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AN INVESTIGATION INTO THE QUALITY STANDARD SYSTEMS (QSS) IN CHINESE MARITIME INSTITUTIONS
- Their problems, practicalities of implementation and recommendations

By

RUAN WEI

The People's Republic of China

A dissertation submitted to the World Maritime University in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

in

**MARITIME EDUCATION AND TRAINING
(NAUTICAL)**

1999

Declaration

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

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Abstract

Title of dissertation: **An investigation into the Quality Standard Systems (QSS) in Chinese maritime institutions: Their problems and practicalities of implementation, and recommendations**

Degree: **Master of Science**

The dissertation provides an examination of Quality Standard Systems in Chinese maritime institutions. Following an overview of general quality standards (ISO 9000 standards), it then expands into MET quality, combining with provisions of the STCW Convention, principles of general educational quality management and management science. The author analyzes the total environment in both external and internal aspects in which MET institutions are operating, particularly those in his home country, i.e., in Chinese MET. The essence of the dissertation is the identification of the problems and difficulties on the basis of the investigation, which some MET institutions are faced with during their implementation of the Quality Standard System. A number of conclusions and recommendations are drawn as a result of the study.

Key words: Quality, Quality Standard System, Quality Management, Management

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Abbreviations

AMC	Australian Maritime College
ARPA	Automatic Radar Plotting Aids
DMC	Dalian Marine College
DMU	Dalian Maritime University
DNV	Det Norske Veritas, a Norwegian classification society
GMDSS	Global Maritime Distress Safety System
HEQC	Higher Education Quality Council, UK
HSB	Bureau of Harbour Superintendency
ISF	International Shipping Federation
ISM	International Safety Management Code
IMO	International Maritime Organization
MET	Maritime Education and Training
METHAR	European Commission's research project on the harmonization of European MET schemes
N/A	Not Available
QMC	Qingdao Marine College
QSS	Quality Standard System
SMU	Shanghai Maritime University
STCW	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers
USMMA	U.S Merchant Marine Academy,
WMC	Warsash Maritime Centre
WMU	World Maritime University
WTU	Wuhan Transportation University
Spain A	Universidade Da Coruna (Maritime institution)

Spain B	Director Escuela Superior de la marina Civil Gijon (Maritime institution)
TQM	Total Quality Management
IMLA	International Maritime Lecturers' Association

Chapter One Introduction

1.1 Background of writing

'ONE in four ships is manned by an incompetent crew'. *(One in four ship crews 'incompetent', Lloyd's list, 1999)*. This is a finding unveiled at a symposium held at the Seafarers International Research Centre in Cardiff, UK, according to a new academic study based on the opinion of pilots.

Many reports as above and the results of the maritime casualty investigations raised the awareness of the quality of seafarers. Since all seafarers are educated and trained before they sail at sea, the root of the seafarer quality is thus in those MET institutions. Maritime Education and Training (MET) is in such an important position that the quality of it is very much the concern of the maritime community. However, there was not any prescription regulating internationally the quality of education and training until the revised STCW Convention in 1995, which sets requirements definitely on quality standards. The aim of doing this is, 'To make the ship safer, the ocean cleaner' by making seafarers of tomorrow more competent and qualified.

The Quality Standard System (QSS), as required by the Reg.I/8 of the STCW'95 *(Quality Standards)*, has been established by most of the maritime institutions. However, the newly established system has inevitably some problems and difficulties, not only in the implementation but also the maintenance of the system. A survey done by ISF within 59 governments on the implementation progress of STCW'95 indicated that there were some serious difficulties worldwide in implementing the quality standards (See figure 1.1).

Figure 1.1 lists six major problems in the progress of the STCW'95 implementation with quantitative figures for the purpose of describing and comparing the results. Among

those specific problems, the 'Quality Standards' and 'Sufficient Lecturers' are related to the MET QSS. The 'Quality Standards' was only marked with a score of 3.1, which means there were more major problems in quality standards. The situation of the 'Sufficient Lecturers' was a little better than 'Quality Standards' with 0.2 mark more. In a word, many problems were identified in the QSS implementation process.
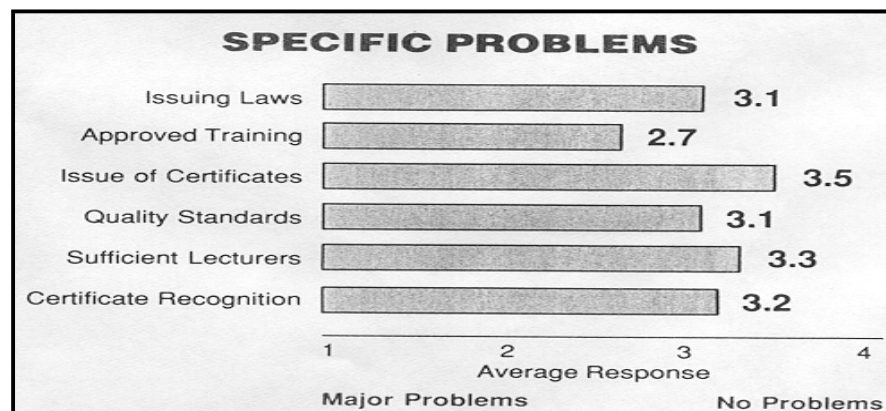
Figure 1.1 Problems in implementing STCW'95

Source: ISF survey in 1995, Mariscene, 1997

1.2 Purposes of writing

Therefore, a necessity of undertaking further more study arose due to the above-mentioned situation. The main purposes of writing this dissertation are:

- To report the present status on the establishment and implementation of QSS in maritime institutions, including those in China and some others worldwide.
- To examine the QSS of selected institutions to find out the problems and difficulties in establishing and implementing the QSS provision in STCW'95.
- To analyze those identified problems and difficulties in the light of STCW'95 Convention, ISO standards and some management applications in MET, etc.
- To come up with recommendations for solving these identified problems, as well as for achieving continuous improvement in MET quality, also in the light of

international conventions such as the STCW Convention, ISO standards, and related management applications in MET.

1.3 Content arrangement of the dissertation

For the discussion of 'Quality', a wide variety of topics usually need to be covered, without the exception of the MET quality, because the MET has various liaisons externally and internally with relevant participants in the maritime community. To avoid confusions when the discussions get along in the dissertation, the dissertation follows a definite clue, that is,

- From general quality standard system to MET QSS, and then to Chinese MET QSS
- Following closely the above point are the identification and analysis of problems and difficulties, and finally the possible recommendations. All elements in both external and internal MET operation environment which may impact the implementation of the MET QSS are examined.

1.4 Investigation

To implement a QSS is a practical process, and it will be unrealistic to write a dissertation with the purposes as stated in section 1.2 divorcing from such a practical implementing process. This makes a certain number of investigations necessary. Investigations were conducted mainly in a way of questionnairing, for the purpose of collecting necessary information on the implementation of the MET QSS. The result of the investigation was quite satisfactory with 13 out of 20 circulated questionnaires returned. It shows a high interest and concern from MET.

Some figures in the feedback are shown graphically in the content of the dissertation, and some written feedback are quoted for the purpose of revealing in detail the problems and difficulties that MET institutions have in the process of establishing, implementing and maintaining the QSS.

1.5 Limitations

Discussing 'Quality' needs to cover a wide range of topics. Meanwhile, quality matters such as 'Quality Improvement' are continuously changing and developing. This brings the dissertation to a limitation that it is difficult to cover all facets of quality in just some seventy pages. Another limitation of the dissertation is that although the large percentage of the questionnaires was returned, the total available information is limited, for some questionnaires were returned with a few questions unanswered. Information data is not plentiful enough to provide a deeper identification and analysis of the difficulties and problems. The third limitation is, due to the educational background of the author, most of the discussions are based on the nautical course (instead of covering both nautical and engineering courses) and educational quality (instead of covering both educational and practical training quality).

Chapter Two   Introduction to Quality Standard Systems

2.1 The purpose of ISO standards

The purpose of the introduction of the ISO standards is, to safeguard continual improvements in quality, and quality assurance all with the effects to achieve the satisfaction of the organization's customers.

2.2 Terminology

Below are some major terminology used in quality standards and quality management. It is beneficial to give them full understanding before undertaking MET QSS.

- **Quality**

The definition of 'Quality' in ISO 8402 is, 'The totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs.'

So the 'Quality' cannot be interpreted only by the price or the performance of the product (goods or services). It must be understood by observing the extent to which the product meets stated or implied needs. In MET, the important and correct understanding on the word is, the 'Quality' is 'Fitness for the purpose'.

The following explanation given in mathematical way could be helpful for an easy understanding of the word.

$$Q = D / E$$

Where Q = Quality, D = Delivery and E = Expectations

If Q=1, compliance with customers' expectations. Quality is achieved.

If Q>1, higher quality achieved than expected

If Q<1, lower quality achieved than expected

- **Quality System**

'The organizational structure, responsibilities, procedures, processes and resources for implementing quality management.' --- *BS 4778:Part 2: 1991*

The quality system is established within an organization for the purpose of facilitating quality management, implementing and maintaining a certain QSS. It usually, as the definition says, contains procedures, processes, and quality elements, such as document and data control, management responsibilities.

- **Quality Assurance**

BS 4778: Part 2:1991 defines it as, 'All those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirement for quality.'

- **Quality Management**

BS 4778: Part 2:1991 defines the phrase as follows, 'That aspect of the overall management function that determines and implements the quality policy.'

- **Quality Improvement**

In *ISO 9004-4:1993(E),* it is defined as, 'Actions taken throughout the organization to increase the effectiveness and efficiency of activities and processes to provide added benefits to both the organization and its customers.'

2.3 Basic structure of the ISO 9000 family

The ISO 9000 family contains mainly the quality terms, quality models, and guidelines for quality systems. Respectively, they are:

| Quality terms | ISO 8402 |

| Quality Models |

- ISO 9001, Model for quality assurance in design, development, production, installation and servicing
- ISO 9002, Model for quality assurance in production, installation and services
- ISO 9003, Model for quality assurance in final inspection and test

Those three models contain basically the same structure, but with some differences in quality element selection. Among those models, the ISO 9001 standard is the most complete one, containing 20 quality elements, while ISO 9002 and ISO 9003 provides respectively 18 and 16 quality elements.

Guidelines for Quality Systems

Apart from the designs of three quality models, the ISO also provides guidelines for the establishment and implementation of those quality models. ISO standard users can choose them according to their needs and product. Those guidelines are:

- ISO 9000-1: Quality management and quality assurance standards – Part 1: Guidelines for selection and use
- ISO 9000-2: Quality management and quality assurance standards – Part 2: Generic guidelines for the application of ISO 9001, ISO 9002 and ISO 9003
- ISO 9000-3: Quality management and quality assurance standards – Part 3: Guidelines for the application of ISO 9001 to the development, supply and maintenance of software.
- ISO 9000-4: Quality management and quality assurance standards – Part 4: Guide to dependability program management.
- ISO 9004-1: Quality management and quality system elements – part 1: Guidelines
- ISO 9004-2: Quality management and quality system elements – part 2: Guidelines for services

- ISO 9004-3: Quality management and quality system elements – part 3: Guidelines for processed materials
- ISO 9004-4: Quality management and quality system elements – part 4: Guidelines for quality improvement
- ISO 10011-1: Guidelines for auditing quality systems – Part 1: Auditing
- ISO 10011-2: Guidelines for auditing quality systems – Part 2: Qualification criteria for quality systems auditors
- ISO 10011-3: Guidelines for auditing quality systems – Part 3: management of audit programs

2.4 Important understandings and concepts in ISO standards

- **Important understandings**

Below are some important understandings which are the cornerstone of the ISO quality standards. The emphasis of ISO standards are placed on:

a. The satisfaction of customers' needs

This is actually the premise to achieve quality. Quality is 'Fitness for purpose'. Customers very often judge quality by the extent of their satisfaction given to the product. There is an important hint in this understanding, that is, it is always very important to know of the customers' needs. Only by doing this can it be possible for a supplier to meet the satisfaction of customers' needs and to achieve the quality. The needs of customers' are so important that it should be understood clearly.

Furthermore, in a modern society, due to the fast-changing market and fast developing technologies, the customers' needs should also be understood promptly by smooth and continuous communication at any stage of the existence of customer-supplier relationship.

b. The establishment of functional responsibilities

The ISO standards improve the performance of an organization in a way of establishing functional responsibilities. In ISO standards' point of view, all management operations in an organization can be categorized into different groups of functions. Together with processes and procedures, the establishment facilitates the management operations.

c. The importance of assessment

The significance of the assessment is that, first of all, it is an effective way to check and compare the practical achievement and the stated requirements to see whether the quality is achieved or not. Secondly, it is a step of identifying non-conformities, because an assessment process usually reviews, examines and verifies all operations which happened in the past. Thirdly, it provides useful information for quality improvement. Non-conformities identified by the assessment are fed back to the corrective procedure to get rectified, leading to quality improvement.

- **Process**

A process is, 'A set of inter-related resources and activities which transforms inputs into outputs.' --- *ISO 9004-4:1993 (E)*

It is one of the most important concepts in ISO standards. A system is perceived in ISO standards more than a sum of processes, which exist both within and across functions. A simple chart below depicts what a process is.
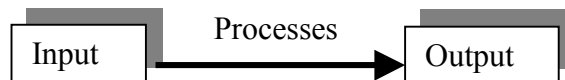
Since the processes are the basic component of a system, carrying out various functions, any improvement of them can then lead to a better performance of the organization. As ISO 9000-4 points out:

All organization needs to identify, organize and manage its network of processes and interfaces. The organization creates, improves and provides consistent quality in its offerings through the network of processes. This is a fundamental conceptual basis for the ISO family. Processes and their interfaces should be subject to analysis and continuous improvement.

So it is meaningful to study and re-arrange the processes within an organization. And it is useful to remember that it is important to highlight the main processes and to simplify and prioritize processes for quality management purposes, and, for a quality system to be effective, these processes and the associated responsibilities, authorities, procedures and resources should be defined and deployed in a consistent manner.

