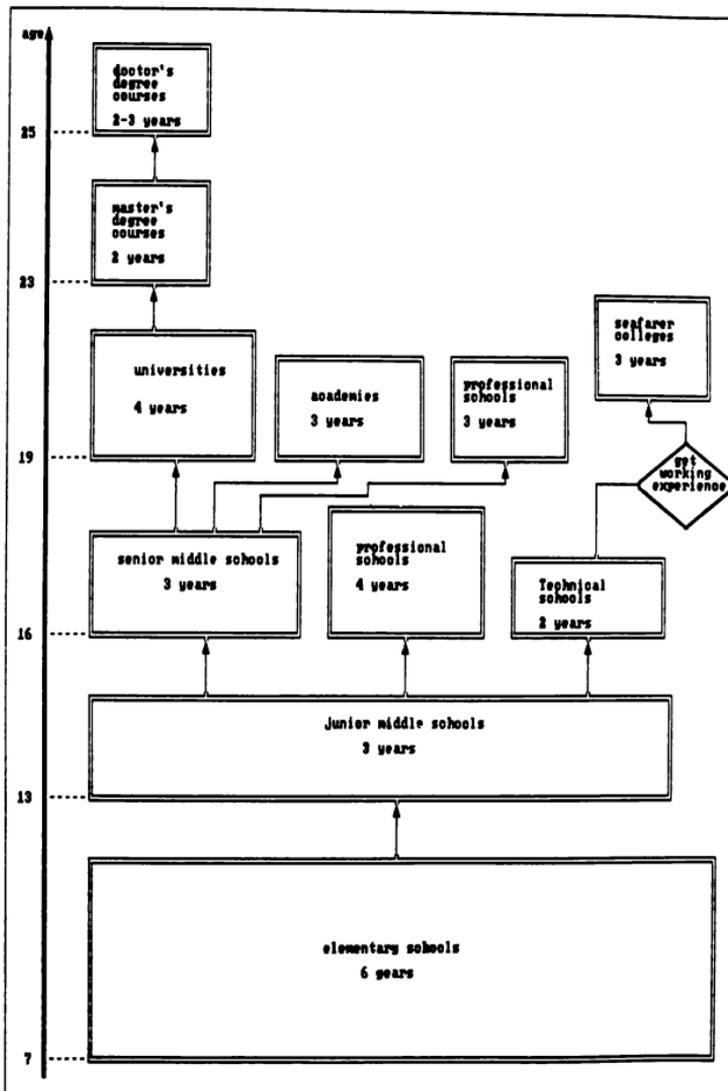


Table 3.2

Administration structure of Maritime Education in China

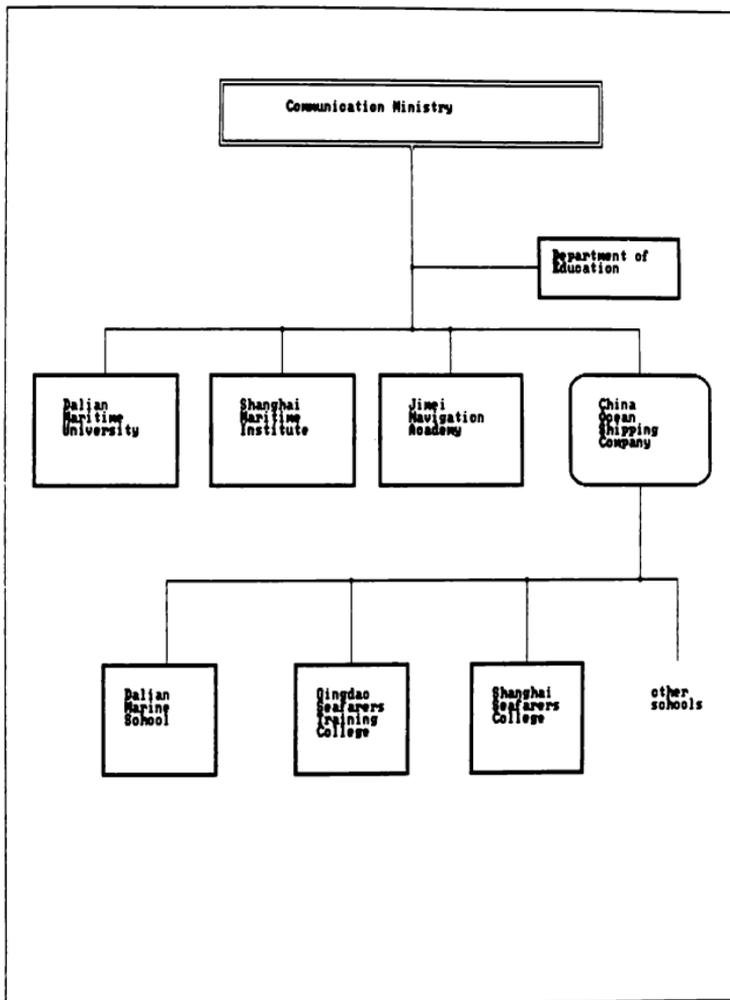


Table 3.3

Management Structure of Dalian Maritime University

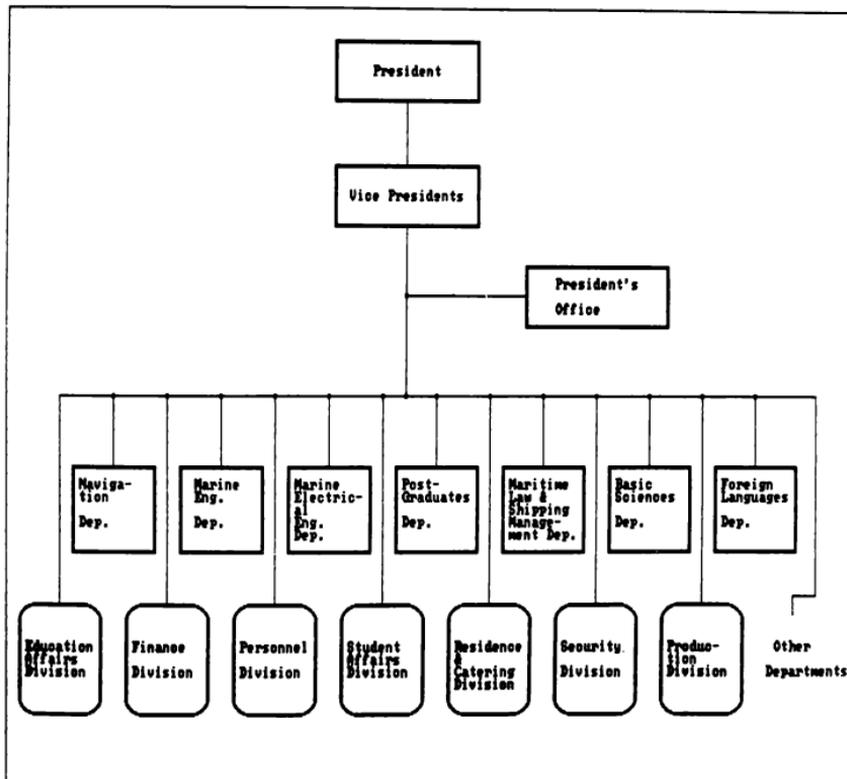


Table 3.4 Management Structure of Navigation Department in Dalian Maritime University

