

Quality Assurance in Shipping and Maritime Education

Gilsoo Kim*

海運과 海技教育에 있어서의 품질보증에 관한 연구

金 吉 洙

〈목 차〉

- | | |
|---|--|
| 1. Introduction | 5. 'SERVQUAL' dimensions applied to shipping/logistics |
| 2. Why quality management in shipping? | 6. Quality control and standards |
| 3. The concept of service and service quality | 7. Quality assurance in shipping |
| 4. Service quality defined as gaps between perceptions and expectations | 8. Quality Assurance in Maritime Education |
| | 9. Conclusion |

1. Introduction

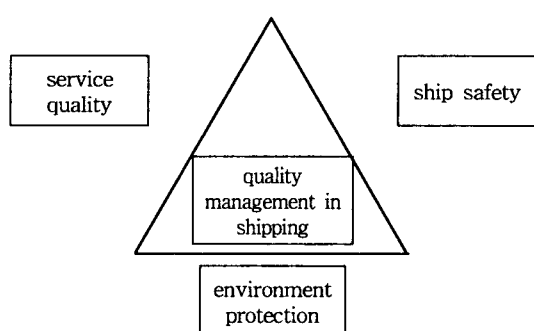
This article explores both what quality of service is and how the quality of maritime education can be improved or guaranteed. The shipping industry is a service industry, based on a derived demand, particularly derived from manufacturing industries. The world manufacturing industry has been becoming sophisticated in terms of time(JIT manufacturing) as well as geography(global sourcing and manufacturing). The sophisticated manufacturing industry has been developing quality management, resulting in TQM(total quality management).

Shipping industry is not immune to the sophistication such as JIT and TQM. Shipping industry itself needs to be equipped with quality service, which means cost-effectiveness, efficiency and reliability. In addition, shipping industry is asked to satisfy the requirements of international community to secure the safety of ships and hence the cargo and ocean environment.

The dimensions of service quality in shipping, thus, may be identified as following three factors—customer satisfaction, ship safety, and environment protection. 'Service quality' in figure 1 means the quality of service provided to shippers and freight forwarders that use

* 한국해양대학교 해사수송과학부 부교수

shipping as a transportation means. 'Ship safety' means the safety of cargo as well as ship itself, which should be afloat and can navigate to the destination with seaworthiness. 'Environment protection' means the pollution control against sea which is polluted during ship operation (like ship's crew sewage) or by accident (like oil pollution) and polluted by air emitted by ship's engine.



Source: The author

Figure 1. Three dimensions of quality management in shipping

Three factors of quality management in shipping is further explained in table 1. It shows that service quality is achieved by company-built measures; safety, by ISM code or ISO 9000; environment, by ISO14002. The service quality is mainly pursued by shore-based office;

safety, by ship; and environment, by ship again. Principal benefactors are shippers, cargo and ship, and general public respectively. Service quality can be monitored by measuring gaps; safety, by audit; and environment, by audit again.

This article, therefore, consists of four parts-service quality, quality control, quality assurance in shipping and quality assurance in maritime education.

2. Why quality management in shipping?

It were Deming, Juran and Fiegenbaum that laid the foundation of quality control in manufacturing sectors not in service sectors. They suggested a set of steps or points- Deming's fourteen points, Juran's quality planning road map and Fiegenbaum's ten benchmarks.

Quality management has a positive effect on a company's market share and profitability. Quality management creates more employee sensitivity to the issue of quality. This generates a higher level of quality, which impacts on both more increased repurchase and more increased sales from positive word of mouth.