The importance of controlling processes is seen in the above paragraphs. The following graphics (figure 2.1) show the idea how to achieve the planned quality by controlling processes. The difference between the two graphics is the 'loop' where the deviation is fed back to the main process, which results in 'planned quality'.
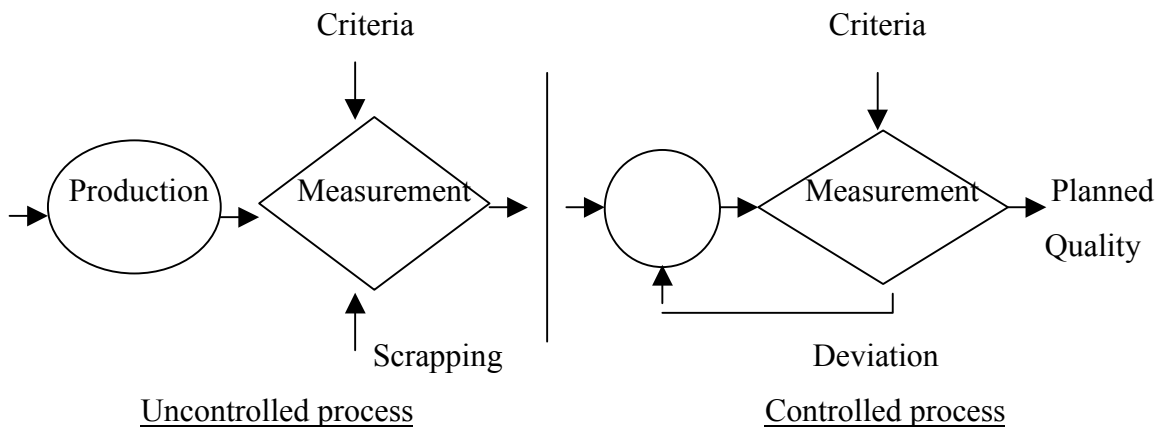
Figure 2.1 Process comparison

Source: Handouts from the lectures on Quality Assurance, Jönsson, WMU, 1999

- **Quality plan**

It is " A document setting out the specific quality practices, resources and sequence of activities relevant to a particular product, service, contract or project." ---*BS 4778: Part 2:1991*

- **Documentation**

It is a significant work that should be done during the establishment and maintenance of any QSS. It produces a series of documents. The chart below (figure 2.2) shows a typical documentation structure in an organization.
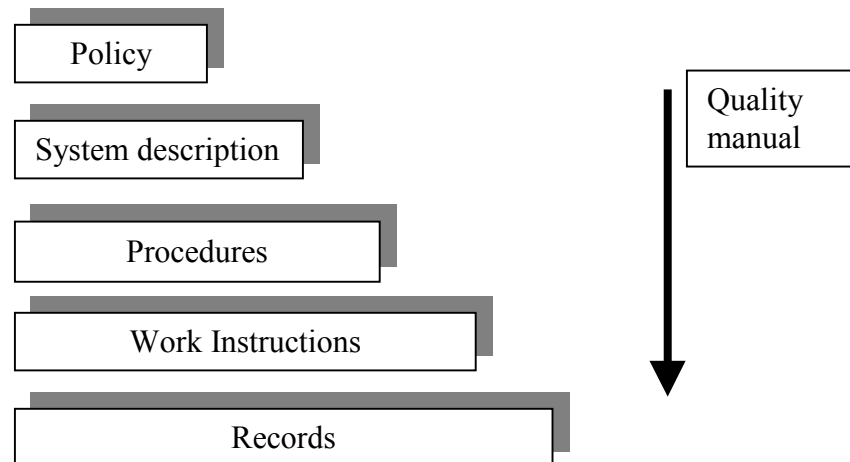
Figure 2.2 Typical documentation structure according to ISO 9000-series

Source: Handouts from the lectures on quality assurance, Jönsson, WMU, 1999

The roles of documentation are:

a. Achieving required (product) quality

All requirements and functions built in a quality management system are for the achievement of a QSS. Documentation as a part of quality system management function aims to achieve required quality.

b. Evaluating quality systems

For auditing purposes, documentation provides objective evidence by which internal or external audits can provide a meaningful evaluation of the adequacy of both deployment and implementation.

1. A process has been defined
2. The procedures are approved
3. The procedures are under change control

c. Quality improvement

Documentation is important for quality improvement. By documentation, every detail of historical records can be retrieved, which eases the process to identify the non-conformities, then make corrections, and finally achieve the quality improvement.

d. Maintaining the improvements

The documentation is also essential for maintaining the gains from quality improvement activities.

- **Auditing**

Defined by the *BS 4778: part 1*, the 'Auditing' is:

> A systematic and independent examination to determine whether quality activities and related results comply with planned arrangements and whether these arrangements are implemented effectively and are suitable to achieve objectives.

The objective of an audit is to find out whether or not quality is being produced. It can be divided into two types of auditing.

a. Internal auditing: The organization itself arranges and executes the audit, and takes actions based on the findings.

b. External auditing: A body outside the organization delivering the product or service evaluates whether the organization is achieving its stated objectives.

Both types of auditing should be performed by qualified and experienced auditors through a pre-determined procedure (referring to ISO 10011-1, 10011-2 and 10011-3 for detailed information on auditing, qualification of auditors, and auditing program management).
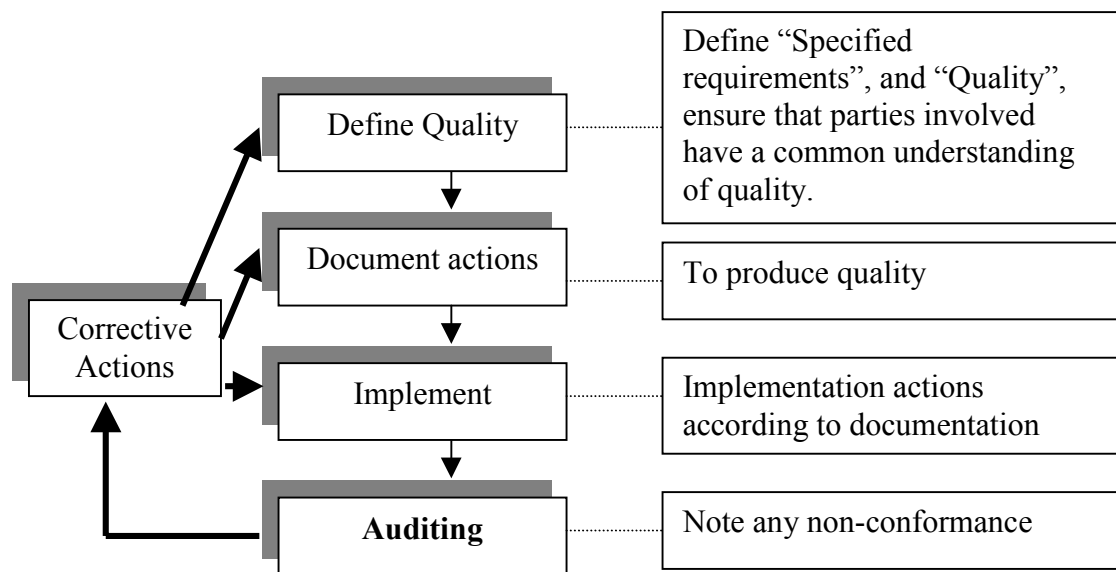
Figure 2.3 General concept of Quality Assurance Scheme

Source: Handouts from the lectures on quality assurance, Jönsson, WMU, 1999

In the above figure, one can see that the auditing plays an important role in the scheme. It leads to corrective actions, and finally the quality improvement.

2.5 Structure of ISO 9001 standard

The ISO 9001 standard is a quality standard model applicable for almost all industries with totally 20 quality elements. The basic structure of ISO 9001 standard is illustrated in the following table.

1. Management responsibility
2. Quality system
3. Contract review
4. Design control
5. Document and data control
6. Purchasing
7. Control of customer-supplied product
8. Product identification and tractability
9. Process control
10. Inspection and testing
11. Control of inspection, measuring and test equipment.
12. Inspection and test status
13. Control of non-conforming product
14. Corrective and preventive action
15. Handling, storage, packaging, preservation and delivery
16. Control of quality records
17. Internal quality audits
18. Training
19. Servicing
20. Statistical techniques

Source: BS EN ISO 9001:1994

All those quality elements are included in a booklet called 'Quality Manual', which is a very important document for the daily operations and management in an organization. Together with procedures, the quality manual shapes the 'Quality System', which is for achieving a certain quality standard.

2.6 The advantages of ISO standards

It is widely acknowledged by various organisations that the ISO 9000 family could bring benefits to them as a quality management and assurance mechanism. Those advantages are very well summarised in the paper *'preparing for ISO 9000'*. (The Institute of Management, 1998)

- Providing consistency in the organisation's response to customers
- Giving the customers confidence that the intended quality is being delivered
- Improving communication by talking about what you do and how you do it.
- Clarifying tasks so that everyone knows what they are doing and how
- Generates a training and reference manual.
- Aids the pursuit of value for money from suppliers.
- Sets a target to aim for in a quality program.

Chapter Three Quality Standard System in MET

3.1 The background

Mr. Chowdhury (1999) that, 'Statistics indicate that well over 70% of the marine accidents relate to human error or omission.' Many other reports on crew quality and manning issues also revealed the similar result that human errors, unskillfulness, and incompetence have led to the majority of the maritime accidents.

For many years, IMO has been devoting itself to achieve its goal of safer shipping. Under the circumstance of the increasing concern of human factors, and believing that proper training with documented procedures could be able to improve human performance and would then reduce maritime accidents, the organization introduced QSS in two instruments, i.e., the STCW'95 and ISM Code. Those two instruments are intended to lead to a big leap in terms of crew quality and safety management improvement, by putting various players in the maritime community, mainly referring to the maritime administrations, shipping companies and MET institutions, into a more harmonized and systematic operation environment. The final aim of doing this is to achieve quality shipping, and safer shipping.

Coming to the MET QSS, the requirements by conventions is the main reason why MET institutions are working with their QSS. Another reason for MET institutions to actively involve in the QSS is their needs for self-development. MET institutions need to have well-designed quality standards and a system with effective quality assurance mechanisms in their organizations, not only for the realization of their roles in building knowledge, skills, and safety awareness into their cadets and trainees, but also for continuously improving their services to the industry.

In the revised STCW convention, there are mainly three provisions dealing with QSS matters. That is, Reg.I/6 (*Training and assessment*), Reg.I/8 (*Quality standards*), and Reg.I/12 (*Use of simulators*). Regulation I/6, I/12 and I/8 make direct references to the quality standards system, while the Reg.I/14 (*Responsibility of companies)* indirectly deals with the QSS.

Regulation A-I/6 links with the QSS matters by setting the requirements on the qualifications of instructors, supervisors and assessors. It reads, '…instructors, supervisors and assessors are appropriately qualified for the particular types and levels of training or assessment of competence of seafarers either on board or ashore…' (*Paragraph 3, A-I/6*), '…such qualification, experience and application of quality standards shall incorporate appropriate training in instructional techniques, and training and assessment methods and practice, and…' *(Paragraph 7, A-I/6, STCW'95)*

Reg. A-I/8 clearly states,

> The field of application of the quality standards shall cover the administration of the certification system, all training courses and programmes, examinations and assessments carried out by or under the authority of a Party and the qualification and experience required of instructors and assessors, having regard to the policies, systems, controls and internal quality assurance reviews established achievement of the defined objectives. *(Paragraph 2, A-I/8, STCW'95)*

The regulation also requires 'an independent evaluation of the knowledge, understanding, skills and competence acquisition and assessment activities, and of the administration of the certification system at internals of not more than five year.' *(Paragraph 3, A-I/8, STCW'95)*

Reg.I/12 connects to the QSS with the requirements on simulator performances (for radar and ARPA) and qualifications of simulator instructors and assessors.

All of those provisions not only clearly require the establishment of a QSS within the MET institutions, but also provide major requirements that such a QSS should cover. Those contents are:

- The qualification of teaching staff in MET institutions
- The performance ability of simulators, and
- The quality system

3.2 Understandings on 'Quality' in MET context

The understanding on the word 'Quality' is fundamental but very important, which influences the characteristics and quality of the individual MET institution. There are various understandings of the word "Quality" in maritime education and training context by different organisations, such as the classification societies, academic accreditation bodies, and the MET institutions. Introduced below are various understandings on 'Quality' being held by different MET institutions.

- *Australian Maritime College*, 'Quality is fitness for purpose, i.e., ensuring whatever you produce or whatever service you provide is fit for the intended purpose.'
- *Singapore Polytechnic* --- Quality maritime and training is:
    1. Student centred teaching and learning
    2. Regular reviews and updating of curriculum
    3. Regular staff upgrading and development
    4. Providing a conducive learning environment
    5. Providing commitment and resources to achieve the above.
- *Warsash Maritime Centre*, 'Achieving the aims and objectives of the training in doing a first class job.'

- *Kings Point,U.S Merchant Marine Academy,USA,* 'The MET program must achieve the stated goals and objectives…'

- *Fisheries and Marine Institute of Memorial University of Newfoundland, Canada,* 'Quality in any form of education and training is about two things: First, giving the customer what they want and, secondly, provide a basis to go beyond the immediate recognized needs.'

- *Dalian Maritime University*, 'The extent to which the students meet the training aims or meet the requirements with respect to knowledge, skill and personal element.'

- *Shanghai Maritime University* ,
  1. The acquisition of the knowledge and the skill necessary for the career including the morality achieved by the students.
  2. The quality of education should meet the relevant requirements set forth by the national policies and the customers.

- *Qingdao Maritime College*
  1. The competence of education and training at the university
  2. To meet the customers' requirement and satisfaction
  3. Excellent performances of the students with strong practical skills, proficiency in English and good respect for the future career.

- *Dalian Marine School*, 'Quality is the symbol of the aim of the organization. Thus, it is tangible and controllable.'

Summary: It should be pointed out that the understandings on 'Quality' in MET, as those in general quality context, are dynamic. Different institutions might have different views and understandings of their own. However, a conclusion that can be drawn from the above feedback is that, most of MET institutions such as AMC, WMC, Marine institute in Newfoundland, and DMC, have similar understandings. They all understand the MET quality in a way of closely linking the behaviors and services of the

organization with the organization's target, which is almost the same as the one defined by the ISO standards.

3.3 Characteristics of Maritime Education and Training

The inherent needs of modern navigation require the MET to provide both education and training. Education means to give students or trainees the theoretical knowledge by means of lecturing and instructing, which could be done on a campus or on board ship. Training means to develop students or trainees' practical skills, which can be accompanied through the organisation of workshops, simulator training, and on board training.

That is the characteristic of the MET. It really can have many influences on MET institutions such as the student intakes, faculty management, teaching and training program management. When coming to the QSS matters, it should be noted that those characteristics of MET should be taken into account, because it can provide some useful thoughts on the QSS. For instance, the QSS should cover all MET activities as the characteristics of MET implied.

3.4 MET Quality

Figure 3.1 is derived from the study of the MET internal operation environment, the general quality management, the MET characteristics and STCW'95, revealing the key elements of the quality in the individual MET institution. Five major elements in the figure are the core of MET quality. A genuine QSS must consider all those five elements.

MET operates also in an environment surrounded by various parties. The graphic (figure 3.2) provides an explanation of the environment in which MET institutions are being operated (external operation environment).

```
                           ┌──────────────────────┐
                           │ Students and trainees │  1. Entrants
                           └──────────────────────┘

                           ┌──────────────────────┐
                           │ The staff resources  │  2. Teaching staff, including
                           └──────────────────────┘
                                                      instructors, trainers, assessors, etc.

    ┌─────────────┐        ┌──────────────────────┐
    │ MET quality │────────│ Curricula and training│  3. Curricula and training programs,
    └─────────────┘        │ programs             │     including the updating of them and
                           └──────────────────────┘     training methodology, evaluation
                                                         methods, etc.

                           ┌──────────────────────┐  4. Libraries, workshops, training
                           │ Educational and      │     ships, and simulators
                           │ training facilities  │
                           └──────────────────────┘
                           ┌──────────────────────┐  5. Quality System Management, and
                           │ Q.M.S & Management   │     other management practices
                           └──────────────────────┘
```

Figure 3.1 The quality of individual MET (Internal operation environment)
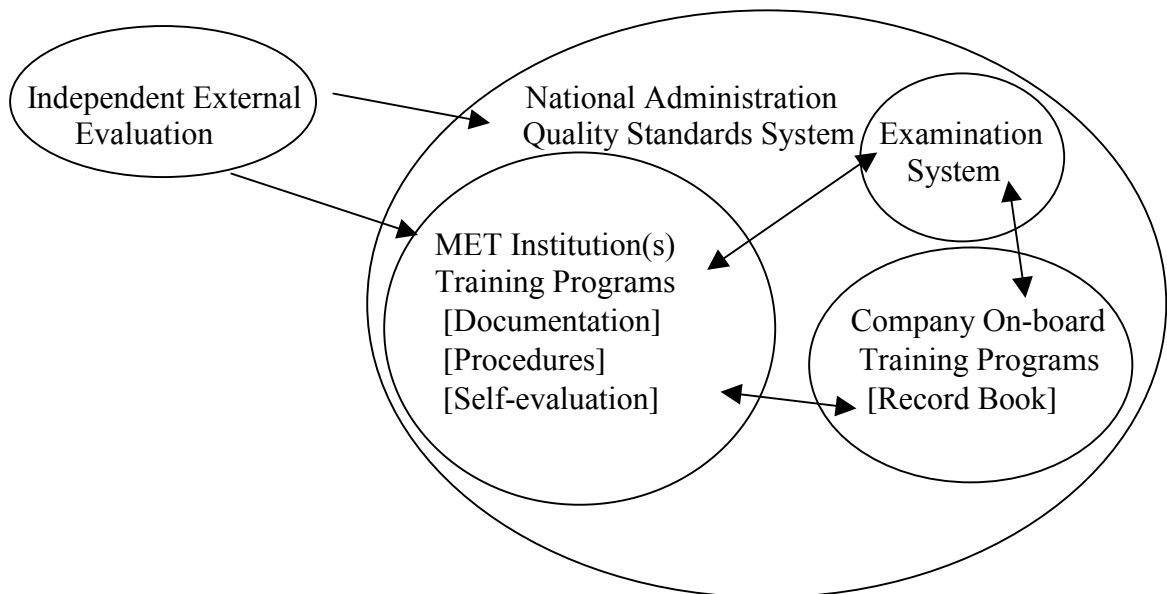
Figure 3.2: Quality Standards: Links & Interactions
Source: Handouts from the lectures on Quality
Standard System, Muirhead, WMU, 1999

More discussions will be based on and encompassing the figure 3.1 and figure 3.2 in the following chapters.