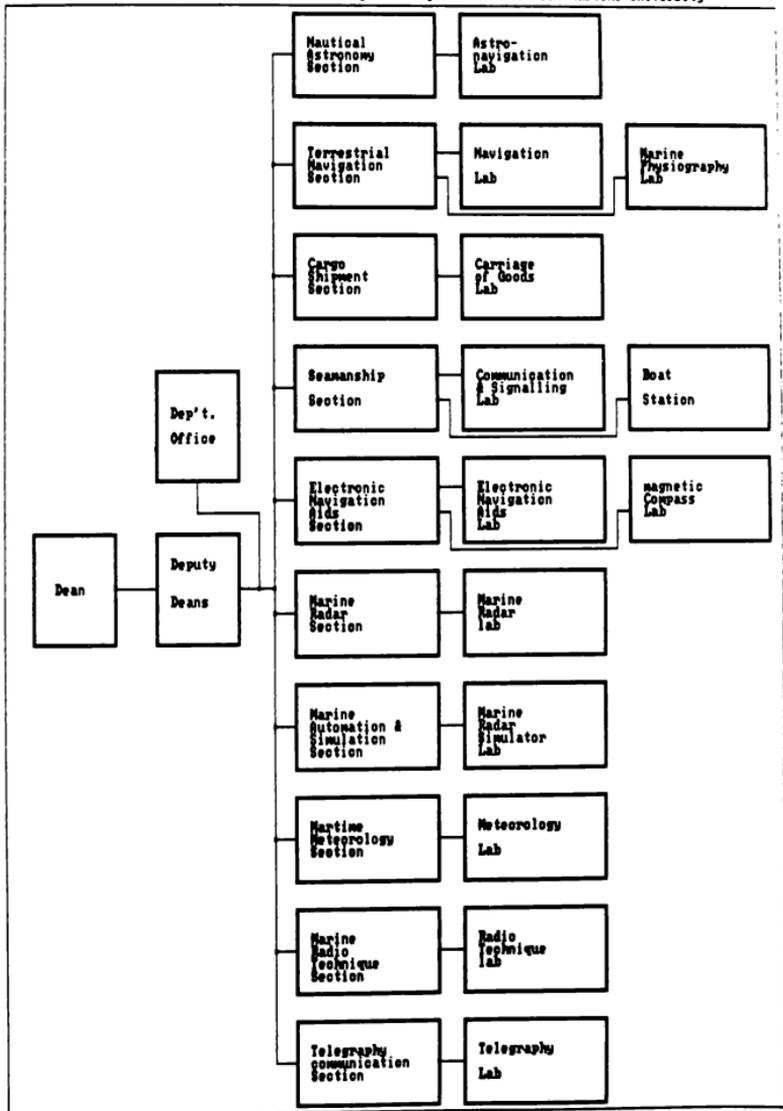


Table 3.5 Management Structure of Marine Engineering Department of Dalian Maritime University

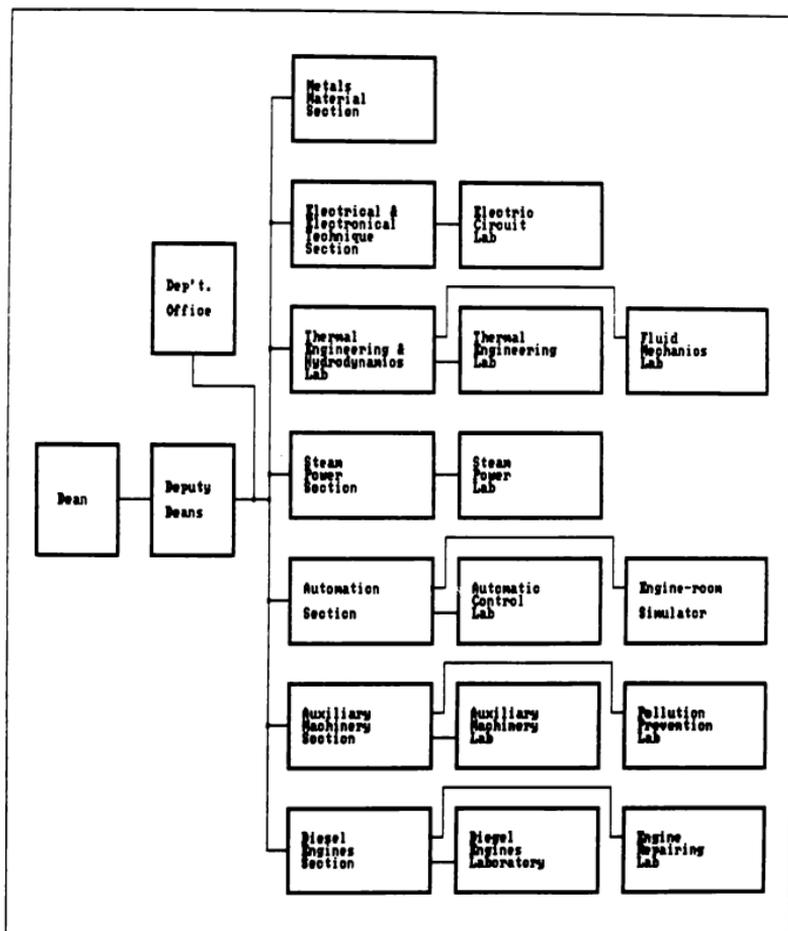
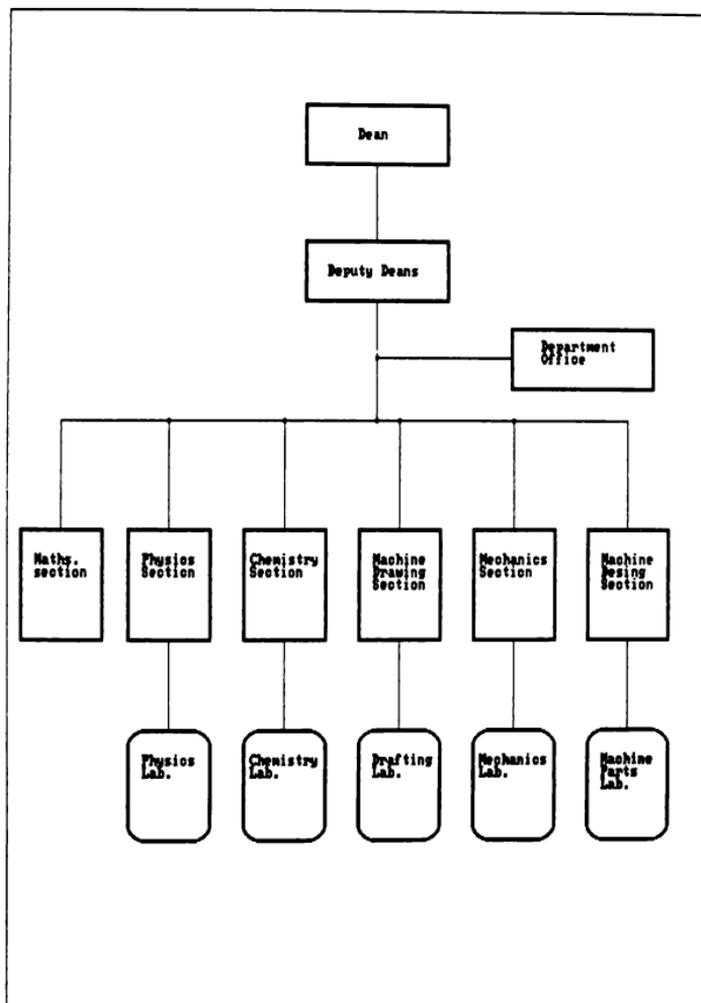


Table 3.6 Management Structure of Basic Sciences Department in Dalian Maritime University



SEAFARER CERTIFICATION AND
EXAMINATION SYSTEM IN CHINA

4.1 The Relevant National Acts and Rules

On 2 September 1983, the People's Republic of China promulgated the Maritime Traffic Safety Act of P.R.China, which came in to force on 1 January 1984, to strengthen the control of maritime safety traffic and to promote the safety of life and property at sea. Subsequently, a number of new rules and amendments to the former ones were stipulated. Among these are some which are related to the seafarer training, examination and certification; namely:

- a) Regulations Governing the Examination and Certification of Seafarers On-board Sea-going Ships of the People's Republic of China, which came into force on 1 January 1988;
- b) Rules of Seafarers Special Training of the People's Republic of China, which came into force on 14 June 1984;
- c) Rules on the Issuing and Carrying of Seaman's Record book, which came into force on 1 January 1985.