The expectations towards market share and profitability make many shipowners and operators be committed to quality shipping. Ship

Table 1. the elements of shipping service quality

	Service quality	Safety	Environment
Means to achieve	<ul style="list-style-type: none"> • Company-built measures such as timeliness, responsiveness • ISO 9000 	<ul style="list-style-type: none"> • ISM code • ISMA code • SOLAS IX • ISO 9000 	<ul style="list-style-type: none"> • ISO 14002
Principal actor	<ul style="list-style-type: none"> • Shore-based office 	<ul style="list-style-type: none"> • Ship 	<ul style="list-style-type: none"> • Ship
Principal benefactor	<ul style="list-style-type: none"> • Shipper 	<ul style="list-style-type: none"> • Cargo and ship 	<ul style="list-style-type: none"> • General public
How to monitor	<ul style="list-style-type: none"> • Gap(expectations-perceptions) measurement 	<ul style="list-style-type: none"> • Audit 	<ul style="list-style-type: none"> • Audit

Source: The author

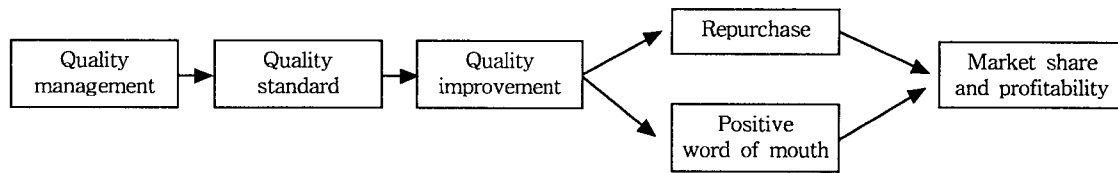


Figure 2. Benefits of quality management

management companies also developed the ISMA(International Ship Managers' Association) code. The ISM(International Safety Management) code has finally come into force internationally. High quality service itself is not an end but results in benefits for the organisation. The drive to quality in shipping sector has had three significant features: positive company image, lower costs and higher market share, and decreased liability.

- **Positive company image.**

A reputation for high-quality service creates a positive image for shipping lines. This in turn helps a shipping company increase sales, obtain funds from various lending agencies and recruit better personnel.

- **Lower costs and higher market share**

Quality enhancement increases productivity and lowers rework time, scrap costs, and warranty costs, leading to increased profits. Improved performance enables the company to increase its market share and gain competitive advantage through economies of scale.

- **Decreased liability**

Shipping companies have been facing complaints caused by transportation or ship accidents. Successful launch of quality assurance system such as ISO and ISM shall typically

result in improved service performance and lower liability costs.

3. The concept of service and service quality

The management of service quality in shipping and logistics companies has become more important than ever. A survey revealed that three quarters of the Australian respondents and 68 per cent of the American respondents reported that their firms had implemented an active quality management program in logistics.²⁾ This figure demonstrates the present situation of the quality management within the logistics activities.

Shipping and logistics services can be regarded as a possession processing service and medium-contact service. A possession processing service means that the service is given to an object not to a person so that there is no real need for the customers to step in the service factory while it is being processed.³⁾ For example, when a shipper is serviced by shipping company, his cargo (not he himself) is actually carried by the ship operator. Shipping may be regarded as medium-contact service rather than 'high-contact service'. The contact occurs between the customer and shipping/logistics

2) Sohal, Amrik S., Maggard Michael, Robert Millen and Moss Simon (1999), Quality in Logistics : A Comparison of Practices Between Australian and North American/European Firms, *International Journal of Physical Distribution & Logistics Management*, Vol.29, No.4., p.269.

3) Lovelock H. Christopher(1996), *Services Marketing*, Third Edition, Prentice Hall, U.S.A, p.30.

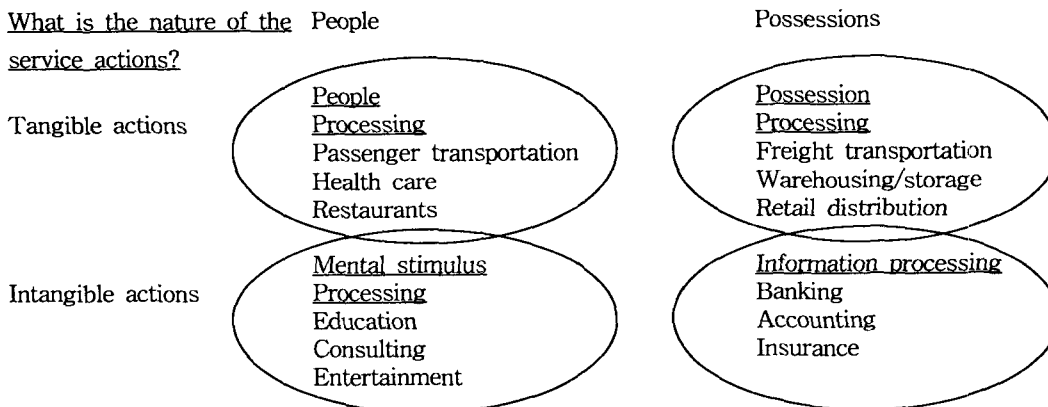
provider during the service delivery and visible component of the service operations (physical facilities and contact personnel) to the shipper is very small.