3.5 Forms of Quality Standard in MET

Although the STCW'95 sets the requirements on QSS, it gives MET institutions the flexibility to choose a certain quality standard that may be the most suitable for the organisations to meet those requirements. Three forms of quality standard in MET QSS exist currently.

- **ISO quality standards**

The ISO quality standard can be applied to almost all kinds of industries, including education. The major advantage of it is that, it is much more systematic than others because of its evolution and accumulations in the past decades. The MET institutions may be able to transfer some successful experience and practices regarding QSS which have been accumulating for a long time by various ISO standard users in industry into their own organizations.

- **National quality standard**

Relevant national quality standard could be an equivalent of the ISO standards. It might be stipulated by the responsible authorities in a country such as the Coast Guard, authorities in charge of education quality, or authorities in charge of industry quality standards. The convenience of using such a standard is, since it is a national system, that MET institutions can find the ease to directly apply it to their organizations.

- **Combination of the above**

It means a quality standard combining the ISO standards with relevant national quality standards. There are two possibilities of applying the standard in this case. The first is, MET institutions may use the standard that is exactly the combination of the above-

mentioned standards. The second is that the MET institutions may keep both standards in parallel. The difference between the two possibilities is, for the first possibility, there is only one standard existing in the organisation, while for the second possibility, there are two standards.

Chapter Four Quality Standard System in Chinese MET

A review of Chinese MET in different aspects in the light of the figure 3.1 and 3.2 is necessary for later discussions on the problems and difficulties of QSS implementation.

4.1 Background of setting up a QSS in Chinese MET institutions

4.1.1 Present situation of MET in China

- **General**

China has presently 7 maritime institutions of higher learning and 20 maritime technical schools with 11 of them at secondary level and 9 at elementary level. Therefore, maritime education in China is a fairly complete system, characterized by the combination of higher and medium level education, offering both academic degree and vocational education.

- **Teaching staff**

According to the *Government report submitted to the IMO on the implementation of STCW'95 (1997)*, China has more than 4000 teachers engaged in maritime education. Most of those teaching staff have one or two of the following items for their professional qualification;

1. Academic degree: Most of the teaching staff have obtained a Doctorate or a Master's degree.
2. Qualification for teaching in tertiary education: A certificate officially issued by the State Educational Committee, certifying teachers the qualification teaching in higher education.
3. Practical experiences: For those who are teaching in nautical and engineering science, most of them hold the Certificate of Competency.

- **Students**

Government report (1997) says that about 2,000 students enroll annually in China at maritime institutions of higher learning, and another 2,000 for secondary maritime education. The quality of the intakes of students is quite good because all students must take and pass the unified state entrance examination before they are admitted to maritime institutions.

- **Teaching, learning and training facilities**

China's maritime institutions of higher learning are generally well equipped with simulators, such as radar and ARPA simulators, ship maneuvering simulators, engine rooms, GMDSS and cargo-handling simulators. Additionally, there are 9 dedicated ships for navigational practice.

- **Training program, curriculum and teaching syllabus**

MET in China is conducted through systematic courses for theoretical study, as well as technical training and navigational practice for a prescribed period of time.

The curriculum and teaching syllabus for various levels of training are developed by the competent authorities, which are made up of a group of specialists from the nautical and engineering course committee. They are made according to the relevant international conventions and national regulations, and finally approved by HSB before being put into use.

4.1.2 Authorities involved in the MET

- **State Educational Committee**

It has the authority to approve or disapprove the qualification of academic degree awarding by the MET institutions, and to supervise and control the MET institutions in order to maintain such a qualification.
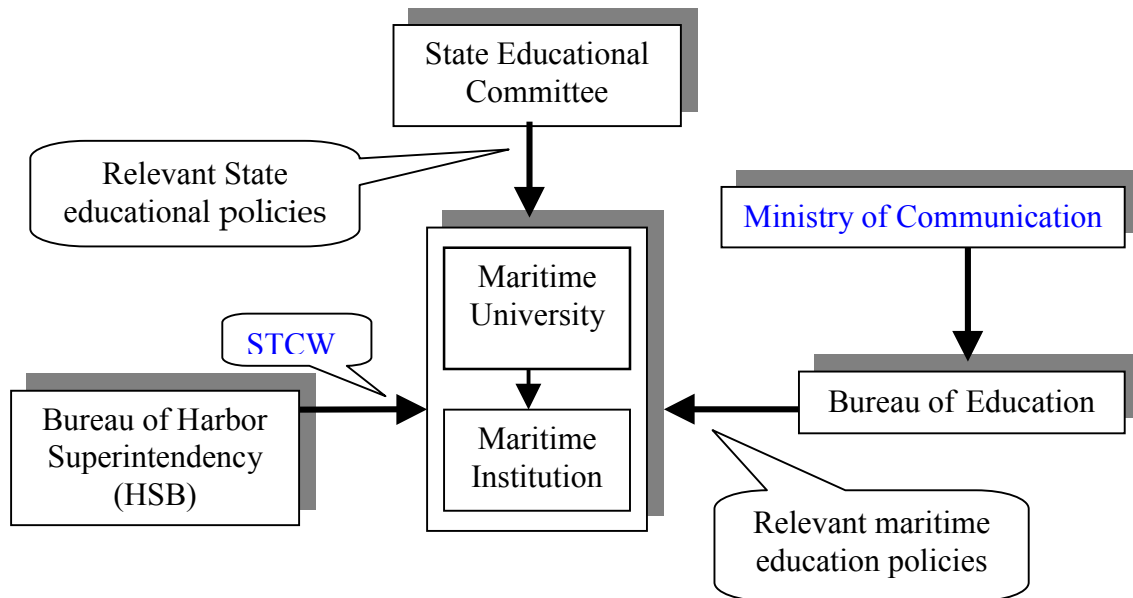
Figure 4.1 Authorities in Chinese MET (after 1998)

Source: Government report on implementation of STCW'95, 1997

- **Bureau of Education**

It is an organ under the Ministry of Communication, a competent authority responsible for supervision and control over the maritime universities, colleges and schools. Its functions are to help maritime institutions to implement the state educational policies, and to give guidance for the implementation of international conventions such as the STCW Convention.

- **Bureau of Harbor Superintendency (The Maritime Administration)**

According to *the Maritime Traffic Safety Law of the People's Republic of China*, the Bureau of Harbor Superintendency of the People's Republic of China is the competent authority responsible for implementing STCW Convention in China. The Administration and the relevant harbor superintendency administrations as authorized by the administration are the administrations for supervision, inspection, evaluation and

assessment of education and training of the seafarers. Therefore, it has very close relationship with MET institutions.

According to relevant regulations, the functions of HSB in MET matters mainly are:

- To exercise supervision and control over the training institutions, carry out verification and evaluation and to issue the training permit
- To exercise supervision over competence education for seafarers conducted in the maritime institutions of higher learning
- To exercise quality control over the educational and training institutions
- To assess the practical skill of seafarers

  It shall be conducted in the forms of demonstration in realistic environment and oral tests by following prescribed procedures and methods in accordance with the mandatory minimum requirements for the qualifications of seafarers specified by STCW'95. It is directly controlled and conducted by the local harbor superintendency administration authorized by the Administration. So is the special training.
- To be in charge of examination and certification of the seafarers

  Graduates from maritime institutions of higher learning shall pass the state examination for third mate or fourth engineer officer competency and gain the harbor superintendency administration's approval of the assessment of relevant practical skills conducted during the study period before obtaining the certificates for the corresponding capacity.

4.1.3 The process of setting up a QSS in Chinese MET institutions

Most of the MET institutions in China have established the QSS. Qingdao Marine College (QMC) is the MET institution who first established the QSS in China. And then, before the STCW'95 came into force on 1st February 1997, the HSB, on behalf of

the Ministry of Communication, organized a series of symposiums, workshops and seminars on how to implement the QSS within all other MET institutions in the country.

The major outcome of those activities was the unification of the requirements on quality system. The HSB set forth by itself the requirements on quality system based on those requirements in ISO standards, the practices in previous MET system and some experience obtained from QMC. However, most of the MET institutions, especially those MET institutions on university level, such as SMU, QMC, were striving then for the certificate of compliance to ISO 9001:1994 standard and additional certificates for their simulators and training centers.

Shanghai Maritime University started to set up the QSS according to ISO 9001 standard prior to the propagation of the *Regulation on Quality Control of Education and Training for seafarers of People's Republic of China* (made by HSB). However, it also keeps the HSB's regulation in the QSS. In June and July of 1998, it was certified by DNV an '*ISO 9001 QSS certificate*' and a '*Certificate for the MET, training centre, simulators*', and the '*Certificate for QSS for seafarer education and training*' issued by HSB.

The QMC not only has the certificate for education and training of seafarers issued by the HSB, but also has other three certificates issued by DNV.
- *Certificate for the MET institutions*, DNV, 1996 (all quality elements in ISO 9001:1994 are adopted.)
- *Certificate for the navigational training centre*, DNV, 1996.
- *Certificate for the navigational simulator centre*, DNV, 1996.

In other Chinese MET institutions, such as Dalian Maritime University, same things happened that both the ISO 9001 standard and the HSB's quality standard requirements were adopted by their QSS.

4.2 The Maritime Administration and MET QSS

4.2.1 Various regulations

The HSB has made and promulgated some regulations related to the QSS in MET quality. Listed below are some major regulations.

- *Quality Control System for Examination Assessment and Certification*
- *Regulation on Quality Control of Education and Training for seafarers of People's Republic of China*
- *Regulations on Supervision and control of Training for Seafarers of the People's Republic of China.*

4.2.2 Quality control schemes

In *Regulation on supervision and control of Training for seafarers of the people's Republic of China*, two quality control schemes are introduced.

- **Verification of the quality control system**

The Administration is responsible for verification of the quality control system and organizes expert groups to carry out independent verification for the quality control systems of the training institutions

Figure 4.2 introduces the procedure of verification.

Notes: The verifying personnel (members of an expert group) are required to satisfy the qualifications as defined by the Administration, have the seagoing services and experiences (with rank above chief mate or second engineer officer), have familiarized themselves with education and training for seafarers and have received the relevant training of quality control knowledge. Main duties of them are to determine if the quality system has satisfied the relevant requirements, to point out explicitly the deficiencies and make suggestions for improvement and to make comments whether the quality

system satisfies the provisions of the *Regulations on Quality Control of Education and Training.*

Verification of the Quality Control System (Figure 4.2, Done by HSB)

Authorized Harbor Superintendency	
	Verification done by expert groups (see *)
Verification of materials	The primary purpose is to determine whether the educational or training institutions have satisfied the basic requirements for the teaching or training staff, training equipment and the documented quality system thereof.
Pre-verification	The purpose is to determine whether the established quality system has satisfied the quality control elements.
Formal verification	It shall be carried out within three months after operation of the quality system. The contents of the verification shall include rectification of deficiency found in the pre-verification, the objective evidence of the effective operation of the quality system and the objective evidence of rectification of non-conformities through the quality system.
Report to HSB	The Verification report shall be compiled after the process of verification and be submitted to the Administration
Issuance of Quality System Certificate after approval	Figure 4.2 Verification of the Quality Control System Source: Government report of P.R.China to IMO on implementation of STCW'95, 1997

30

Quality System Certificate: It is valid for duration of four years. The regular verification shall be held once every four years and the internal verification shall be carried out once every two years. Institutions, which have passed the verification, shall be granted the new Quality System Certificate while those who failed in the verification shall be subject to suspension of education or training. The deficiencies found in the interval verification shall be rectified in time under the supervision of the authorised harbour superintendency administration.

Procedures for training permit (Figure 4.3, by HSB)

MET institutions	
Application to Administration	Training institutions submit the application for training to the Maritime Administration. The Administration shall make decision whether to approve the application
Maritime Administration	
Application to Relevant Harbor Superintendency Administration	The training institutions, upon completion of the preparatory work, submit application to the relevant harbor superintendency administration for verification.
Relevant Harbor Superintendency Administration	
Verification conducted by relevant Harbor Superintendency Administration	The related harbor superintendency administration carries out verification for such institutions.
MET	
Submit the report of verification	The Maritime Administration should issue the Training Permit based upon the verification result. The training institutions shall then conduct the relevant training in accordance with the training courses, training place and training scale as defined in the Training Permit.
Maritime Administration	
Issuance of Training Permit if approved	Figure 4.3 Training permit scheme

Figure 4.3 Training permit scheme

Source: Government report of P.R.China on the implementation of STCW'95, 1997

- **Training permit scheme**

Qualifications of institutions for training of seafarers are approved by the Maritime Administration in accordance with the procedures as figure 4.3 shows (see figure 4.3).

> **Note:**
> - Facilities and equipment for training of seafarers shall conform to the technical standards and functions as provided for by the Maritime Administration.
> - Training plans, programs and materials shall satisfy the requirements made by the Maritime Administration;
> - Instructors shall meet the requirements with respect to educational schooling, seagoing service, professional knowledge and practical experience as defined by the administration, and shall be competent to the training of appropriate items for seafarers.
> - The manning, facilities and equipment for all the training courses shall satisfy the minimum standards made by the administration.

Training Permit: All the institutions for training of seafarers shall obtain the Training Permit issued by the Administration prior to commencement of training.

Comparison: The following chart (figure 4.4) shows the procedures made by Swedish Maritime Authority for approving training. It indicates the similarities with the one made by the Chinese Maritime Administration. The general procedure of approving the training for MET mainly consists of four steps.

Documentation submission
↓
Run desk-top study
↓
Full Auditing
↓
Approval
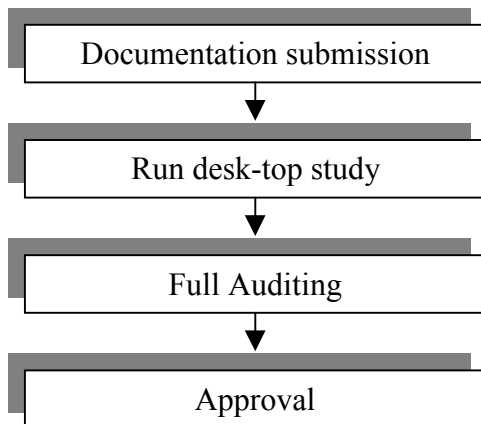
Figure 4.4 Procedure for training permitting
Source: Government report for STCW'95
by Swedish Maritime Administration
(1999)

4.3 MET quality standard models

There are some quality standard models that could be applied to MET quality. Each model contains a certain number of required quality elements. And all those quality elements are included in a quality manual.

4.3.1 Quality standard model by the HSB in China

According to the regulation *Quality Control of Education and Training for seafarers of People's Republic of China apply to all institutions for education and training for the seafarers of the P.R.China,* which applies to all MET institutions in China, twelve essential elements are laid down in the regulation. They are:

1. Quality Policy
2. Responsibilities and authorities
3. Curriculum and programs
4. Trainees
5. Staff
6. Facilities for education and training
7. Education and training
8. Control of quality records
9. Inspection and evaluation of teaching and training
10. Corrective and preventive
11. Documents and data control
12. Internal review

Figure 4.5 Quality standard model by the HSB in China

Source: Government reports from P.R.China to IMO on implementation of STCW'95,

1997

4.3.2 Comparisons

4.3.2.1 Quality standard model in STCW '95

In Section B-I/8 of STCW'95, the convention gives out some guidelines regarding quality standards.