These rules were developed in principle according to the 1978 STCW Convention, in order to raise the professional

quality of seafarers, enhance the safety of life and property at sea and prevent marine pollution. Thus these requirements are consistent with the 1978 STCW Convention.

4.2 Administration of Examination and Certification

As provided by the Regulations Governing the Examinations and Certifications of Seafarers On-board Sea-going Ships of the People's Republic of China, the Bureau of Harbor Superintendence of the People's Republic of China is the competent administration in charge of seafarer examination and certification of the whole country. It supervises the practice of examination and certification of seafarers, stipulates examination programs and special training curricula of seafarers and supervises the instruction work in respect to special training of seafarers.

The Harbor Superintendence Administration authorized by the competent administration is the seafarer examination and certification administration. They organize and carry out seafarer examination and certification, approve the issue of seafarer certificates for special training, give guidance to seafarers regarding special training, and supervise and inspect the performance of seafarers holding certificates.

Up to now six administration organizations have been authorized as the examination and certification administrations with regard to the certificate of competence of seafarers who serve in the unlimited area, while nine have been designated in relation to the certificate for special training.

4.3 Types of Certificates

Certificates of competence of seafarers on board sea-going ships of P.R.China are divided into 3 types.

An "A Type" certificate of competence shall be applicable to:

- 1) the master and officer on board a ship navigating in unlimited navigation areas;
- 2) the chief engineer and engineer officer on board a ship navigating in unlimited navigation areas; and
- 3) the general 1st-class and 2nd-class radio telegraphy operator and general radio telephony operator.

A "B-Type" certificate of competence shall be applicable to:

- 1) the master and officer on board a ship navigating in coastal navigation areas;
- 2) the chief engineer and engineer officer on board a ship navigating in coastal navigation and offshore navigation areas; and
- 3) the general 1st-class and 2nd-class electrical officer.

A "C-Type" certificate of competence shall be applicable to:

- 1) the master and officer on board a ship navigating in offshore navigation areas; and
- 2) the special radio telegraphy operator and special radio telephony operator.

An "unlimited navigation area" means any water area of the sea, including ports of different countries of the world and canals open to international navigation.

A "coastal navigation area" means the coastal water

areas of China, including ports along coastal China.

An "offshore navigation area" means the water areas between different ports in one of the littoral provinces of China (here it means the coastline along the geographical figuration of the main land, Hainan Island and Taiwan Island).

4.4 Qualification

The navigation experience and examination subjects required for the seafarers who apply for the certificate of competence of class A, B, and C was developed.

Any seafarer in active service with an age between 18 and 60 years may apply for a seafarer's examination if he passes a health checkup, fulfills the requirements on corresponding service at sea and holds appropriate certificates for special training. After a check, the Examination and Certification Administration shall issue an examination permit to the applicant. One who passes the examination shall be granted the certificate of competence by the Examination and Certification Administration.

Any seafarer applying for a certificate for special training before the examination shall be trained in a training center approved by the competent administration. One who passes the writing test and a practical operation test shall be granted the certificate of special training by the Examination and Certificate Administration.

The present items of special training listed below apply to the master and deck officers:

- Fire Fighting on Board
- Maneuverings of Lifeboats and Craft
- Life Survival at Sea
- Medical First Aid at Sea
- Radiotelephone Communications

Radar Observer and Simulator
Automatic Radar Plotting Aids
Crude-Oil Washing
Management on Oil Tankers

For chief engineer and engineer officers:

Fire Protection on Board
Maneuvering of Lifeboats and Crafts
Life Survival at Sea
Medical First Aid at Sea

In the near future special training on liquified gas carrier and bulk chemical carrier operation will also be provided.

4.5 Examination of Master and Deck Officer.

The Certificate of Competence for Masters and Deck officer are divided into six classes according to navigation areas and ship gross tonnage as follows:

- 1) 1600 tons gross tonnage and above in unlimited navigation areas;
- 2) 200 to 1600 tons gross tonnage in unlimited areas;
- 3) 1600 tons gross tonnage and above in coastal navigation areas;
- 4) 200 to 1600 tons gross tonnage in coastal navigation areas;
- 5) 200 to 1600 tons gross tonnages in offshore navigation areas;
- 6) Under 200 tons gross tonnage in offshore navigation areas.

These are four certificates of deck officers in the following positions: masters, chief mates, second mates and third mates. But no chief mates, second mates and

third mates shall be posted on board ships under 200 tons gross tonnage in offshore navigation areas and they shall be substituted by a deck officer in charge of navigation watch.

A seafarer, who has graduated with a navigation major from one of the maritime universities or institutes and has received a 1st-class diploma of higher learning, would get a 2nd mate certificate of competence for an unlimited navigation area on board a vessel of 1600 GT or above after he has served 12 months on board the same class ships and same class navigation areas since graduation. In order to get a 2nd mate Certificate, he must pass a check, but not an examination. The "check" means a checkup conducted by a Seafarer's Examination and Certification Administration on a technical appraisal, which is given by the personnel and technical management departments of the entity where the applicant for certificate of competence works. The technical appraisal determines the competence of the applicant to hold the post for which he applies.

Those who have graduated with navigation majors from one of the maritime academies and who have got 2st-class diploma of higher learning would get 3rd mate certificates of competence for unlimited navigation area on board vessel of 1600 GT or above after they have served 12 months on board the same class ship and in the same kind of navigation area since graduation and passed a check, but not examination. Here, the check has the same meaning as above.

Seafarers who had graduated with navigation majors from one of the maritime professional middle schools would get 3rd mate certificate of competence for unlimited navigation areas on board vessel of 200 to 1600 GT after they have served 12 months on board the same class ships

and in the same kind of navigation areas since their graduation and passed a similar check as the one mentioned above.

Relevant navigation experience requirements and examination subjects for master and deck officers are shown in Tables 4.1 and 4.2.

4.6 Examination of Chief Engineer and Engineer Officer

The certificates of competence for chief engineer and engineer officers are divided into three classes according to the power of the main engine as follows.

- 1) 3000 kilowatt and above
- 2) 750 to 3000 kilowatt
- 3) under 750 kilowatt

those are four certificates of competence for engineering officers in the following positions: chief engineer, first assistant engineer, second assistant engineer and third assistant engineer. But no first assistant engineer, second assistant engineer and third assistant engineer shall be posted on board ships on which the main engine power is under 750 kilowatts. They shall be substituted by an engineer in charge of engine room watch.

Seafarers who have graduated with marine engineering majors from one of the maritime universities or institutes and who have received 1st-class diplomas of higher learning would get 2nd assistant engineer certificate of competence for 3000 KW and above after they have served 12 months on board ships with the same class main engine power since graduation and passed a check (The check is same meaning with that above description in examination of master and deck officer).

Those who had graduated with marine engineering majors

from one of the maritime academies and who have received 2nd-class diplomas of higher learning would get 3rd assistant engineer certificate competence for 3000 KW and above after they have served 12 months on board ships with the same class main engine power since graduation and passed a similar check as the one mentioned above.

Those who have graduated with marine engineering majors from one of the maritime professional middle schools would get 3rd assistant engineer certificate of competence for 750 to 3000 KW after they have served 12 months on board ships with the same class main engine power since graduation and passed a similar check as the one mentioned above.

Relevant work experience requirement and examination subjects for chief engineer and engineer officers are shown in Tables 4.3 and 4.4.

7. Examination of Radio Telegraphy Operator.

Radio Telephony Operator and Electrical Officer

The relevant rules about examination of radio telegraphy operator, radio telephony operator and electrical officer such as classes, post, work experience and examination subjects, are shown in Tables 4.5-4.9.