Services could be classified into four major groups according to the nature of the service action; people processing, possession processing, mental stimulus processing, and information processing. Within people processing services, customers enter the location of the provider. Passenger transportation and restaurants may be the example of such services. On the other hand, within the possession processing services, there is no real need for the customers to step in the service factory because that service is given to an object such as freight etc. Freight transportation, warehousing/storage and retail distribution are the examples of possession processing (figure 3). Mental stimulus processing, are related with the education, consulting, entertainment, etc. Such

services interact with the mind of people. Information processing services, as the name implies are very much concerned with the information. Examples of such services are banking, accounting, etc.

The perception of the quality of a service is determined on two dimensions—a technical dimension and a functional dimension.⁴⁾ Technical quality is related with what the customers receive in their interactions with the firm, and mainly covers the activities within technical core of the service process. The examples of the technical actions in shipping and logistics sector include transportation of the shipper's cargo from one place to another place and the storage of the customer's commodities in the warehouse. Technical quality can be measured rather objectively by customers. Functional quality is related how the customer receives the service, and covers the contact

Who or what is the recipient of the service ?



Source: Lovelock H. Christopher (1996), *Services Marketing*, Third edition, Prentice Hall, U.S.A, p.29.

Figure 3. The nature of the service actions and logistics

4) Gronroos Christian (1990), *Service Management and Marketing : Managing th Moments of Truth in Service Competition*, Lexington Books, Massachusetts/Toronto, p. 37.

personnel and physical facilities. Moments of truth determine the level of functional dimensions. Politeness and friendliness of the personnel, appearance and behaviour of the sales personnel, appearance of the printed materials are the examples of the functional dimension. Functional quality can not be measured as objectively as the technical quality.

Service quality is described as a form of attitude, which is related to satisfaction but not equivalent to it. Satisfaction comes out of the comparison of customer's expectations with the performance of service providers.⁵⁾ Quality, therefore, is what customers perceive. Perceived service quality differs from satisfaction in that service quality is the customer's attitude or general judgement of service superiority over time, whereas satisfaction is connected to a specific transaction.⁶⁾

Satisfaction is strongly influenced by customer expectations, which are affected by experience. For example, if the customer has a bad experience, then the expectation will decline. A good experience tends to raise the expectation. Thus expectations change over time, often for the better. The expectations are a very important influence on satisfaction through the mechanism of 'gap'.

The gap between perceived quality and expected quality is a very powerful predictor of satisfaction. Consider, for example, a situation that perceived quality is higher than expected. This situation will usually result in satisfaction, and will almost always result in enhanced expectations for the service. The opposite is also true. Perceived quality not as high as expected

will result in dissatisfaction, which might lower future expectation. These gaps form the conceptual basis for the SERVQUAL model for service quality and satisfaction.

Ultimately, perceived positive gap drives customers to purchase and repurchase due to value for the service. Value is formed by the relationship between quality and service as is shown in figure 4. The higher the quality, the higher the value, and the higher the price the lower the value. For example, a service may be very expensive, but because it is also of very good quality, its value is high. It can be expressed as:

$$\text{Value} = U(q) - U(p)$$

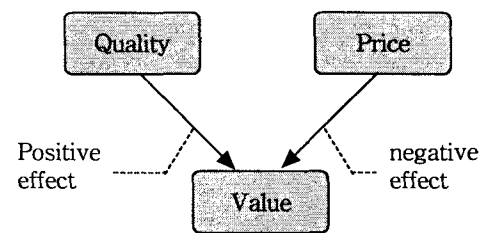


Figure 4. value determined by quality and price

The formula says that value is utility of quality minus utility of price. Better value of a service is given if the quality utility of the service, which is quite individualistic, exceeds the price utility of the service, which is quite individualistic again. Some people may be willing to pay more money for better service, but others may refuse to pay.