Quality standards model for assessment of knowledge, understanding, skills and competence should incorporate:

- A quality policy, including a commitment by the training institution or unit to the achievement of its stated aims and objectives and to the consequential recognition by the relevant accrediting or quality standards authority

- Those quality management functions that determine and implement the quality policy, relating to aspects of the work which impinge on the quality of what is provided, including provisions for determining progression within a course or program.

- Quality system coverage, where appropriate, of the academic and administrative organisational structure, responsibilities, procedures, processes and the resources of staff and equipment.

- The quality control functions to be applied at all levels to the teaching, training, examination and assessment activities, and to their organisation and implementation, in order to ensure their fitness for their purpose and the achievement of their defined objectives

- The internal quality assurance processes and reviews which monitor the extent to which the institution, or training unit, is achieving the objectives of the programs it delivers, and is effectively monitoring the quality control procedures which it employs.

- The arrangements made for periodic external quality evaluations required under Reg.I/8, paragraph 2 and described in the following paragraphs, for which the outcome of the quality assurance reviews forms, the basis and starting point.

The arrangements made for periodic external evaluations should also be covered. Section A-I/8 also requires,

> An independent evaluation of the knowledge, understanding, skills and competence acquisition and assessment activities, and of the administration of the certification system to be conducted at intervals of not more than five years in order to verify that,
>
> - All internal management control and monitoring measures and follow-up actions comply with planned arrangements and documented procedures and are effective in ensuring achievement of the defined objectives
> - The results of each independent evaluation are documented and brought to the attention of those responsible of the area evaluated
> - Timely action is taken to correct deficiencies.

4.3.2.2 Quality standard model at the USMMA

1. References

   1995 amendments to the STCW 1978

   Title 46 CFR Parts 10, 12, and 15

2. Definitions

3. Management responsibility

   3.1 Quality policy including a commitment to quality mission statement

   3.2 Management responsibility and authority

   3.3 Management resources

   3.4 Management review

4. The quality system

   4.1 Overview of purpose and function

   4.2 Structure of the system

   4.3 Procedures

4.4 Data and documentation

4.5 Records

4.6 Instructor and assessor qualification and experience

    4.6.1   USCG requirements

    4.6.2   STCW requirements

    4.6.3   MAO 710 – 180 (federal employees at USMMA)

5. Student admissions

  5.1 Policy and standards

6. Student progress

  6.1 Control of deficiencies

7. Verification of candidates for STCW certification

8. Training of management, instructors, and assessors

9. Use of equipment and simulations

10. Internal evaluation and self-study

11. The external evaluation and report

    11.1   Interim evaluations
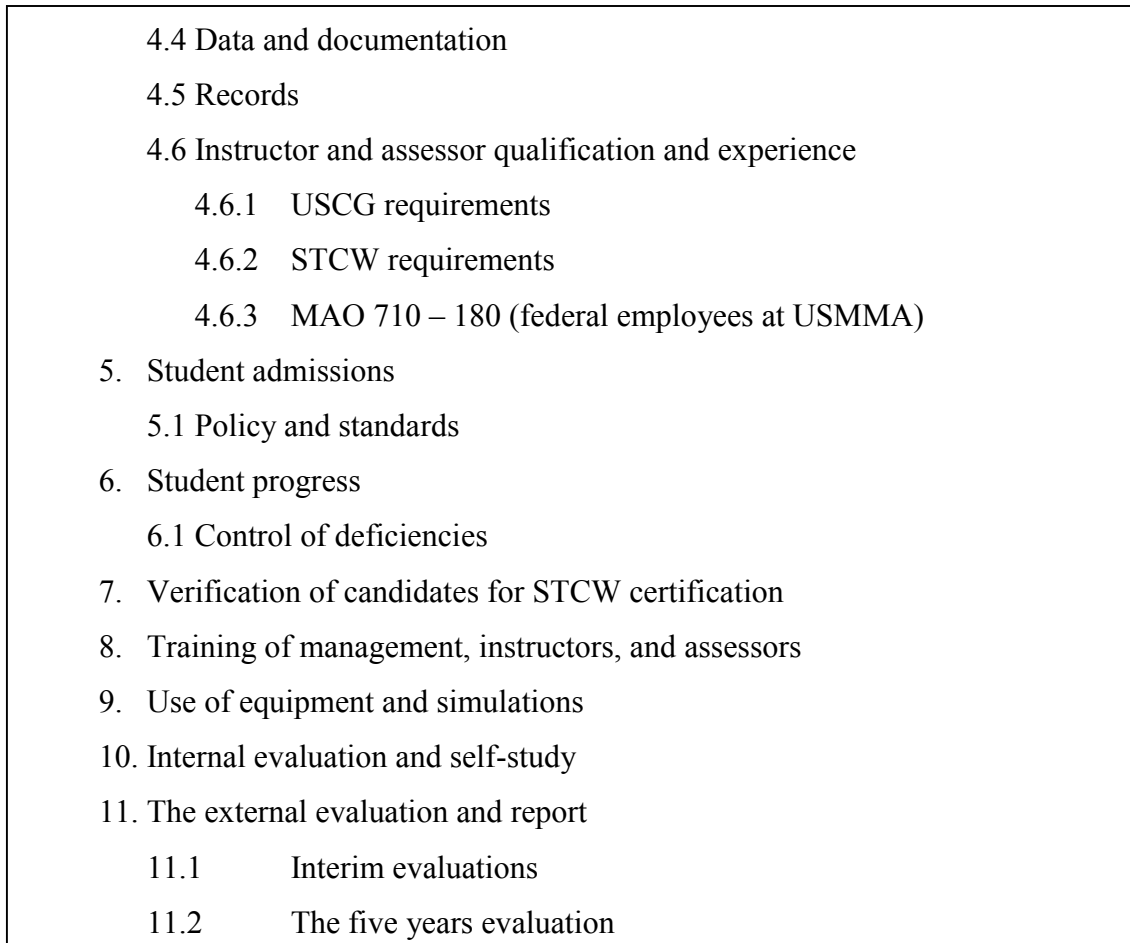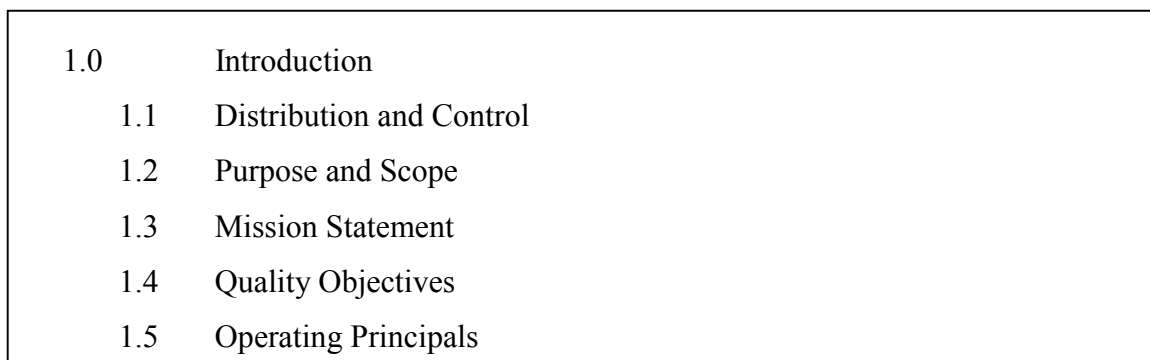
    11.2   The five years evaluation

Figure 4.6 Quality standard model in USMMA

Source: Proceedings of IMLA'97

4.3.2.3 Quality standard model at the 'School of Maritime Studies', Fiji

1.0   Introduction

    1.1   Distribution and Control

    1.2   Purpose and Scope

    1.3   Mission Statement

    1.4   Quality Objectives

    1.5   Operating Principals

2.0		Quality System
	2.1	Part "A" Quality Policy
	2.2	Part "B" Quality Procedures
	2.3	Standard Forms
	2.4	Manual Register
	2.5	External Documents
	2.6	Quality Planning
3.0		Organisation
	3.1	Organisation Charts
	3.2	Responsibilities
	3.3	Management Review
4.0		Document and Data Control
5.0		Purchasing
	5.1	Purchasing Policy
	5.2	Subcontracted Services
6.0		Assessment of Service Quality
	6.1	Training Courses
7.0		Identification and Reporting of Non-Conforming Service
8.0		Corrective and Preventive Action
9.0		Quality Records
10.0		Internal Quality Audits
11.0		Independent Verification Audits
12.0		Training

Figure 4.7 Quality standard model in "the school of maritime studies" of Fiji

Source: Quality manual of The Fiji Institute of Technology "school of maritime studies"

Chapter Five   Identification and an analysis of difficulties and problems

The substantial work needs to be done after the establishment of a QSS is to get it implemented. That is accomplished by managing a quality system and using quality assurance mechanisms. This chapter comes to the core of the dissertation, intending to identify and analyze some difficulties and problems encountered in the practical implementation process of the MET QSS.
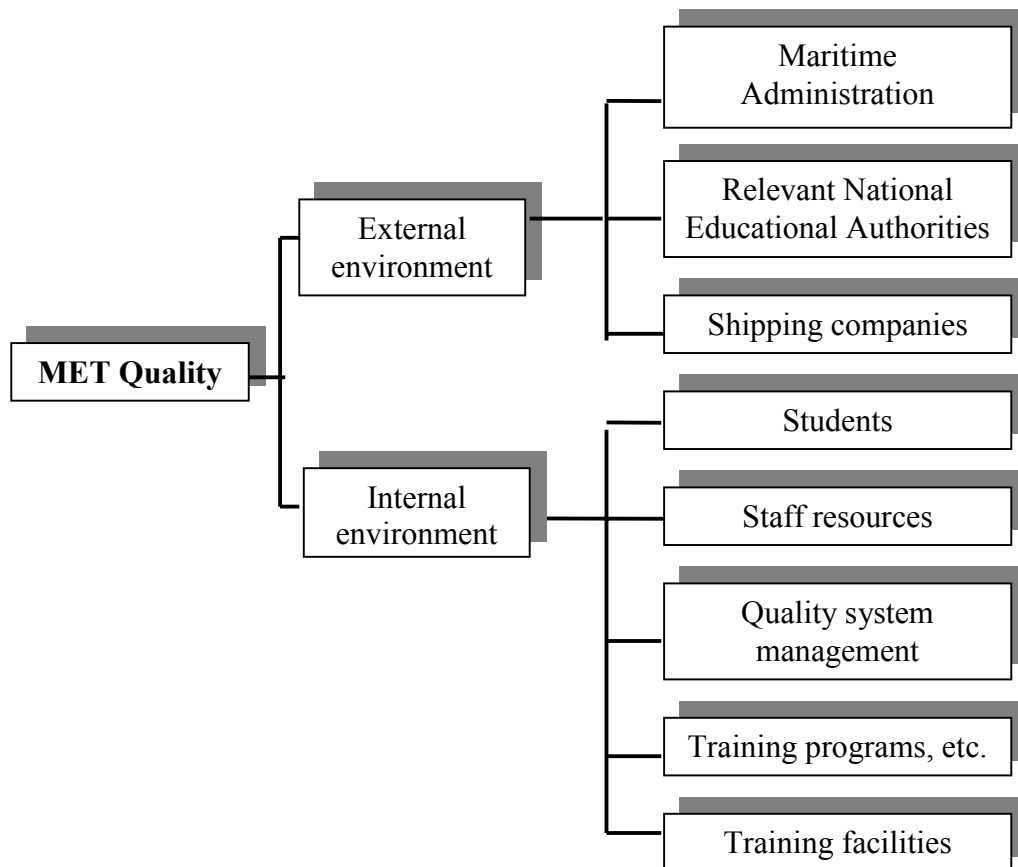
Figure 5.1 MET quality

There is a necessity to examine first both the external and internal environment in which the MET operates before tackling problems and difficulties of implementation. A sound MET QSS should cover all elements in both external and internal environment, which possibly affect the MET quality. The examination helps to gain deep understandings on different aspects of the MET quality, and finally does benefit to the establishment, implementation, and maintenance of the MET QSS. The examination in the same time can provide different angles for identification and analysis of problems and difficulties in QSS implementation. Combining the figure 3.1 and figure 3.2, the figure 5.1 depicts both the MET external and internal environment, and their elements crucial to the MET quality.

5.1 MET external environment

The MET institution exists together with many other parties in the maritime community (Figure 5.2), but mainly the shipping companies, maritime administration. In some countries, such as China, it also has some linkages with national educational authorities, because the MET is deemed as a part of general higher education. MET should have a close relationship with all of those parties. In the process of QSS implementation, the role of such a relationship is so crucial that it really cannot be ignored. In fact, the MET QSS cannot be truly implemented and maintained without the involvement and participation of those parties.
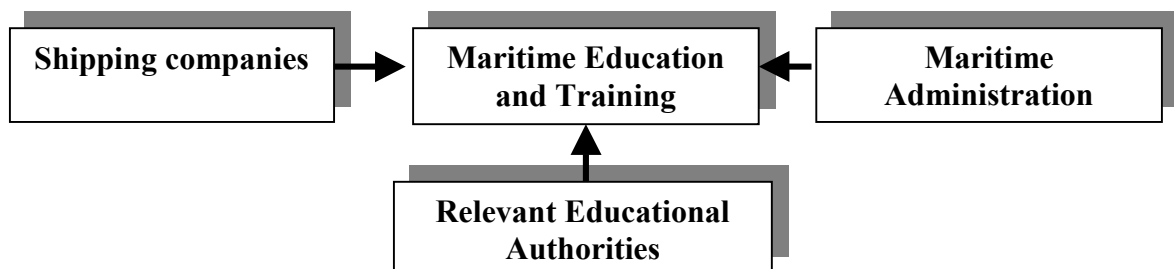

Figure 5.2 MET external environment

Unfortunately, some shortcomings presently exist more or less in the above-mentioned relationship during the QSS implementation. They might be from the HSB, or from shipping companies, or, even from the MET itself in a form of inadequate co-operation, lack of mutual support, etc. One of the shortcomings from the MET side can be seen in the paper *New demands on maritime training institutions (Zade, 1996)*. He said,

> …the normally subordinate role of MET institutions to maritime administrations and shipping companies and their often passive attitude to change. MET institutions rather tend to wait to be told what is expected of them rather than take own initiative and lead the way.

5.1.1 Shipping companies

Shipping companies are the major customers of the MET. As a customer, they are always concerned about the quality of the products they purchase. In this case the product is the maritime education and training, a kind of service provided by MET. The quality of such a kind of product is so important that it influences critically the safety on board, environment protection, reduction of the shipping cost, enforcement of other various companies' policies, and finally it affects the integrated quality of the services the shipping companies provide to the industry, which all shipping companies concern very much. For this reason shipping companies should involve themselves very much in MET activities, in particular those activities regarding the MET quality.

So the shipping companies should have close relationship with MET due to because of their inherent needs of always striving for a better quality. Furthermore, a new regulation laid down in the revised STCW Convention (Reg.I/14, '*Company responsibility*') connected them to MET quality standards by the prescription of onboard training and assessment (Training Record Book). There will be a closer relationship between those two parties.

However, such kind of involvement in MET activities from the shipping companies is limited in some countries. MET institutions often complain difficulties they have; out-of-date of the training facilities, lack of funding, inadequate feedback from the industry, etc. Some of those difficulties, however, could be possibly mediated or overcome through a close working relationship between MET and shipping companies.