Table 4.3

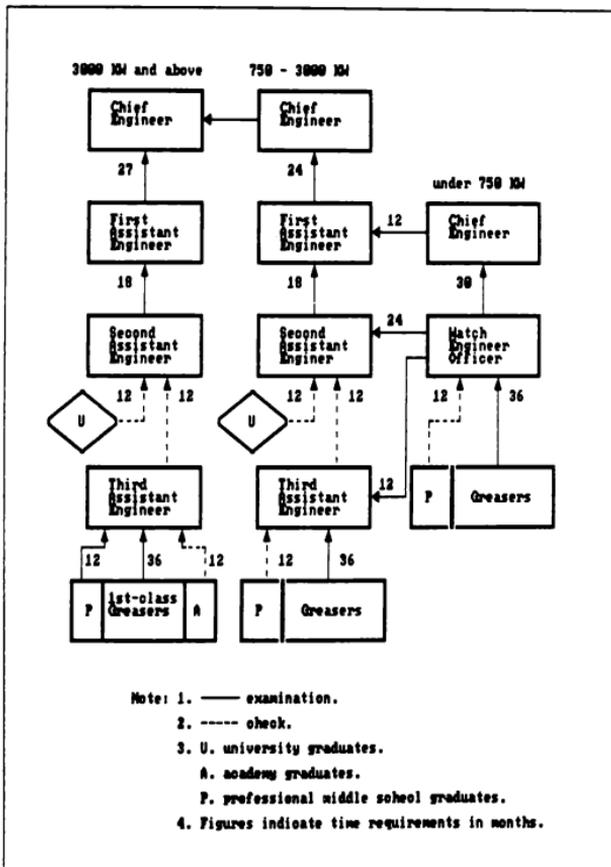
Navigation Experience Requirement of
Chief Engineer and Engineering Officers

Table 4.4 Examination Subjects for Chief Engineer and Engineering officers

power	3000 kW and above								750 - 3000 kW				under 750 kW		
	post		chief eng.		1st ass't. eng.		2nd ass't. eng.		3rd ass't. eng.		chief eng.		watch ass't. eng.		
	A	B	A	B	B	A	B	C	A	A	B	B	A	B	A
subjects															
Marine Power Installation	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Marine Auxiliary Machinery	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Technical Management of Marine Engineering	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fundamental Principles of Marine Engineering							*			*	*	*	*		*
Marine Electricity					*	*	*			*		*			*
General Knowledge of Ship Building							*			*	*	*	*		
Marine Engineering Automation	*	*	*	*					*	*					
English	*	*	*	*	*	*	*	*	*	*					
Total Number	4	5	5	4	5	7	5	4	4	4	4	4	6	4	3

Note: 1. A - post promoted;

B - power raise;

C - professional middle school graduates.

2. English is only for unlimited navigation areas.

Table 4.5 Experience Requirement of Telegraphy Operator and Telephony operator

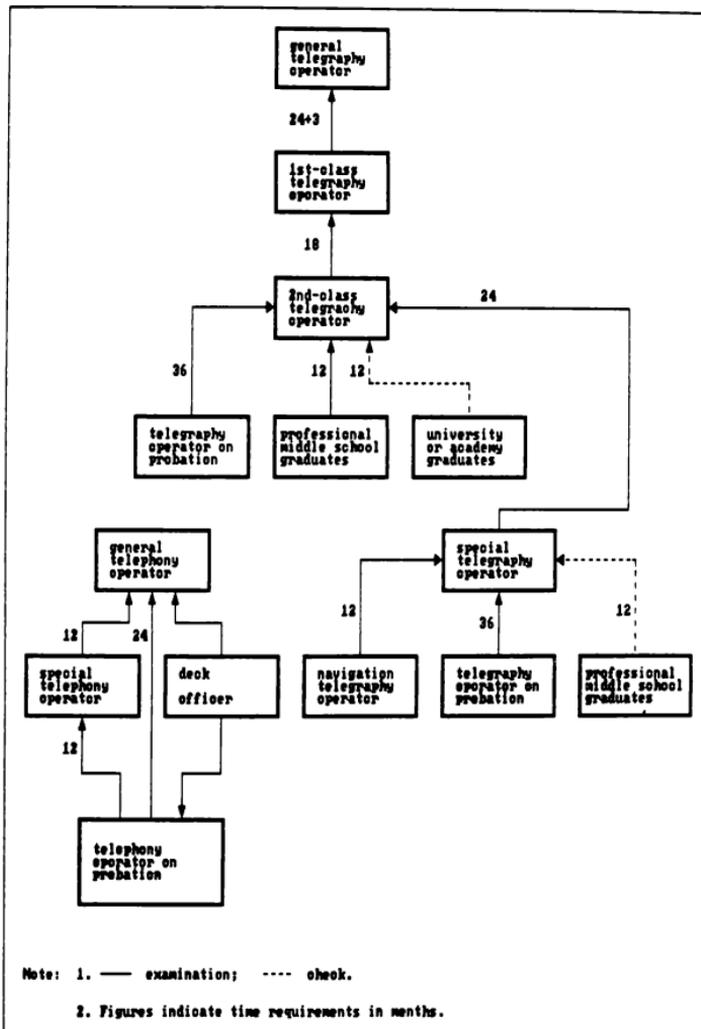


Table 4.6 Examination subjects for Telegraphy and Telephony Operators

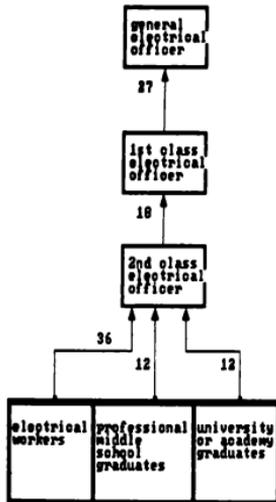
subjects	post class	telegraphy operator				telephony operator		
		general	1st class	2nd class		special	general	special
				A	B			
Radio Communication Equipment		*	*	*		*	*	*
Radio Communication		*	*	*	*	*	*	*
Telegram Deciphering			*	*		*		
Morse Receiving			*	*	*	*		
Morse Sending			*	*	*	*		
English		*	*	*	*		*	
Total		3	6	6	4	5	3	2

Note: A - post promoted,

B - professional middle school graduates.

Examination Subjects for Electrical Officers

**Experience Requirements
for Electrical Officers**



Note: Figures indicate time requirement in months.

subjects	post		2nd class	
	general	1st class	A	B
Fundamentals of Electronic Technique and Electrical Engineering			*	
Electronic Technique and Electric Circuits		*		
Automatic Control System of Electric Drive		*	*	*
Electric Power Supply System and Automation		*	*	*
Fundamentals and Application of Ship's Electric Automation		*		
Ship's Motor			*	*
Ship's Electric Equipment Supervision and Technology			*	*
Theory of Ship's Automatic Control	*			
Principle and Application of Microcomputer	*			
English	*	*	*	
Total Number	3	5	6	4

Note: * - post presented,
 □ - professional middle school graduates

MARITIME EDUCATION AND TRAINING
IN SOME DEVELOPED COUNTRIES

5.1 Maritime Education and Training in U.S.A.

1. Maritime Academies

There are seven maritime academies in the U.S.A. providing maritime education and training for officers. They are:

- ✓ - the US Merchant Marine Academy, King's Point
- State University of New York Maritime College, Fort Schuyler
- California Marine Academy
- Maine Marine Academy
- ✓ - Texas Maritime College, University of Galveston
- Massachusetts Marine Academy
- Michigan Marine Academy

The King's Point Merchant Marine Academy is run by the national government. The rest belong to the state governments.

All academies are residential and provide course curricula which enables a cadet to achieve a nationally recognized degree as well as a certificate as 3rd mate and 3rd assistant engineer.

2. Course

General speaking, a four year course was instituted in U.S.A. maritime academies. The aim of the academies is to train young men and women as officers in the American merchant marine to operate commercial ships and also serve in some other capacities such as ship designers, maritime lawyers, port engineers, shipping company executives, naval officers, Coast Guard officers and oceanographers.

The four year course leads to a Bachelor of Science degree and is good preparation to pass the US Coast Guard examination for a certificate as a 3rd mate or 3rd assistant engineer or both. In addition, the students are enrolled as midshipmen in the US Navy reserve and the graduates are commissioned as ensigns in the US Navy reserves.