The perception of the buyers of the service determines the quality level. Service interactions

5) Parasuraman A., Zeithaml V. and Berr, L.(1988), SERVQUAL: A Multiple Item Scale for Measuring Consumer Perceptions of Service Quality, *Journal of Retailing* 64, (Spring), p. 12.

6) Bitner, M.j.. (1990), Evaluating Service Encounters: The Effects of Physical Surroundings and Employee Responses, *Journal of Marketing*, Vol.54, April, p.69 ; Parasuraman A., Zeithaml V. and Berr, L.(1988), op.cit, p. 12.

between the shipper/logistics providers and customers have a very important impact on the service quality perceived. Interactions include series of moments of truth / boundary spanning according to the contact level. In the case of shipping/logistics services, volume of the moments of truth are smaller compared with the high-contact services such as education, restaurant services etc.

Behavioural intentions of the customers occur according to the perceived service quality. Behavioural intentions can be analysed in two major groups, favourable and unfavourable. When the customers praise the firm, express preference for the company over others, increase the volume of their purchases, or agreeably pay a premium, they are indicating behaviourally that they are bonding with the company⁷⁾. Customers with favourable intentions are, considering the service company as a first choice every time, recommend the company to other people and, continue to do business with the company. It can be said that there is a positive correlation between the perceived service quality and favourable intentions of the customers.⁸⁾

On the other hand, customers perceiving service performance to be inferior are likely to

exhibit behaviour signalling they are poised to leave the company or spend less with the company.⁹⁾ The unfavourable perception may drive the customer to move to a competitor that offering better prices and, doing less business with the company in the next years etc.

Properly exploited, logistical performance can help gain and maintain profitable customers. Service quality enhancements have been shown to consistently result in market share and revenue gains.¹⁰⁾ Organisations in virtually every market sector have come to recognise that differentiation through superior customer service offers an opportunity to avoid price competition.¹¹⁾

Today's customers demand a number of services that add value to their business, including; a high level of productivity, on-time delivery as promised at the time of sale, a shorter cycle time from order placement to delivery, flexibility in packaging, labelling and pallet configurations, effective communications with multiple levels in the organisation, zero damage at receipt, hassle-free transactions and after-sales support¹²⁾.

Another important element in quality management in logistics can be customer complaints. Wagner¹³⁾ has stated four major

7) Zeithaml, Valerie A., Berry, Leonard L. and Parasuraman A. (1996), The Behavioural Consequences of Service Quality, *Journal of Marketing*, Vol.60., April, p.34.

8) Liljander, Veronica and Strandvik Tore (1995), *The Relation Between Service Quality, Satisfaction and Intentions*, *Managing Service Quality* (Edited By : Kunst Paul and Lemmink Jos), Paul Chapman Publishing, The Netherlands, p.51.

9) Zeithaml, Valerie A., Berry, Leonard L. and Parasuraman A. (1996), op.cit., p.34.

10) Ellinger Alexander E., Daugherty Patricia J. and Gustin Craig M. (1997), The Relationship Between Integrated Logistics and Customer Service, *The Logistics and Transportation Review*, Vol 33.E, No.2 , June, p.130.

11) Christopher Martin(1997), *Marketing Logistics*, Butterworth Heinemann, Oxford, p.17.

12) Inglis, Paul F. (1992), Quality Logistics: A Key Competitive Advantage, *Canadian Business Review*, Summer, Vol. 19, Issue 2, p.30.

13) Wagner William (1994), Managing Customer Complaints in Distribution, *International Journal of Physical Distribution and Logistics Management*, Vol. 2 No.3, June, p.14.

groups in customer service complaints in the field of logistics: traffic and transportation, storage and warehousing, inventory maintenance and control, and order processing. Lost merchandise, errors in freight bills and bill of lading, damaged goods are the examples of the traffic and transportation complaints. Late delivery, warehouse release error forms and, incorrect type of container are related with 'storage and warehousing' complaints. Minimum order size are related with inventory maintenance and control. Complaints on order processing cover late shipments, brokerage errors and, duplicate errors etc.