In China, for historical reasons, the participation and involvement of the shipping companies in MET activities are limited. For example, the university level of MET education, as with other general university level education, follows pre-designed programs and curricula through which every student is educated. Those programs and curricula have some limitations although they are basically developed after considerable considerations by a certain authentic education committee, say the National Educational Committee or a specific course committee, because of the limited participation of the shipping companies.

Such a situation might have some negative impacts on the implementation of the MET QSS. The main purpose of the QSS is to achieve quality. And the most crucial factor for achieving quality is, as discussed in chapter two in general quality, to know the expectations of the customers'. Today, to know exactly the customers' expectations becomes extremely important due to the fast-changing and competitive market and continuously developing technologies. Both the suppliers and customers should work for it by exchanging their own needs and expectations at any stage.

5.1.2 Maritime Administration (HSB)

Maritime Administration takes care of all maritime affairs in a country, including those MET activities. When it comes to the MET QSS, the Maritime Administration throws quality control over to MET. In STCW'95 convention, Maritime Administrations and

MET institutions are both obliged to define and achieve quality standards and to assure that they are meeting the requirements of the Convention.

Feedback from the investigation shows some difficulties and problems in this regard, which affects the implementation of the QSS.

Bureaucracy: It is a problem that can be often seen in many organizations, without the exception of the Maritime Administrations. This can be illustrated by the feedback from a MET institution, the USMMA. It says, 'resistance and frustration with the government bureaucracy of USCG and MARAD (U.S Maritime Administration).'

Harmonization of quality standards: In some MET institutions, for instance the SMU in China, two quality standards are being used in parallel. One is the quality standard promulgated by HSB for MET, and another is the ISO 9000 standard which in MET institutions' viewpoint is a more complete and systematic standard, and can make the institutions more competitive. Keeping two quality standards and systems simultaneously of course can satisfy the Maritime Administration and MET institutions themselves. But the problem arising is that, the MET institutions have to deal with some difficulties with respect to the quality system management, such as some unconformity between ISO and HSB standards, and different interpretations on quality elements due to different QSS models and standards.

The situation also imposes a heavier burden on the MET institutions because the establishment, implementation and maintenance of two quality standard systems take much more time and cost more.

5.1.3 Relevant National Educational Authorities

The relevant National Educational Authorities in a country are in charge of general educational quality, ranging from all teaching and learning activities to the qualification of teachers and students management. It is certainly necessary to have a mechanism with such functions to maintain the education quality of a country. In some countries, MET is under the supervision and control of such an organ.

What happened in those countries causes some difficulties that affect the implementation of the MET QSS. MET is under an "overlapped" supervision and control. Apart from those difficulties resulted from the overlapped supervision and control such as daily management and administration difficulties, a notable difficulty for MET faculty is that they have to meet two requirements. One is from the relevant National Educational Committee, which stresses on the academic background, and another is from STCW'95 imposed by the Maritime Administration, which stresses on the practical experiences. It is difficult, honestly speaking, for faculty in a MET institution to meet both academic education and practical experiences requirement, especially to meet them in short period of time due to the implementation deadline of the STCW'95, because it is widely known that the achievement of academic education and practical experiences can only be made through a long time span, instead of just an overnight.

5.2 MET internal environment

5.2.1 Students

A successful education relies on the participation of high quality students. The completion of many requirements laid down in the QSS such as requirements on training programs and curricula depends on the capacity and knowledge of the students. Therefore, without the enrollment of the students with satisfactory quality, a QSS then loses one of the important bases for successful implementation. For Chinese MET institutions, generally they can have students with satisfactory quality enrolled, since all

students have to pass unified national entrance examination, which signifies strict academic requirements and high standards. But the only difficulty is, when the institutions provide training for continuous learning, such as short courses or refresher courses for certificate validation, they might have intakes with different levels, which make the execution of some training programs and curricula difficult.
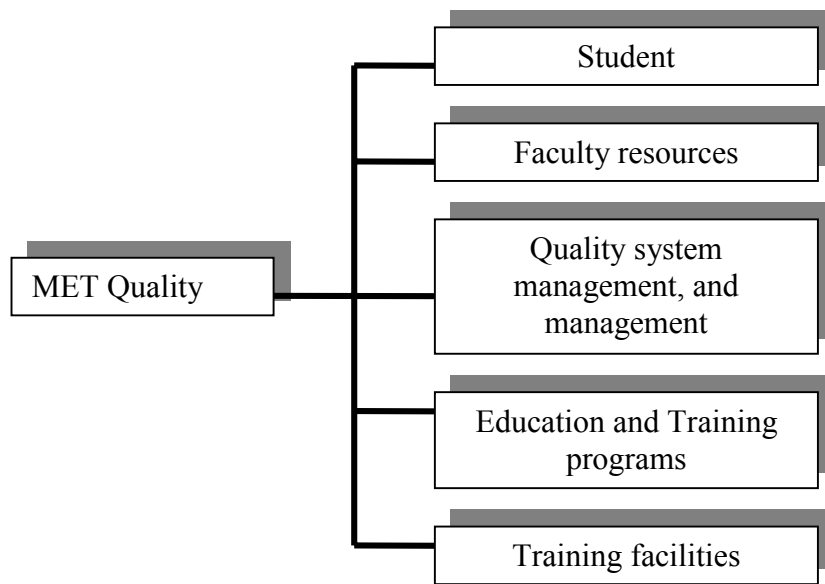
Figure 5.3 MET internal quality aspects

5.2.2 Faculty resources (Trainers, Instructors and Assessors)

Faculty in MET institutions takes charge of the execution of the curricula and training programs, as well as evaluation and assessment. Therefore the qualification of the faculty is crucial for quality education. In MET, the qualification of the faculty is particularly important because of the characteristics of the MET.

So the importance of the qualification of faculty on the implementation of the QSS is clear. As Zade (1996) said in his essay *New demands on maritime training institutions* that:

It will have to ensure the meeting of the new requirements for trainers, assessors and assessment of competence, among those the requirements for simulator instructors. Faculty qualification and commitment is the prerequisite for both program provision and quality assurance meeting the new requirements of STCW'95.

The STCW'95 thus sets requirements on the qualification of trainers, instructors and assessors by Reg.I/8 *(Quality standards)*, Reg.I/6 *(Trainer and assessor)* and Reg.I/12 *(Use of simulators)*.

- **Academic Title Distribution**

Professor	Associate professor	Lecturer	Assistant	Others	Total
16	47	88	42	15	208

- **Age Distribution**

<36	36-40	41-45	46-50	51-55	56-60	>60	Total
84	29	29	15	14	26	11	208

- **Certificates Distribution**

Master & C.E	C/O & 2nd Engineer	2nd Officer & 3rd Engineer	3rd officer & 4th Engineer	Others	Total
6	9	51	6	136	208

- **Academic Degree Distribution**

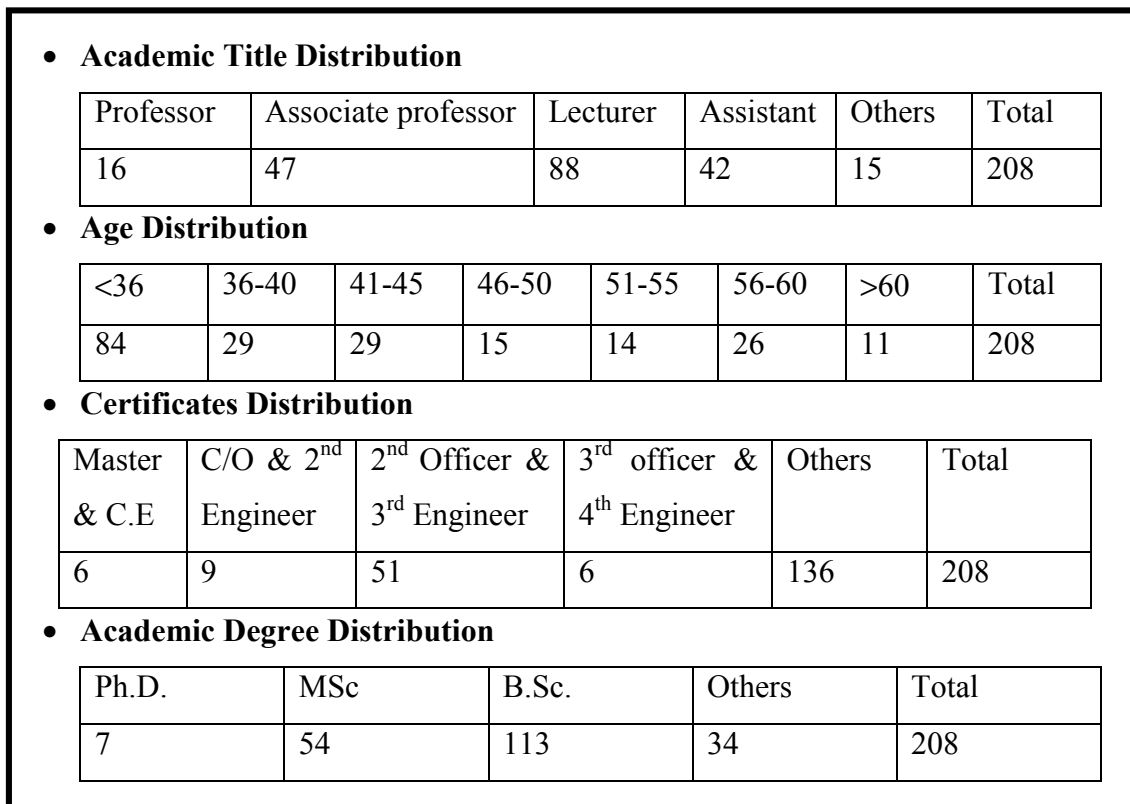| Ph.D.	MSc	B.Sc.	Others	Total
7	54	113	34	208

Figure 5.4 Profile of the faculty members at the Mercantile Marine College of Shanghai Maritime University

Source: Shanghai Maritime University (1995)

The requirements in STCW'95 made a shift from knowledge-based to competence-based, which makes the emphasis of the qualification of faculty shifted to the assessment of competence. Consequently it brings a problem to some MET institutions, that is, lack of competent trainers and assessors, which undoubtedly is affecting the implementation of the QSS. The figures shown in figure 5.4 indicate that the qualification of the faculty members in Mercantile Marine College in SMU in the aspects of academic title, age, certificate, and academic degree.

It should be mentioned additionally that faculty should also be required to be qualified in terms of pedagogic. They must know how to teach, evaluate and assess efficiently and effectively. This is extremely important in a competency-based training scheme. But the reality is, as Muirhead (1997) said in his paper *STCW-95 and the challenge of setting new global standards in maritime education and training*, that 'shortage of qualified instructors and assessors: In many maritime training institutions, many existing and new teaching staff in particular are given no formal pedagogical or instructional training.'

The following graphics (Figure 5.5 & Figure 5.6) are derived from a project called METHAR, which was a survey done within 13 EU countries with MET, including Iceland and Norway. It confirms further the conclusion that there is an inadequacy of qualified lecturers worldwide. Studying those two figures, it is easy to find that those who have Ph.D. degree or Certificate of Competency (CoC) only occupy a small percentage of the total number of lecturers, especially those in EU countries, then say nothing of the percentage of those hold both. Kobe University seems to have a good situation. However, many of those who are holding CoC do not have the practical sea-going services.
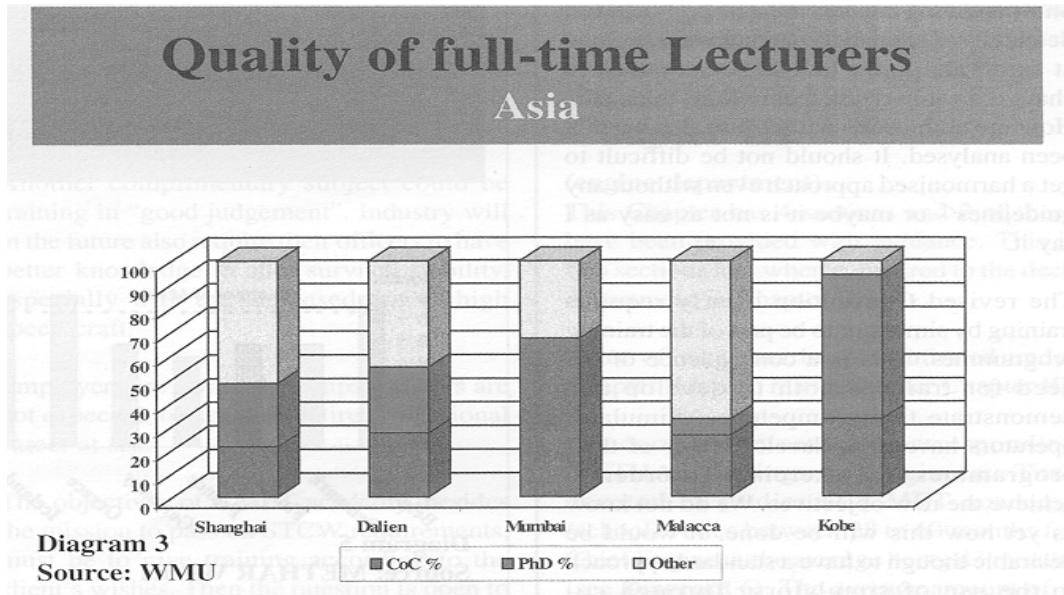
Figure 5.5 Quality of full-time lecturers in Asia

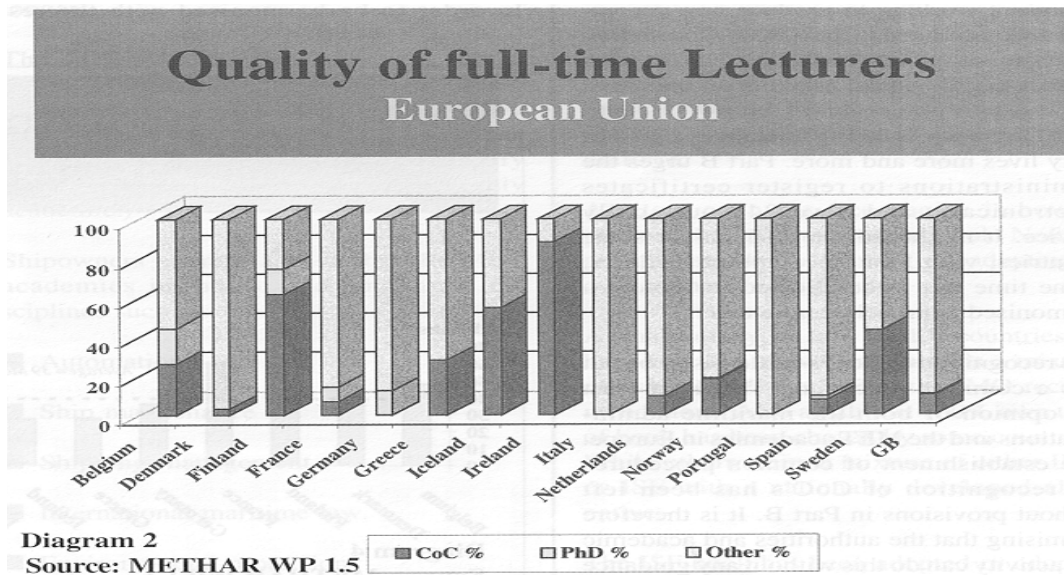Source: MERTHAR project, 1998

Figure 5.6 Quality of full-time lecturers in the European Union

Source: MERTHAR project, 1998

ISF conducted a survey concerning the progress being made by governments to implement STCW'95 in a wider coverage of survey within 59 governments, which also revealed the same difficulty, that is, lack of suitably qualified lecturers and assessors. (See figure 5.7)
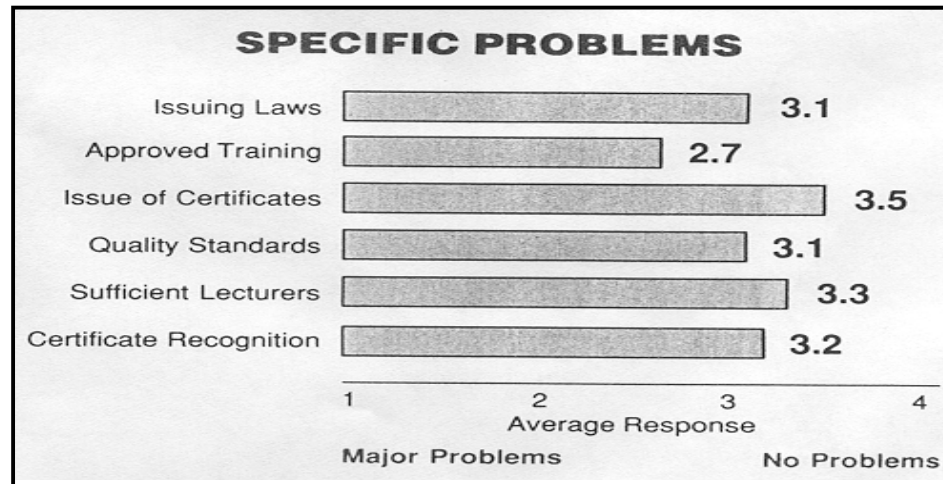

Figure 5.7 Specific problems of STCW'95 implementation

Source: ISF survey, 1995

To sum up, instructors, trainers and assessors in MET institutions now have to meet qualification requirements not only in academic degree and practical experience, but also the instructional skills. The triple requirement causes a difficult situation of shortage of qualified trainers, instructors and assessors.