All midshipmen must also take naval science courses prescribed by the Department of the Navy.

3. Dual Certificate Program

In the US Merchant Marine Academy, the dual certificate program started in 1969. Like the other majors in the academy, it is a four-year academic program with a combined curriculum, leading to a certificate of deck and marine engineering specialty. This program is designed so that only a well-selected group of students are enrolled. The courses designed for them are very tough since they sometimes have to join the classes in both the marine transportation program and marine engineering program, plus fulfill additional required self-study subjects.

During the first period of the sea training the dual license students spend half of their time in the deck department and the other half in the engine department to obtain experience in both specialties, and to obtain basic familiarity with all aspects of ship operation.

Upon graduation, the graduates are awarded with B.S. degrees and can sit for the Coast Guard examination for both deck and engineering license. More job opportunities are open to them.

4. Academic Year

The academic year at the academy is divided into four academic quarters which span about eleven months. All students follow a common program of study for the first two quarters of their first study year. During this period, in addition to basic courses in mathematics, science and the humanities every student takes introductory courses in nautical science and marine engineering. The new student is given an opportunity to determine intelligently an area of special interest before choosing a major field of concentration.

As part of the professional training, each student participates in a co-operative educational program consisting of two quarters of the second academic year and two quarters of the third academic year at sea (approximately four months for each sailing period).

The shipboard training program provides all students with the opportunity to use a ship as a sea going laboratory. Students are given a study guide called a "seaproject" and, in addition to performing shipboard duties, are required to complete written assignments which are submitted to the academy for evaluation and grading.

The assignments are carefully designed to ensure that, while aboard ship, students apply the knowledge and skills learned in the academy classrooms and acquire a firm foundation for advanced study upon their return to the academy. Aboard ship, marine transportation students are assigned to the deck department and engineering students to the engineering department. The dual license students

spend half of their time at sea in each department and their study program is designed to ensure intensive experience in both specialties.

Between periods of shipboard training during the second and third academic years, each student returns to the Academy and continues academic study in his or her chosen field. Every student is required to complete a specific number of elective courses.

To meet the elective requirement, students may choose an elective course for which they have the prerequisites.

An indoctrination program is conducted during the first two weeks after arrival of the new class. It is an extremely intensive program, both physically and mentally. The aim of the indoctrination program is to provide a basic orientation to instill motivation, and to develop a sense of achievement and pride in the plebe candidates.

5. Admission Requirements:

All candidates must meet certain requirements of citizenship, age and moral character.

To be eligible for admission, a candidate must be an American citizen, at least 17 years of age and not older than 25 and of good moral character.

Candidates must meet requirements for appointment as midshipmen of the US Naval Reserves.

Applicants must have completed a high school education at an accredited secondary school or the equivalent and have earned at least 15 units of credits. The credits must be at least three units of English, three units of mathematics and one unit of either laboratory physics or chemistry.

Foreign students who wish to be enrolled at the academy are subjected to the same entry requirements as US citizens but the nomination authority, instead of a member

of Congress, should be the representative of the administration or a diplomatic representative of the United States in the candidate's own country of residence will be designated as the candidate's sponsor.

6. Certificate of Maritime Personnel

Candidates for the higher grades of certificate such as second mate or second engineer up to master/chief engineer, are required to sit for an examination in order to demonstrate their proficiency and qualifying experience. The licensing is carried out by the US Coast Guard Marine Inspection.

During the year, several periods of examination are programmed and tests last between four and five days.

Prior to sitting for a license examination, applicants must meet certain requirements. Applicants must be at least 21 years of age with the exception of third mates who must be at least 19 years of age.

A minimum qualifying sea experience is required for each grade of certificate. The basic requirement is one year's sea service as second mate or second assistant engineer to qualify for chief mate or first assistant engineer, and one year's sea service as chief mate or first assistant engineer to qualify for master or chief engineer.

All applicants must be citizens of the United States. All statements of sea service must be supported by documentary evidence, issued by responsible persons, officers in charge or related organizations.

Upon acceptance and approval of his application for a certificate, the candidate will be sent for a physical check up.

5.2 Maritime Education and Training in France

1. Classes of Certificate

Level one:

This is the highest level corresponding to the rank of first class captain of the merchant navy. The main characteristic of this level is that the training is specifically dual purpose (deck and engine), meaning the officers can work either on deck or in the engine room.

Level two:

At this level the training is given in two separate streams either deck or engine and from there the officers can reach level one for deck and engine specialization.

The two streams are:

- the technical officer for the engine room;
- the watchkeeping officer for deck.

Officers from both streams, after some theoretical training and sea time, can become second class captains of the merchant navy and then follow the dual purpose officer training to reach the highest level.

2. Requirements of the Different Streams

In order to be admitted to the different levels of selection programs, prospective students must pass a competitive entrance examination.

To be eligible to follow the dual purpose course, the candidates should hold a Scientific Baccalaureat (the highest secondary school certificate) and pass the competitive entrance examination.

The competition is open to navigating and non-navigating personnel.

For the Level two courses, the minimum required level of entry is an attendance certificate of the last secondary school year.

To be able to reach the second class captain merchant navy certificate level, a special examination is required for maritime personnel holding the technical engineering officer's and the watchkeeping deck officer's certificates.

3. Education and Training Syllabuses:

The Level one consists of a four-year full-time course. The academic year is eight months long and the total effective sea time is 60 months.

The first three years of the course are spent at the maritime school, and after spending 20 months at sea, the students return to the training institution for their final year of studies. The weekly lecture hours vary between 30 and 32.

During the school holidays at the end of the first and second year, all students spend two months and four months respectively at sea.

Special examinations are programmed at the end of the third and fourth year. The first examination leads to the merchant navy officer diploma which becomes a watchkeeping certificate after ten months of sea time. The second examination leads to the diploma of higher education of the merchant navy which becomes a certificate of competency of first class master when the officer concerned has accomplished 36 months of sea time including 16 months in the engine room.

In general the syllabuses are based on subjects taught in the streams for deep-sea captains and first class engineer officers and also to take into account the

developments of today's technology.

The schools are equipped with bridge simulators, electrical, electronics and automation laboratories, small stream prime mover and engine room fittings.

It takes about ten years of full-time education and sea training to obtain the certificate of captain first class of the merchant navy (dual license). However, this certificate allows one to become a master or a chief engineer on any type of ship of any power. This unique opportunity to work aboard a ship as a master or a chief engineer is very much welcomed by shipowners as the crew costs are getting higher.

Students from Level two, who hold certificates of second class captain of the merchant navy, have the possibility of joining the Level one cycle starting straight at the third year after being selected through an open competition, as the intake number of students is limited to 21 per academic year.

The training program is periodically adapted, taking into account the technical developments in shipping.

The shipping companies welcome this idea and are expected to contribute financially to the set up and to reward those concerned in the framework of the new law concerning professional training.

The maritime education and training is virtually free for all students. Some students in the fourth academic year continue to be paid by their respective shipping companies, while other students not receiving a salary can claim a grant, either from the shipping companies on the condition of signing a contract of employment or from the state.

5.3 Maritime Education and Training in U.K

In the UK, the established service scheme was introduced in 1974 to replace the old one (which has been established by an essential work order during the second World War) and to combat the casual nature of sea-going employment which was the case before the war. The whole purpose of this scheme is to provide some security of employment and to provide a single source of supply of seamen. This scheme is administered and financed by the employers commission which plays a major role in training most ratings, and also in seeking deck and engineer cadets for appointment to shipping companies. The whole recruitment policy is co-ordinated by the Merchant Navy Training Board.

1. Marine Engineer Cadet Course:

A. BTEC (Business and Technical Education Council) Higher National Diploma in Marine Engineering.

This is a sandwich course of three years' duration.

- Applicants should hold or expect to obtain a minimum of four GCE (General Certificate of Education) at ordinary level or equivalent to grade C or above, including mathematics, physics, English and one other subject. In addition and more importantly they should have studied mathematics and physics at the advanced level and passed at least one subject at this level.

- Training program:

Phase one for HND (Higher National Diploma) entry consists of a 36 week college based full-time course involving both academic and practical work.

Phase two is the first period at sea service generally about three to three and a half months duration, in which

time the cadets follow a program of guided technical studies. During this period they receive operational and maintenance training and experience.

Phase three consists of a 36-week college-based full-time course including academic and practical work for the higher national diploma.

The final practical phase is spent at sea for a sufficient duration to bring the total sea service as a cadet to not less than nine months.

At the end of the training scheme, students sit for an oral examination for the class four certificate of competency (Watchkeeping Certificate).

Successful completion of the cadet training scheme gives exemption from various parts of Department of Transport Class one and two Engineers Certificates of Competency.

B. BTEC National Diploma leading to BTEC Higher National Diploma in Marine Engineering.

This is sandwich course of four years' duration.

- Applicants should hold or expect to obtain a minimum of four GCE Ordinary levels or equivalent to grade C or above including mathematics, physics, English and one other subject.

- Course Outline.

Phase one

This is a two year full-time course including academic and practical work. On completion of six terms, cadets will earn the BTEC National diploma in marine engineering, but cadets who show good academic ability may sit the examination after four terms in the academic subjects of the diploma. These cadets can continue working towards the BTEC Higher National Diploma.

Phase two

At the end of the two year period in college, cadets normally proceed to sea for one year. During this period they undertake a planned guided study program of practical work aboard ship in a somewhat similar manner to the third year scheme. One important point to consider is that if a shipping company wishes to take up sponsorship of a cadet who has entered the four years scheme of training, it may be that the company would wish the cadet to be transferred to the three-and-a-half month sea time followed by phase three.

Phase three.

Cadets return from sea service to college to continue studies on a one year full-time course leading to the completion of the Higher National Diploma (HND). On successful completion of the course cadets are employed as junior officers on completion of class four Department of Transport Watchkeeping certificate. This course also gives substantial exemptions to both class one and two Department of Transport Engineers Certificates of Competency.

2. Nautical Science Cadet Coursès

The procedure for recruitment and certification is similar to the marine engineering cadet but course contents are different.

A. BTEC National Diploma in Nautical Science

Admission to the course is normally confined to young persons aged between 16 and 18 who are sponsored as cadets by shipping companies. The academic requirements are a minimum of four GCE ordinary levels at grade C or better, to include mathematics, physics and English language.

This is a sandwich program of college phases and industrial training at sea with a sponsoring company. The two college phases are each a four weeks induction and a 36 weeks academic session. Between these two phases is a period of eight to ten months' practical experience aboard ship. The diploma is awarded at the end of the second college phase and qualifies the person for entry to the HND in Nautical Science, which also leads to the Department of Transport certificates of competency.

B. BTEC Higher National Diploma in Nautical Science.

This course consists of a three year sandwich course which covers all the academic work to the Class one certificate level. The first college year takes the student to the Class four certificate standard, which is the requirement for a junior watchkeeping officer. The second year consists of industrial experience as a junior watchkeeping officer, whilst the final college year covers the academic work to the senior watchkeeping level. Successful students at the end of the third year will be awarded an HND with the class two certificate being issued on completion of the qualifying seetime stipulated by the Department of Transport. After a further period of seetime plus an oral examination, a class one master's certificate will be issued.

3. Dual Certificate Program.

This course is designed for the multiple role officer giving the opportunity to achieve both master and chief engineer qualifications. The course content is designed to ensure that the student is trained in high technology and that he will be fully conversant with the total ship systems required for the role of the future ship manager. This broadens the career choice both aboard and ashore.

On successful completion of the course, the students will be eligible to register with the Engineering Council as technician engineer.

Applicants should have a relevant BTEC National Diploma or have studied two relevant A levels with success in at least one with maths, applied science and English at GCSE or equivalent levels.

ANALYSIS AND
RECOMMENDATIONS

6.1 Advantages of China's Existing Maritime Education
and Training

As one component of the national education network China's Maritime Education and Training enjoys some advantages as follows:

1. All the academies are under the Ministry of Education and the Ministry of Communication, some directly under the nation's ocean-going fleet. They naturally get resources from each authority accordingly.

2. Enrollees must pass examinations, almost all having to pass a national examination, so their quality is good.

3. General speaking, China's maritime education and training system with respect to higher learning have always, as with other institutions, focused on laying down a solid theoretical foundation. Students have good academic ability.

4. There is a high quality of teaching staff who have stronger academic and research ability, because some of

them are postgraduates and others are graduates from excellent universities.

5. Maritime universities are also scientific research institutions in which sophisticated equipment and competent teaching staff with good research ability can be found. So far, they have many achievements in scientific research, some at high level. For instance, in Dalian Maritime University two inventions were given awards by a national authority, one obtained a patent. Twelve others, in recent years, were given awards by ministerial, provincial and municipal authorities as important scientific research achievements.

6.2 Problems of China's Maritime Education and Training

Apart from all the advantages, there are some problems in China's maritime education and training.

1. The nation's central planning system left very limited flexibility within the maritime education and training academies and gave them little incentive to meet their potential.

2. As described in Chapter three, there are several education levels in China's system of maritime education and training: university, academy, seafarers college and professional middle school. There should be different aims, different need and different program for each education level. The problem is that all these education levels are oriented to nearly the same educational objectives and no clear distinctions in curriculum or syllabus have been made. Some professional middle schools even use the same textbooks as maritime universities.

This problem leads to another problem, namely the assignment of graduates. For example, sometimes a low percent of university graduates, who have had better training in technology, foreign trade and English language compared with other educational levels, are assigned to ocean-going ships, while a high percent of professional middle school graduates are assigned to ocean-going ships. This is unreasonable, because ocean-going ships have a greater need for the graduate with advanced training in technical subjects, foreign trade and English.

3. At the professional middle school level, most schools enroll junior middle school graduates but some schools enroll senior middle school graduates. This reflects another problem in China's maritime education and training structure. For instance, a senior middle school graduate studies at Dalian Marine School for three years, and another senior middle graduate studies in Jimei Navigation Academy also for three years. The former must pass examination in order to get a 3rd mate or 3rd assistant engineer certificate after graduating, but the latter would get the certificate without passing an examination, and the former gets a lower salary than the latter according to Chinese employment policies. So it is difficult for Dalian Marine School to attract students. In order to resolve this problem, the Dalian Marine School reduced the study duration to two years four years ago. But the problem is not really resolved, and it seems that only two years' study is not enough for students who have no prior sea-going experience to succeed in their studies.

4. Another problem in China's maritime education and training concerns the electrical engineering major in universities. The university students with this major

spend more time studying in university compared with those graduates from academies, but the examination requirements and certificate levels are the same for graduates of these two different levels. This matter seems unreasonable; and it makes university graduates very unhappy and makes them unhappy to work on board ships (see Table 4.7).

5. There is a shortage of lectures and subjects in new technology and new developments, such as computer technology. There is also not enough training in basic technical skills and safety.

6. Although China's maritime institutions have some advanced equipment, such as simulator and computer centers, techniques and aids are undeveloped. So far, the main teaching aids used by teachers in the classroom are still blackboard and chalk. There are very few advanced teaching aids such as overhead projectors, slide projectors, film projectors and televisions, and those available are seldom used. One reason for this is the low educational budget and finance. It makes it difficult to educate and train students effectively and efficiently.

6.3 Recommendation for Re-Structuring of the China's MET System

A rational structure of the whole education system is an important requisite, especially in respect to China's development in the long run. A reasonably structured and well coordinated maritime education and training system is fundamental for a smooth nurturing of qualified seafarers at all levels to meet the present and future demand.

It is necessary to clarify the focuses and objectives of different education levels in China's Maritime Education

and Training system.