5.2.3 Quality system management

Quality system is often set up within an organization, together with procedures and quality assurance mechanisms, for the implementation of a QSS. Quality system should be fully examined because any poor performance of its elements could lead to the dissatisfaction or failure of the QSS implementation. Management aspects should also be examined for the same reason. In the following sections, some important elements of

a QSS are discussed on the basis of an investigation done for purpose of collecting necessary information on the implementation of QSS in MET institutions.

5.2.3.1 Quality system management
5.2.3.1.1 General aspects

General: The QSS in the educational field is quite different compared with those in other industries. In other industries, the product of an organization is often tangible. People in that organization can see most of the stages of the product being produced, but in the education field, what MET provides is a kind of service, an intangible product. The service could be designed and controlled too but intangibly. Thus, the implementation of QSS in the educational field is much more difficult in comparison to those in other industries.

Time: One of the difficulties identified is the time factor. (Figure 5.8, Difficulties in finding adequate time. Source: Feedback from survey)
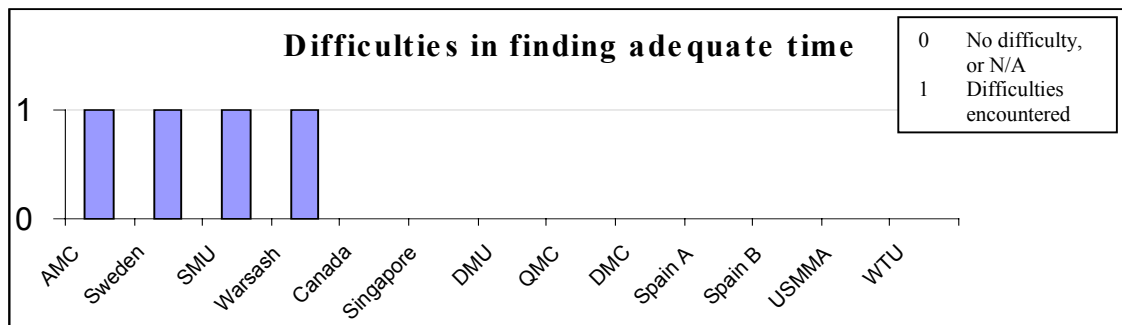
- *Australian Maritime College* --- 'It was a common complaint that the time given to the organizations for setting up the QSS is too pressing. Time consuming to implement is one of the main difficulties during the implementation of QSS.'
- *Warsash Maritime Centre, UK* --- 'Lack of time for developing procedures for implementation of education and training.'

- *Chalmers, a MET institution in Sweden,* --- 'One of the difficulties encountered in implementing and improvement the QSS is time factor.'
- *Shanghai Maritime University, P.R.China* ---'It takes long time to training employees.'

The pressing time, as indicated above, is resulted from various reasons, such as documenting all training programs, training people and developing some procedure. Getting all those done needs a quite long period of time. The STCW convention was enacted in 1995, and the new requirements should be given full effect by on 1st, February, 1997. There is in fact only a limited time for implementation.

Financial:

DNV certified some MET QSS in the world, which implies that information from it allows a broader understanding on the current MET QSS situation. A quality expert of DNV, Jager (1999) said in his feedback that,

> METs in many countries are government institutions and financed accordingly. Many METs do not get any money to propose advisory services financial freedom to make budgets for the third party certification. These institutions often have to trust resources among people already employed. This often delays the process to some degree due to lack of quality assurance knowledge and technique in the development process.

There is another feedback conveying the same difficulty. Shanghai Maritime University (1999) said, 'There is a shortage of funding for long time in China. It limits the existence and development of the education.'

In summary, financial situations for most of MET institutions are not optimistic. To fulfil the requirements of both hardware (such as training facilities) and software

(management and quality management , such as quality system) needs a strong finance injection.

5.2.3.1.2 Element-transferring of ISO standards

Most of the MET institutions are using a quality standard model according to or related to a certain ISO quality model. For those who adopted ISO standards, it is a very important step to transfer quality elements in ISO standards when establishing and implementing the QSS to their own system. It is somewhat difficult to do so, because the ISO standards in their first inception were mainly designed for the manufacturing industry.
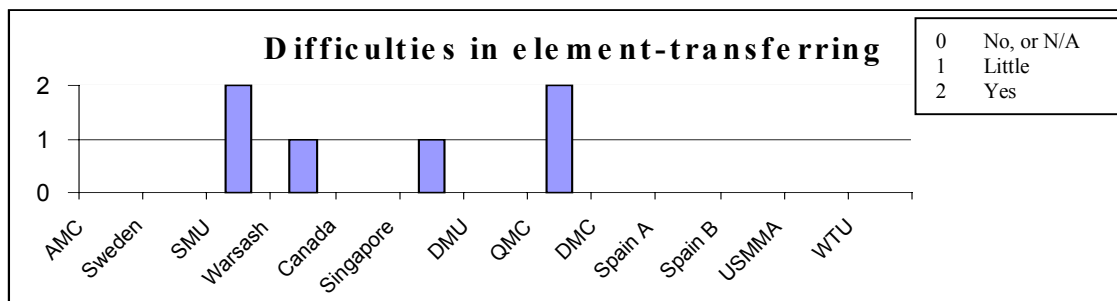
Figure 5.9 Quality element-transferring

Source: Feedback from survey

Figure 5.9 shows the situation of the difficulty within the investigated institutions, and below are the extractions from the feedback relating the difficulties in detail.

- *Singapore Polytechnic* ---'ISO elements vocabulary is not totally appropriate to education service that we provide. The ISO standards were developed for the manufacturing industry. All elements are not applicable.'

- *Shanghai Maritime University* --- 'It is a key factor to transfer the element but it is difficult to transfer elements.', and, 'It is worth to be noted that the elements in ISO standards have to be transferred before they are applied to the educational quality management in MET. Otherwise, it will be not feasible...'

- *Qingdao Maritime College* ---

    … Additionally, there are some problems and difficulties in transferring the design control, process control, etc., in the standard, such as the design planning, input and output, checking and confirmation, implementation, etc.

It should be noted that three of those four institutions are using the ISO standards. That is to say, these problems are usually encountered during the system element-transferring from the ISO standards to individual quality system. If an institution uses national standards, the difficulties then could be diminished.

5.2.3.1.3 Management Responsibilities

Feedback shows that a majority of the management representatives in MET institutions are faced with difficulties when they are discharging their responsibilities. (See figure 5.10 and extractions)
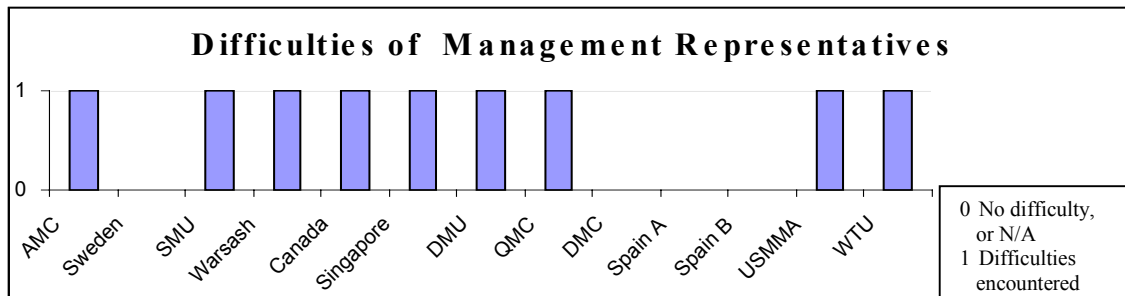

Figure 5.10 Difficulties of Management Representatives

Source: Feedback from survey

- *Australian Maritime College* --- 'The main difficulties of the management representative when executing his responsibility is, convincing staff that Quality Assurance is about improving the management of AMC not about retaining accreditation.'

- *Singapore Polytechnic* --- 'The main difficulties and problems faced by the quality representative when executing his responsibility are that those may be faced during the initial stages (when the system is immature) regarding the internal audits, writing of non-compliance by one auditors and acceptance of non-compliance by the auditees.'

- *USMMA, Kings Point, USA* --- 'The management representative is faced with the problems that the upper management is interested in the college degree not MET and the faculty resists the new assessment criteria under STCW'95.'

- *Fisheries and Marine Institute of Memorial University of Newfoundland, Canada* --- The management representative is faced with difficulties as follows:
  a. Effectively involving all personnel
  b. Making the implementation process a top priority at all levels

- *Dalian Maritime University* ---

  The difficulty faced by the management executive is that strong influences could be caused by the administrative rank of the management executive. The attention of the management executive in the top management is seldom centered on the quality management. Meanwhile, those management executives who are working in the middle level can not sit in the meetings related to the quality management. This affects the execution of the functions of the management executive.

- *Shanghai Maritime University* --- Difficulties faced by the management executive are:
  a. The out-of-date and shortage of educational aids, facilities, shortage of funding, affecting adversely the quality of teaching and learning, and the development of the disciplines.
  b. The ways in which the leaders (middle management) and employees deal with the relationship between the 'quality system' and their other work.

- *Qingdao Marine College* --- Difficulties met by the executives are:

  a. To enhance the quality awareness of the quality of the education and training among all employees in different levels of the organization, to increase the awareness and resolution of executing procedures at all levels, to understand fully the significance of 'Quality Record'.

  b. To increase the internal verification on quality, and to overcome the misunderstanding that no further effort needs to be made after certification.

  c. To pay heed to the effectiveness and adaptability of the system document, and to pay attention to the continuous improvement of the quality system.

Summary: What management representatives are mainly confronting are problems and difficulties related to:

- Awareness of quality

- Organizational relationship

- Participation of employees at all levels

- Management over employees on QSS matters

- Facilities available

- Support from top management, etc.

Most of those problems and difficulties are resulted from the introduction of the new QSS system. Management representatives thus have to deal with not only the daily management affairs as they used to do, but also the QSS matters such as managing processes, which might be quite new for him. Moreover, it should also be noted that the Management Representative introduced by the quality system is something completely new for some MET organisations, because previously there are not a clear stratum of management in those organisations. This of course increases the management difficulty.

5.2.3.1.4 Documentation

Any quality system can not work if there is no documentation function working. Documentation is not only necessary for establishment of a MET QSS, because all training programs should be in written form, including the standards of competence, but also important for daily operations of a quality system.

Documentation forms the basis of a quality assurance system. For a MET QSS, it should include entry requirements, specific training objectives, methods and media of delivery, course materials, assessment procedures, qualification and experience of teaching staff, facilities used (such as laboratories and simulators). Preparation of such documentation is probably the most time-consuming task.

As to the documentation in daily operation of a quality system, only a few institutions indicated that they really had some difficulties. (See figure 5.11) However, the difficulties in documentation did exist, which might be the complaints due to the time-consuming work, or the reluctance resulted from the heavy and tedious paperwork, etc.
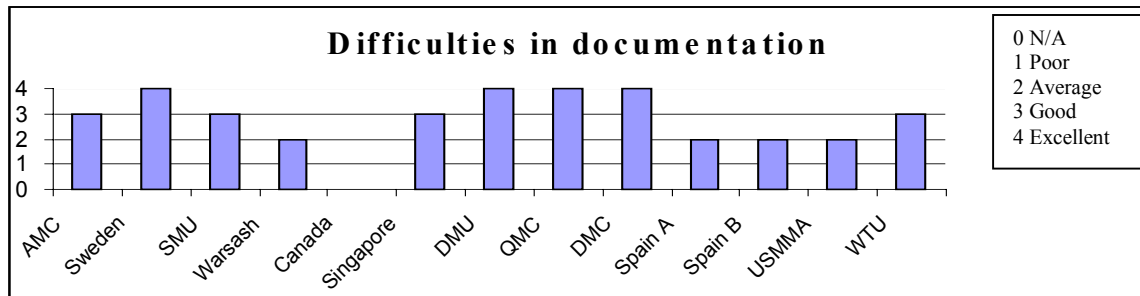
Figure 5.11 Difficulties in documentation

Source: Feedback from survey

5.2.3.1.5 Processes and Procedures

- **Processes**

Problems identified in general quality management could also occur during the implementation of MET QSS. In a quality system management, problems tend to arise where people have to manage several processes and their interrelationships, particularly for large processes that may span several functions. Thus the MET QSS, as one of the branches of the general QSS, has unavoidably the problems and difficulties when dealing with processes.

- **Procedures**
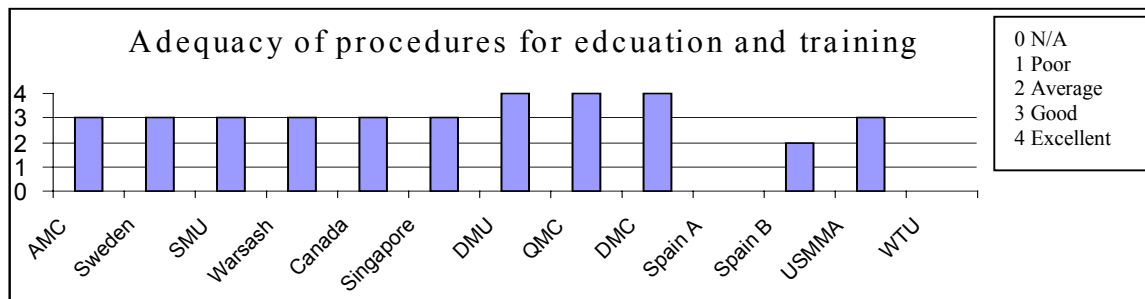
Figure 5.12 Adequacy of procedures for education and training

Source: Feedback from survey

- *USMMA, King Point, USA* --- The difficulty is, 'based on long standing methods used in higher education throughout USA and accepted by accreditation society, which affects the design and execution of procedures.'
- *Fisheries and Marine Institute of Memorial University of Newfoundland, Canada* --- 'Curriculum development has evolved over the past 10-12 years. Often there is a reluctance to follow a set format but once in place the new format is accepted and followed.'

The 'Procedures' has the same importance as the 'Documentation'. There are various procedures in a quality system, but here only talks about the procedures for education and training. The above feedback implies a difficulty in developing procedures, that is, a reluctance to change. Although no further difficulties were discovered, what most MET institutions experienced or are experiencing are the inadequacy of time and lack of experienced experts for procedures developing.

5.2.3.1.6 Quality records

Keeping quality records is an important work for any QSS. It provides information data for auditing and quality improvement, etc. The problem is that, it is time-consuming to do so and it leads to heavy paperwork. It is difficult to keep people in the organizations always interested in doing it.

Dalian Maritime University --- 'During the implementing QSS, keeping the practice of filling out the quality records very often increases the burden of the work. Someone does not bring up the habit, showing the reluctance to keep quality record. And someone thinks it is too tedious.'
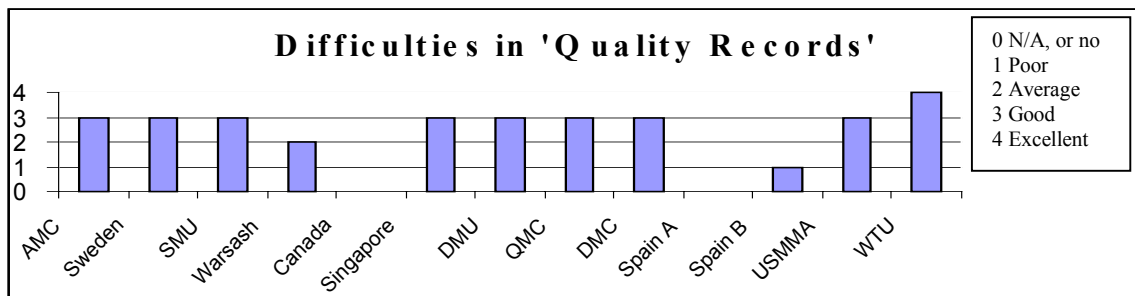
Figure 5.13 Difficulties in 'Quality records'

Source: Feedback from survey

5.2.3.1.7 Internal auditing

Feedback reflects that a majority of MET institutions encountered this difficulty during the implementation of QSS. (See figure 5.14)
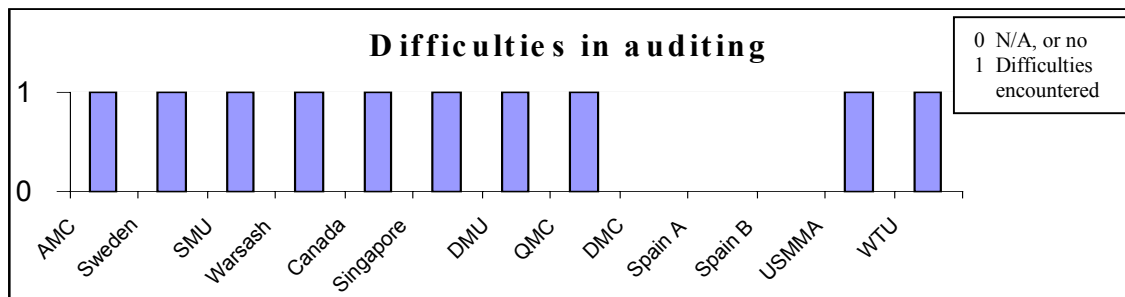
Figure 5.14 Difficulties in auditing

Source: Feedback from survey

- *Dalian Maritime University* ---'Some individuals do not want to be supervised. They don't want to be found fault by others. Therefore, they show antipathy towards the internal auditing and complaints, which are from other people, either from teachers or from students.'

- *Kings Point, USMMA, USA* --- 'Do not have QSS in place yet. Outcome assessment is stalled in its infancy with the accreditation bodies.'

- *Göteborg, Chalmers academy in Sweden* --- 'Referring a requirement to the correct Quality Management System chapter can be difficult.'

- *Dalian Maritime university* --- 'The internal auditor has to very often compromise when he finds non-conformities for the sake of the old friends. Although there is no direct relationship between the auditor and the unit to be audited, the auditor and the employees in that unit recognize each other. This affects the effect of the internal audit.'

- *Qingdao Marine College* ---
  a. A genuine auditing should be carried out for the system, to make sure the continuous adaptability and effectiveness of the system.

b. The internal auditing must be carried out on the pre-made plan, and the coverage of the plan should meet the requirements, increase the strength of the measurement, make the normal working of the system document.

- *Australia Maritime College* --- 'The problems and difficulties arisen during auditing are mainly identification of non-compliance seen as a black mark rather than an opportunity to rectify procedures or behavior.'

To summarize, the problems and difficulties in auditing are, lack of the participation from employees, improper management on auditing programs.

5.2.3.1.8 External evaluation and verification

It is always important to know how the quality system works and if it works well, sort of things. The external evaluation and verification, which is usually exerted by an external accreditation body, is the way to achieve this. The purpose of the evaluation is to provide an independent assessment of the effectiveness of the quality standard arrangements at all levels.

In MET, the external accreditation body could be a classification society, a certain national academic accreditation body, or a national quality accreditation body. Whether the external evaluation and verification is successful or not largely depends on:

- The qualification of the team conducting evaluation and verification
- The management of evaluation and verification programs
- The Co-operation from the organization being evaluated and verified

There is no examination on the external evaluation and verification in the investigation. But at least, keeping two quality standards in parallel as mentioned before consumes much time and finance.

5.2.3.1.9 Quality improvement

Quality improvement is a continuous activity, aiming forever-higher process effectiveness and efficiency. These activities often require new values and behaviour focusing on measuring customer satisfaction and acting on results.

The Plan-Do-Check-Act cycle by Dr. Deming is commonly used when describing continual quality improvement. Essentially, the cycle says:

P - Plan activities

D - Implement the cycle

C - Check the result

A - Improve the process
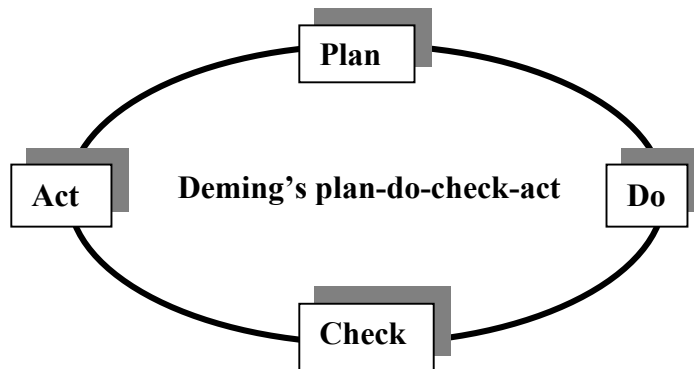
It is important to understand that there is a spiral circle in the quality management system providing continuous quality improvement. Unfortunately, such an importance was ignored or resisted by some employees in MET institutions. Feedback below (see figure 5.15 and extractions) reveals that the attitudes of employees are the predominant factor affecting quality improvement.
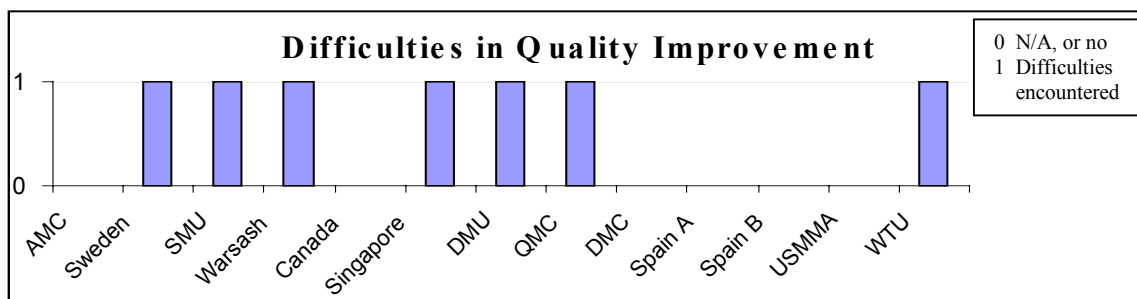
Figure 5.15 Difficulties in 'Quality Improvement'

Source: Feedback from survey

- *Dalian Maritime University* --- 'There is a thought from the leaders to the employees in the organization that they can have a break after passing the certification. Furthermore, there are always many things needed to be done in the daily university management. Therefore, there are not too many stresses being put on the quality improvement.'

- *Shanghai Maritime University* ---
  a. There are some difficulties to deal with the new added procedures.
  b. In the process of quality improvement, very often the employees lack of creativity. Moreover, they tend to improve the working quality according to the will of their own.

- *Qingdao Marine College* --- 'People tend to resist changes, and this becomes a barrier of quality improvement.'

5.2.3.2 Management

Good management practices such as using motivation, scientific management over human resources, good administrative management, encouragement to employees, are able to contribute a lot to QSS implementation, etc.

However, some unsatisfactory situations still exist. Shanghai Maritime University (1999) made remarks as follows:

> The way to employ people in domestic has not been changed yet, which affects the development and improvement. Cutting off low-level employees and taking in high level employees became a necessity in order to develop the university.

> When the employees execute the prescriptions or procedures of the quality system, they do that following the way that they used to do unintentionally. Non-conformities then occur.

Every employee should have the quality awareness, and then be able to develop their good practices to maintain the quality system automatically. Only by doing this can then the organization improve the quality of the product.

Qingdao Maritime College (1999) commented, 'It is difficult to improve the awareness of the employees at all levels. The way to educate and train people by dividing them into different levels must be taken.'

All those comments reflect the difficulties in management aspect. But the main difficulties are the weak quality awareness and poor participation from the employees.

5.2.4 MET learning and training programs

The MET learning and training programs are designed for the theoretical teaching and learning, and skill training. They are required by STCW'95 to be a part of the content of the QSS. Due to the conspicuous shift in STCW'95 (The training and learning, assessment requirements will be shifted from knowledge-based to competence-based side), the requirements consequently resulted in some changes in the following aspects, which caused some difficulties.

- **Development & documentation of education and training programs**

Prior to conducting education and training, institutions should get relevant education curricula and training programs developed and documented. Such a process of development and documentation is also necessary for special training such as tanker and ro-ro ship operation, and for revalidation, refresher and up-grading courses.

All these work should be done by a suitable person who is familiar with both the training and education, as well as is qualified with enough practical experiences. This raises the difficulties.

Zade (1996) said in his paper *New demands on maritime training institutions* stated that:

> Successful training programs should be conducted by a competent person, who has the experiences in relation to the training item. But there is a lack of such kind of a person with such maritime university; there is no one who has the experiences involved in ro-ro vessels. Secondly, development & documentation is a kind of time-consuming work.

Muirhead (1997) commented in more details about the difficulties that:

> It is very difficult, for example, to review programs that are poorly or inadequately documented if the experience in teaching and curriculum development and design is missing. Similarly, to examine the standards of competency tables in Code A and develop clear skill and competency objectives within existing programs, is not an easy task if a criterion based training and assessment approach has not been in use before.

To sum up, the difficulties here are; first of all, the work itself is time-consuming, and secondly, there is a lack of experienced persons to do the particular job.

- **Evaluation and assessment methods**

The shift from knowledge-based to competence-based requirements also resulted in the change of the way of evaluation and assessment.

Assessment is defined in STCW'95 as a process of comparing evidence of competence against a standard.

'**Competence**' is in chapter I of Code A of the STCW'95, which states inter alia:

…the level of proficiency to be achieved for the proper performance of functions on board ship in accordance with internationally agreed criteria… (As specified in the STCW Code)… incorporating prescribed standards or levels of knowledge, understanding and demonstrated skills.

Evidence of competence should include proof of the ability to apply skills, knowledge and understanding to the proper performance of functions aboard ships and the capacity to respond to changes in technology, different circumstances and contingencies.

The concepts of 'Competency' and 'Assessment of competency' are new for most of the MET institutions. They cause some difficulties. First of all, it is difficult to interpret the standards of competency as Muirhead (1998) stated that, 'the difficulty facing all institutions is in interpreting the standards in the competency tables in Code A.' Secondly, it is an developing progress for faculty to become familiar with the new evaluation and assessment methods. Zade (1996) continues his comments:

There should be some time for teachers to adapt to the new assessment method. Teachers should know how to identify effective objective evidence, how to obtain the evidence of knowledge, understanding and practical ability, etc. Beside, teachers should know the development of assessment criteria, of assessment material, the validation of the assessment material (by peer review, result comparison, industry involvement etc.

5.2.5 Learning and Training facilities

Facilities are indispensable for the QSS implementation, in particular in the MET QSS schemes under the STCW'95, which emphasises the practical skill acquisitions (competency). Failure to get necessary facilities in place lead to the failure of executing the training and learning programs, and will finally lead to the failure of the QSS

implementation. When the Reg.I/12 in STCW'95 *(Use of simulators)* requires compulsorily that radar and ARPA should be used in both the training and assessment of competency, which implies that every MET should be properly equipped with all necessary simulators for the training and assessment, the situation becomes more pertinent to have necessary facilities in place. When talking of the facilities, it usually refers to library, training ships, simulators and other workshops. But in this paper, it mainly refers to simulators.

Most of the simulators are expensive equipment. A GMDSS simulator costs about thirty to fifty thousands of dollars, and a full mission bridge simulator may even cost millions of dollar. Taking account of the expenditures spent on repair and maintenance for the equipment, the total cost will become higher. Information from DNV experts and SMU indicates that most MET institutions have been suffering from financial pressures for a long time. Therefore, the Reg.I/12 *(use of simulators)* undoubtedly throws a heavier

Marine Simulator facilities held by EU MET Academies

Diagram 1
Source: METHAR
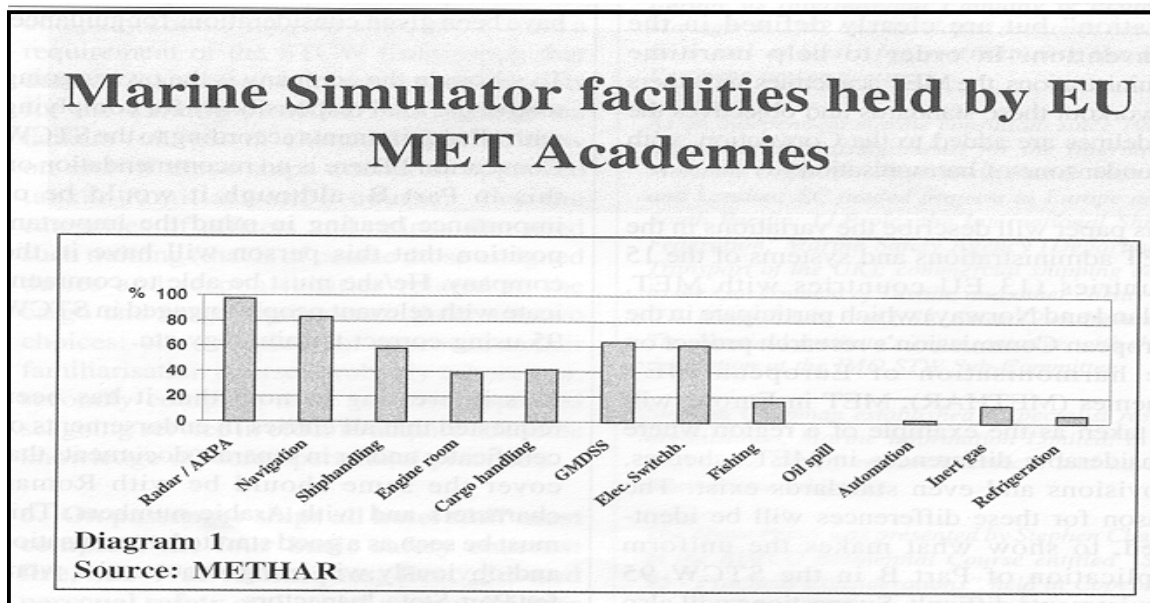
Figure 5.16 Marine simulator facilities held by EU MET institutions

Source: MARHAR , 1998

65

financial burden on MET institutions. Furthermore, according to the regulation in STCW'95, institutions have to consider when they decide to install simulators the capabilities of the simulators in meeting established performance standards and course training objectives, instead of only the price they can afford.

Figure 5.16 tells the situation of the deployment of marine simulator facilities in EU MET academies. It is easily to see that most of the MET in EU countries are equipped with the radar/ARPA simulators. However, simulators for special training such as inert gas are still scarce.