- University level

This level of higher education gathers the young people with the highest academic ability. Dalian Maritime University and Shanghai Maritime Institute are both comprehensive maritime institutes and are entrusted with a developmental role in the shipping industry. The educational emphasis, therefore, should be on both research and higher level management. Some graduates from this level will become researchers or lecturers after they go through postgraduate courses. Others will work on board ocean-going ships with high technology and advanced equipment, and almost all of them will be promoted to senior managers and other senior personnel position in shipping companies, factories and the government after they get the necessary practical experience on board. The potential of the students should be carefully and fully cultivated accordingly.

- Academy level

The stress should be on the operating skills of the future ship officers. Each of them should be an expert in his post and a competent manager of his level with a good understanding of the whole system.

- Seafarer's College level

This program is open to seafaring ratings and has a similar educational focus as the academy level. The graduates will be officers on board.

- Professional Middle School Level

These schools emphasize the education of officers. Most of them, however, will go to work on board ships that will

sail in near navigation areas or with lower gross tonnage and main engine power compared with those ships on which the academy graduates work.

- Seaman School Level

These schools emphasize the training of ratings

Considering the existing maritime education and training system in China, there is a shortage of academy level institutes. The national fleet demands a large number of ships' officers. According to the report from the Communication Ministry, the demand for all kinds of technical personnel in the shipping industry is 20,000 persons per year for the next five years. That demand is beyond the combined capability of China's national academies and universities. In particular, the demand for ships' officers can not be met under the present circumstances. To develop more opportunities for academy level training would be an efficient way to meet the demand.

It will be better to change Dalian Marine School and Nanjing Mariner School into academies because these two schools have good facilities and training experience. After being changed to academies, these two schools can still enroll senior middle school graduates but extend their course of study to three years. Other professional middle schools can continue to enroll junior middle school graduates. A more reasonable maritime education and training system structure will be achieved through this change (see Table 6.1).

The marine electrical engineering major in universities should be changed to emphasize the education of electrical engineers on shore but not ship electrical officers, who will be trained by academies. This would be a good way of

resolving problem four which is mentioned in 6.2.

More attention should be paid to the training of ratings, which is important in developing China's shipping. Shipping companies and local governments would be responsible for organizing short courses for training ratings and they could be helped by maritime academies and schools. This should be tried to ensure that every rating would get suitable training before he goes on board ship.

Considering the big demand for technical personnel in the next several years, and the limited graduates trained by China's maritime education and training system, it is necessary to develop the adult higher education. It would be a good way to resolve the problem of a shortage of graduates which we are facing. It would be impossible for China, as a developing country and with such a large population, to establish many maritime academies in a few years' time to meet the demand. So far Dalian Maritime University has made progress in adult higher education; more work should be done by both shipping enterprises and the remaining maritime institutes.

6.4 Recommendation About Courses in China's Maritime Universities and Academies.

After identifying the objectives of the various maritime education levels, it is necessary to determine a suitable course arrangement to ensure that graduates possess the competency necessary to meet their respective job requirements and to ensure their adaptability to technical and environmental changes.

The syllabus and curriculum ought to be periodically revised to reflect the development of technology and keep a good balance between the general sciences and

specialized knowledge. Balance should also be sought between theory and experience.

Generally speaking, it is believed that the following courses at China's maritime universities and academies could be enhanced.

1. Computer Technology

The computer is advanced technology and is certainly going to be used more and more, in particular on ships. Compared with developed countries, the computer technology course is a weak point in China's maritime education. To learn more about computers, particularly their application to shipping, is necessary for Chinese students.

2. Law

In many practical cases, law means the national and international standards and criteria that one should behave in accordance with. But there are few officers and maritime administration personnel who have complete knowledge about law. The law courses, particular maritime law, should be enhanced.

3. Economics

This course is the hidden axle of the present world. Previously few of China's mariners were aware of the economics of sea transport. To teach the students more and useful economic knowledge is important for developing China's shipping industry and making competitive in the area of shipping.

4. Management Science

This course embodies the scientific principles to aid in the pursuit of operational efficiency. This also

underlies the rational allocation, co-ordination and co-operation of all resources, material, manpower, knowledge, technology and the environment.

5. Safety

This is a prerequisite to enhancing productivity. It is particularly important for maritime transport students. The students should master basic concepts about safety and skill of using equipment.

In addition to the course above, attention should be paid to increasing practical training. This can be done by extending the duration of laboratory teaching increasing the efficiency of student practice on board and in workshops.

6.5 Recommendation About Teaching Staff in China's Maritime Universities and Academies.

Undoubtedly the effectiveness of maritime education programs and the quality of a country's maritime education depend on the competence, qualification and commitment of the maritime teaching faculty. The reputation of a maritime institute, its value to the industry, the administration and the national economy, are closely related to the qualifications of its teaching staff.

Due to historical reasons and traditional practice, China's maritime faculties in universities and academies are mainly composed of people with high academic ability, sound theoretical background, which is an advantage that has been described in 6.1. But they lack real maritime experience. The majority of teachers who are responsible for teaching basic science courses, humanities and foreign language graduated from non-maritime universities or colleges, and almost none of them have maritime experience

or basic knowledge of shipping. Among those teachers who are responsible for teaching specialty courses, many have no experience on board ships, and there are few who hold master's or chief engineer's certificates. In order to ensure their promotion in the future, young teachers work hard to obtain higher academic degrees and older teachers emphasize research work. This has left them out of touch with maritime reality.

In order to improve the quality of maritime education it is very important for teachers to obtain maritime experience, and keep in touch with maritime reality and advanced maritime technology. This is, unfortunately, a weak point of China's maritime teachers.

Seven years ago, Dalian Maritime University established a policy whereby every young teacher who graduated with a maritime transport major had to work on board ship at least one year during the first 5 years to get a 2nd mate or 2nd assistant engineer or other relevant officer certificate. That is a very good way to force young teachers to get maritime experience. However, one year is perhaps not enough, if they do not intend go to sea again at some later date.

In order to overcome this weak point, the following measures should be taken.

1. Universities and academies should offer more opportunities for teachers to get maritime experience or basic maritime knowledge.

For those basic science course teachers, humanities course teachers and foreign language teachers, the university should run some short courses to introduce basic maritime knowledge to them, and thus connect theories with practice to improve the quality of their teaching.

For the specialty course teachers, the university should

create more opportunities to work on board ships or in the maritime industry to get them acquainted and reacquainted with ships, equipment and operation procedures, as well as with the shipboard and shipping industry realities and problems. This approach is more easily implemented where it has the full support of the shipping industry. In fact this support is essential.

2. It is beneficial to encourage exchange of expertise and professional co-operation between academies and industries.

6.6 Recommendation about Educating Administration Personnel

In order to improve its maritime business, China needs not only many qualified officers but also many qualified administrative personnel. At present there is a shortage of maritime administrative personnel in China, and many of them lack the maritime experience and the knowledge of advanced technology to be the highest quality of work.

A couple of years ago, Dalian Maritime University, as required by the Communication Ministry, established a specialty of maritime administration which emphasizes education of maritime safety administration personnel. Students in this specialty spend four years studying in university, and obtain a bachelor degree and a 1st-class higher learning diploma. Almost all of them will work in the Bureau of Harbor Superintendence, the maritime safety administration in China. That may be a way to meet the existing need of maritime administration personnel, but that is not the best way to supply qualified people for maritime administration and raise the level of the national maritime administration. A better way would be to choose persons from seafarer officers who have worked

on board ships for a period and have gotten plenty of practical work experience. The shipping industry is a comprehensive business. Both practical knowledge and theory are needed in order to do maritime administration, particularly maritime safety administration. It is very difficult for the university graduates who have never had any work experience on board ships to hold maritime safety administration posts. If surveyors have no working experience at sea they will not understand completely about how ships and equipment respond under operational conditions. Thus, they will not be able to check if the ship and equipment are satisfying the maritime safety requirements.. It is impossible to do an effective survey based only on theoretical knowledge that is learnt in classrooms. In many countries, particularly developed countries, every surveyor has sea experience, and many hold master or chief engineer certificates.