Chapter Six   Conclusions and recommendations

6.1 Conclusions

6.1.1 External environment

In the discussion of section 5.1, the problems identified in the external environment are:

- There is a lack of participation, involvement, co-operation, and support in the relationship between the MET institutions and shipping companies. This will affect adversely the implementation of the MET QSS. MET institutions thus on the one hand cannot understand clearly and correctly the needs of the industry, and on the other hand cannot get support (technology, funding, facilities, and information available) from the industry.

- The difficulty in the relationship between the HSB and MET institutions is mainly the harmonization of various quality standards. Keeping two quality standards in parallel will be a heavy burden in terms of time, management, quality management, and finance.

- Requirements from the State Education Committee, together with those from HSB, leads to an overlapped supervision and control on MET. MET institutions then have to try to meet all those requirements, which makes the MET institutions lost the freedom of keeping and creating characteristics. For individual faculty members in MET institutions, they are hard to meet a triple requirement (academic, practical experience, and instructional skill)

- Difficulty also arises due to the understanding by the MET institutions on the MET's role in the maritime community.

6.1.2 Internal environment

6.1.2.1 Qualification of faculty

This is one of the main concerns regarding the implementation of the MET QSS. Faculty in MET institutions is required to be qualified with a certain amount of academic education and practical experiences, and the knowledge on instruction. Major problems identified in this respect are lack of well-qualified and competent instructors (including simulator instructors), trainers and assessors.

6.1.2.2 Quality system management

- In the general aspects of quality system management, the problem identified is the shortage of funding in MET institutions. The financial problem in fact can affect the implementation of a QSS a lot because all work such as preparations for the establishment of the QSS, external evaluation and verification, and install simulators costs a lot of money.

- In studying the quality system management, some important elements for the MET QSS such as Management Representative, documentation, records, procedures are examined. Difficulties encountered in summary are
  - a. inadequate knowledge on quality system management
  - b. lack of quality awareness
  - c. problems in organisational relationship
  - d. failure to involve all employees
  - e. problem in getting the available resources
  - f. no strong support from the top management
  - g. time-consuming in documentation, procedure developing and quality records
  - h. heavy paperwork in documentation, procedure developing and quality records
  - i. lack of the competent person to do documentation, procedure developing

j. reluctance to change

k. improper management over auditing program

l. passive attitude of the employees towards the Quality Improvement, poor awareness of quality improvement, and inadequacy of quality improvement technique

- Finally in the management aspects, several problems and difficulties were identified in the aspects of administration management, human resources, willingness to change, and participation awareness.

6.1.2.3 MET learning and training programs

One of the major concepts brought by the STCW'95 is 'Competency', which results in the problems and difficulties are follows:

- Time-consuming, and difficult to interpret the standards of competency when develop & documentation of the training programs.

- The difficulties arisen due to the shift of the evaluation and assessment methods.

6.1.2.4 Training facilities

Simulators are the main training facilities in MET, used for education and training purposes. The STCW'95 not only requires the installation of the simulators (compulsory for radar and ARPA), but also a certain performance ability by the installation. The problem is, that there is an inadequacy of training facilities.

6.2 Recommendations

- **Relationship with external parties**

a. Mutual understanding and support, and co-operation, in the respects of quality management, technique development, information exchange, and policy-making

b. Encouraging participation from all parties, and use more feed back from industry

c. Creating an environment for good communication

- **Qualification of faculty (for instructors, trainers and assessors)**
  a. Training people for instructional skills, by assigning them to a short course, or using IMO model courses, or using leading technologies such as Internet, distance learning, satellite technology. Additionally for simulator instructors, it is feasible to undertake the manufacture's training programs.
  b. Seeking technical assistance and co-operation, in a way of holding symposium, workshops, etc., or using relevant organisations such as IMLA.
  c. Assigning faculty on board ship for better practical sea-going experience.

- **Training facilities**
  a. Sharing facilities such as simulators and training ships with other institutions, or with commercial companies.
  b. Designing and developing, or updating the training facilities by the faculty in the institution.
  c. Requiring for an investment by government.

- **Quality system management**
  a. Encouraging the participation, improving the quality awareness and involving the whole organisation, by creating a quality culture within the organisation.
  b. Using quality assurance knowledge and techniques, such as process management, brainstorming, benchmarking, cause-and effect diagram, flowchart, histogram, statistics, etc.
  c. Enhancing the use of quality assurance mechanisms, such as quality planning, preventive and correction procedure, auditing, verification and evaluation, and quality improvement. Those are the critical factors affecting the continuous development of the system.

d. Managing scientifically the processes and procedures, and putting emphasis on the quality improvement.

e. Using available information for quality management reference. The ISO guidelines and successful industry experience could be useful.

f. Enhancing the relationship with customers, strategic partnership for quality,.

g. Using computer-based method for quality records.

h. Training people for a better quality system management.

i. Requesting for investment for the construction of the quality system.

j. Seeking support and co-operation from other MET institutions or commercial companies.

- **Management**

  a. Create an environment positively affecting the value, attitudes and behaviour of employees.

  b. Use management science, such as TQM, teamwork, motivation, leadership, organisational management.

  c. Change of organisational structure, harmonise various relationships across different department.

  d. Good communication

Finally, a citation is made for the closing of the dissertation, giving out an outlook for the future of the MET QSS. Jager (1999), a quality expert from DNV gave out his perceptions of his own that:

> The development and implementation process in MET in comparison with other kinds of "companies" is that people employed in METs are professionals in communication, and that helps in the implementation process. They are used to lessen plans etc. And tend to be very structured in the development process. Generally they have a good understanding of document controls.

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Appendix 1

Feedback from MET institutions in China

This form is made on the basis of the statistics of the responses of the questionnaires sent to five Chinese institutions. Those institutions are, Shanghai Maritime University, Dalian Maritime University, Dalian Marine College, Qingdao Marine College, Wuhan Transportation University.

Some of figures, however, are incomplete because some questions are left unanswered. But, it does give out the results to some extent. Meanwhile, The appendix does not include the written part of the feedback.

Part one: General

1.   The selection of Quality Standard model at your academy

| 3 | ISO standards |

| 3 | Related National standards |

| | Other standards |

| | Combination |

2.   If you adopted ISO standard, did you then have any difficulties in transferring that into your system?

| 2 | Yes | | A little | | No |

Part two: Quality Standard System

1.   How would you describe the possibility to make your Quality Policy understood, implemented and maintained at all levels of your organization?

	Very good					
1	Very good	3	Good		Poor		Bad

2.   How would you define the responsibility, authority and the relation of all personnel related to MET quality?

| 1 | Very good | 3 | Good | | Poor | | Bad |

3. How would you describe your intake and admission control procedures?

| 1 | Very good | 3 | Good | | Poor |

Are you satisfied with the general entry standards of new students?

[ ] Very good   [4] Good   [ ] Poor

4. How is the general qualification of your teaching staff, trainers, and assessors?

[2] Excellent   [2] Good   [ ] Average   [ ] Poor

5. How is the general qualification of your management and administrative staff?

[1] Excellent   [3] Good   [ ] Average   [ ] Poor

6. How is your procedure for new staff to get proper familiarization with their new job?

[4] Yes   [ ] No

7. How would you describe the education and training facilities of your academy (library, simulators, etc.)?

[ ] Excellent   [4] Good   [ ] Average   [ ] Poor

8. How would you evaluate procedures for implementation of education and training (e.g. to develop curriculum and training programs, to set objectives, assessment activities, etc.)?

[3] Good   [ ] Average   [ ] No set procedure

9. How does the control of quality records function?

[1] Excellent   [4] Good   [ ] Average   [ ] Poor

10. How would you describe the procedures for evaluation and assessment of the training and education at your academy?

[3] Excellent   [1] Good   [ ] Average   [ ] Poor

11. How would you describe the procedures for correction and prevention?

[2] Excellent   [1] Good   [1] Average   [ ] Poor

12. How would you describe you system for evaluation of documentation and data control?

[3] Excellent   [2] Good   [ ] Average   [ ] Poor

13. Do you have a procedure for the evaluation of sub-contractors (e.g. suppliers providing textbooks, learning materials)?

[3] Yes   [1] No

14. Do you have a "procedure for writing procedures"?

| 3 | Yes | | 1 | No |

15. How do you in general evaluate your Quality Manual?

| 2 | Excellent | | 2 | Quite good | | | General | | | Poor |

16. What about the effect of Q.S.S as a whole?

| 1 | Excellent | | 3 | Quite good | | | General | | | Poor |

17. What are your colleagues' general views on Quality Standard System?

- It is costly   [ ] Yes   [4] A little   [ ] No

- It is a massive paper generator   [3] Yes   [1] A little   [ ] No

18. Qualification of auditors in your academy

| 2 | Excellent | | 2 | Good | | | Average | | | Poor |

19. Management of auditing programs in your academy

| 3 | Excellent | | 1 | Good | | | Average | | | Poor |

20. Which of the following groups does your external authority for auditing belong to?

| 1 | Classification society |

| 2 | International accreditation body |

| 1 | National accreditation body |

| | Combination bodies of the above |

21. Are statistics technologies widely applied in the management of Q.S.S?

| 2 | Yes | | 1 | No (Shanghai Maritime University: partly applied) |

22. Do you have more meetings and other planning activities since the adoption of Q.S.S?

| | Yes | | 2 | No | | 2 | A little |

Part three: Management

1. How did your shape your Quality system?

   ☐ Just a simple transplant of directives without the involvement of different departments

   ☐ 1 Just a rigid transplant from ISO standards, without the involvement of various department

   ☐ 3 A version of a certain standards after some suitable modification then applied.

2. How would you describe the communication between sections and departments?

   ☐ 3 Good   ☐ 1 Average   ☐ Poor

3. Do you have a clear job description for the employees?

   ☐ 1 Excellent   ☐ 3 Quite good   ☐ General   ☐ Poor

4. Did people in your organization show a reluctance to change?

   ☐ Yes   ☐ No   ☐ 4 A little

5. Any difficulties in the Q.S.S implementation because of your specific culture?

   ☐ Yes   ☐ 3 No

6. Any special difficulties because you are a MET academy?

   ☐ Yes   ☐ 3 No

7. Did your make any adjustment in terms of the organizational structure and functions in order to meet the requirements of the Q.A.S?

   ☐ 3 Yes   ☐ 1 No

8. Did the introduction of a Q.S.S in your academy result in a modification of
   - Curriculum and training program development

     ☐ 3 Yes   ☐ 1 No

   - Training methodology

     ☐ 3 Yes   ☐ 1 No

   - Evaluation methods

     ☐ 4 Yes   ☐ No

Appendix 2

Feedback from the other MET institutions worldwide

This form is made on the basis of the statistics of the responses of the questionnaires sent to eight MET institutions worldwide. Those institutions are, Australia Maritime University, Singapore Polytechnic, Fisheries and Marine Institute of Memorial University of Newfoundland, Canada Chalmers, MET institutions of Sweden, Göteborg, two maritime universities in Spain, USMMA, in Kings Point, USA, Warsash Marine Center.

Some of figures, however, are incomplete because some questions are left unanswered. But, it does give out the results to some extent. Meanwhile, The appendix does not include the written part of the feedback.

Part one: General

1. The selection of Quality Standard model at your institution

| 5 | ISO standards |

| 5 | Related National standards |

| | Other standards |

| 1 | Combination |

2.   If you adopted ISO standard, did you then have any difficulties in transferring that into your system?

| | Yes | 2 | A little | 2 | No |

Part two: Quality Standard System

1.   How would you describe the possibility to make your Quality Policy understood, implemented and maintained at all levels of your organization?

| | Very good | 7 | Good | 1 | Poor | | Bad |

2.   How would you define the responsibility, authority and the relation of all personnel related to MET quality?

| 2 | Very good | 5 | Good | | Poor | | Bad |

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4. How would you describe the documentation procedure for teaching planning?

| 1 | Very good | 5 | Good | 1 | Poor |

5. How would you describe your intake and admission control procedures?

| 3 | Very good | 4 | Good | 1 | Poor |

Are you satisfied with the general entry standards of new students?

| 3 | Yes | 3 | No |

6. How is the general qualification of your teaching staff, trainers, and assessors?

| 1 | Excellent | 5 | Good | 2 | Average | | Poor |

7. How is the general qualification of your management and administrative staff?

| | Excellent | 6 | Good | 1 | Average | | Poor |

8. How is your procedure for new staff to get proper familiarization with their new job?

| | Excellent | 4 | Good | 3 | Average | 1 | Poor |

9. How would you describe the education and training facilities of your institution (library, simulators, etc.)?

| 5 | Excellent | 3 | Good | | Average | | Poor |

10. How would you evaluate procedures for implementation of education and training (e.g. to develop curriculum and training programs, to set objectives, assessment activities, etc.)?

| 6 | Adequate | 1 | Average | 1 | No set procedure |

11. How does the control of quality records function?

| | Excellent | 4 | Good | 1 | Average | 1 | Poor |

12. How would you describe the procedures for evaluation and assessment of the training and education at your institution?

| 1 | Excellent | 5 | Good | 2 | Average | | Poor |

13. How would you describe the procedures for correction and prevention?

| 1 | Excellent | 4 | Good | 2 | Average | | Poor |

14. How would you describe you system for evaluation of documentation and data control?

| 1 | Excellent | 2 | Good | 4 | Average | | Poor |

15. Do you have a procedure for the evaluation of sub-contractors (e.g. suppliers providing textbooks, learning materials)?

| 4 | Yes | 3 | No |

16. Do you have a "procedure for writing procedures"?

| 5 | Yes | 3 | No |

17. Does your academy consider the elements of quality cost?

| 4 | Yes | 2 | No |

18. How do you in general evaluate your Quality Manual?

| | Excellent | 3 | Quite good | 3 | General | | Poor |

19. What about the effect of Q.S.S as a whole? **(not known yet in USA)**

| | Excellent | 2 | Quite good | 2 | General | | Poor |

20. What are your colleagues' general views on Quality Standard System?

- It is costly | 3 | Yes | 2 | A little | 1 | No
- It is bureaucratic | 4 | Yes | 2 | A little | | No
- It is a massive paper generator | 2 | Yes | 3 | A little | 1 | No
- It only places an emphasis on correction | | Yes | 5 | A little | 1 | No
- It places emphasis on prevention (Singapore)

20. Qualification of auditors in your institution **(None yet in USA)**

| | Excellent | 4 | Good | 1 | Average | | Poor |

21. Management of auditing programs in your institution

| | Excellent | 4 | Good | 1 | Average | 1 | Poor |

22. Which of the following groups does your external authority for auditing belong to?

3	Classification society
2	International accreditation body
3	National accreditation body

1 Combination bodies of the above

23. Are statistics technologies widely applied in the management of Q.S.S?

1 Yes   **4** No (**Singapore: some**) (**USA: do not know yet**)

24. Do you have more meetings and other planning activities since the adoption of Q.S.S?

1 Yes   **3** No   **1** A little(**USA: not adopted yet**)

Part three: Management

1. How did your shape your Quality system?

   1 Just a simple transplant of directives without the involvement of different departments

   ☐ Just a rigid transplant from ISO standards

   4 A version of a certain standards after some suitable modification then applied.

2. How would you describe the communication between sections and departments?

   2 Good   **6** Average   ☐ Poor

3. Do you have a clear job description for the employees?

   7 Yes   **1** No

4. Did people in your organization show a reluctance to change?

   2 Yes   **1** No   **4** A little

5. Any difficulties in the Q.S.S implementation because of your specific culture?

   2 Yes   **5** No

6. Any special difficulties because you are a MET academy?

   2 Yes   **5** No

7. Did your make any adjustment in terms of the organizational structure and functions in order to meet the requirements of the Q.A.S?

   ☐ Yes   **4** No

8. ___d the introduction o___ Q.S.S in your institution result in a modification of

- Curriculum and training program development

   2 Yes   **5** No

- Training methodology

  | 1 | Yes | 6 | No |

- Evaluation methods

  | 3 | Yes | 4 | No |