So, it would be wise to choose excellent seafarer officers from ships by examination and assign them to a post in the maritime safety administration. In order to acquire the advanced knowledge, they could be trained in short courses before they start to work in their positions. It is also possible to make a postgraduate program to train these persons. In this program, students could just complete the courses but need not do research work. After graduating they would get post-graduate diplomas but without a master degree. The duration would be 1.5 - 2 years.

Besides the maritime safety administration personnel, other kinds of administration people such as shipping managers and maritime lawyers, would be chosen and trained from among the seafarer officers who have graduated from maritime university and served on board ships for a specified period of time. Their navigation experience,

which could not be obtained from the classroom, would be very beneficial to those kinds of work.

Shipping is a special business: maritime administrative persons need both theoretical knowledge and practical experience. Maritime institutes have the responsibility of training these persons. Therefore the seafarer officers, who have gotten higher education and the necessary navigation experience, are the best candidates to be administrative personnel.

6.7 Other Recommendations

1. More flexibility and rights should be given to institutes, particularly in personnel and finance administration. The government authority should not control the institutions too much. The better way of leadership of the government is to guide institutes by making correct policies but not controlling them directly.

The highest leader in an institute is the president or principal, who is responsible for the whole institute and who must have power and authority to manage the institute. The president or principal should be elected democratically by staff congress. To do that is the key of mobilizing the enthusiasm of both leader and staff.

2. In maritime institutes, the subjects of scientific research should be related to shipping activities, and not other businesses. The subjects should benefit the development of maritime business and technology and solve the practical problems in the maritime industry. This is one responsibility of maritime institutes.

If some individual teacher has an interest and ability to carry out research in subjects other than shipping, he may get support from the institute, but the institute

should emphasize and give preference to research on maritime science and technology.

3. More attention should be paid to the development of teaching techniques and teaching aids, specially the utilization of more overhead projectors, slide projectors, films and television in classroom teaching. In this way teaching will be more effective and will help students to learn well. This is also a way to improve teaching, and save time which can be used for establishing more courses.

Of course, money is needed to install new teaching equipment, but this basic teaching equipment is not more expensive today compared with other advanced equipment. The problem is how to budget, how to spend money in the place where it is most needed. The teaching techniques and aids in China's maritime institutes need to be developed, and therefore should be of high priority.

4. In Chapter 5, it was mentioned that dual-purpose programs have been established in the maritime academies of some developed countries. The main purpose of making this program is to reduce labor costs, because the labor cost is higher in these countries. In China, there is no such problem, because the nation has a big labor market and labor costs are cheap now. But on the other hand, students who study in a dual-purpose program will get a sound background knowledge and a broad view that is very beneficial for future management personnel and other high level people such as maritime safety administration personnel that have been mentioned in 6.6.

China can learn from the US experience with dual-purpose training programs. This group of students and graduates appear to be more system-minded. They can accomplish a great deal in a short period of time and are more ready

for the cooperative world.

So to make a dual-purpose program is a better way to prepare management and administration personnel for China's future. This program could be established in a maritime university. A small number of students can be selected after the common first year to join a dual-purpose program. The education can be done by integrating the students into the programs of the two departments. During the sea training, the student must take both the deck and engineering courses. Upon graduation the successful students will get their bachelor degrees plus 1st class higher learning diplomas, 2nd mate and 2nd engineer certificates and go on board to serve either as deck officers or engineer officers. After some years, they will be selected for management and administrative posts. The broader overview and higher working capacity will make them more competent managers or administrative personnel.

6.8 Closing Discussion

In Chapter 3 Dalian Maritime University's very large administrative structure and very high ratio of staff to students (around 0.51) was mentioned. One should wonder why there are so many staff. This is because the university is in charge of building and assigning flats to every staff member, so it has residence division; it is further in charge of security in campus, so it has a security division and it must make money to replenish finances; so it has a production division; and so on. All of these create a large administrative structure. This happens in every institute in China, not only Dalian Maritime University. An excessively large administrative structure leads to lower efficiency in China's education.

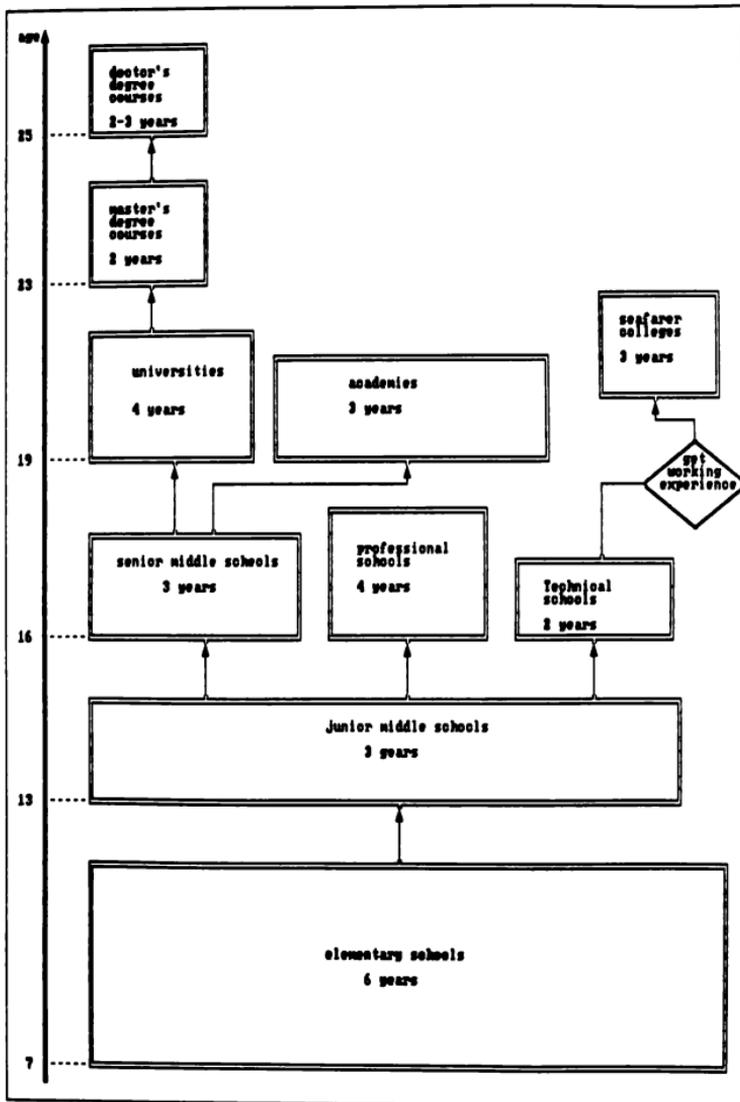
In 6.6, it was suggested that excellent seafarer officers should be selected and trained for administration posts. But this plan is not easy to carry out in China now because every seafarer is controlled by the personnel department of a shipping company, and the company does not like its seafarers to be shifted from their jobs. Almost all shipping companies are publicly owned. People who work in publicly owned enterprises are controlled tightly by the enterprise and the authority of personnel administration in governments, and it is difficult for them to move out. Personnel distribution should be adjusted by the labor market and a personnel administration law.

In order to develop China, science and technology should be mastered by the people. This can only be done through education. That is a simple but important principle. So education should get more emphasis by the government and all the people. The Chinese have a good tradition of emphasizing education, and also have great educational methods, thoughts and great educationists. For example, Confucius' name is famous around the world and his philosophy, Confucianism, has been influencing Asian countries for centuries. That is why Chinese civilization has developed over 5000 years. Today our country and people are facing the challenge of developing and structuring our country. By tradition China emphasizes the importance of education and this should be inherited and maintained. Looking at today's developed countries, not one of them denies the importance of education. China also needs to learn many advanced education methods, thoughts and techniques from these countries. That is the way to develop our education and develop our country. It is sure that the day when China will be developed is the day when national education will have received enough

attention and the day when China's education will have been perfectly successful.

Table 6.1

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