4. Service quality defined as gaps between perceptions and expectations

Parasuraman et. al. have developed a model

called gap analysis which intends to analyse sources of quality problems and to improve the service quality level as is explained in figure 5. Expected service is the function of word of mouth communications, organisational needs and past experience. According to this model, there are five gaps within the service quality;

- gap 1 : the difference between the consumer's expectations and management perceptions of consumer expectations. This gap arises when the management does not understand how the service should be designed, what support or secondary services the customer requires, etc.
- gap 2 : the difference between the company's quality specifications and management perceptions of consumer expectations of the service and its quality. This gap arises, in spite of good specifications, when management, in an

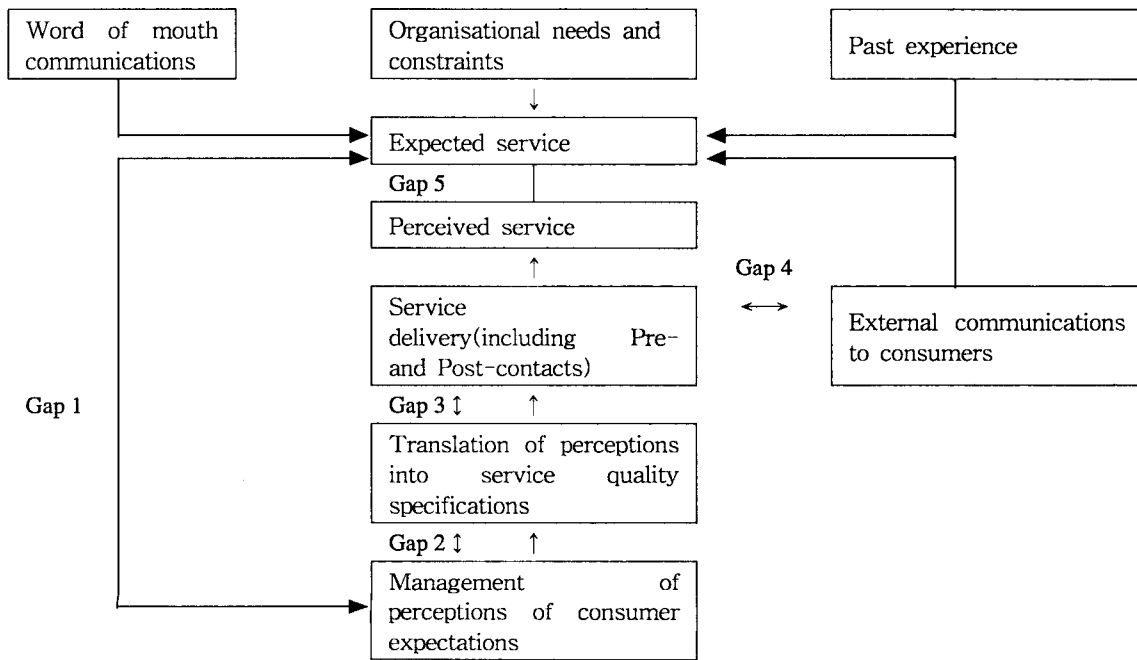


Figure 5. Conceptual model of service quality

attempt to reduce costs, deprive the staff of the opportunity to meet the customer's expectations.

- gap 3 : the difference between the quality of the service delivery and quality specifications. This usually happens because quality of service is so often dependent on personal contact between the customer and company staff.
- gap 4 : the difference between the quality of the service delivery and the quality promised in marketing. Customers may feel that the company did lip service only.
- gap 5 : the difference between expected and perceived service quality. This gap is the function of the other four gaps, i.e. Gap 5 = f(gaps 1,2,3,4)

The expectations of customers may vary from company to company. A shipping company listed the expectations of its customers arising from six areas;¹⁴⁾

- The negotiation and agreement of terms and conditions,
- Purchase order tracking,
- Transportation from customers' premises to port,
- Seaborne leg of the cargo movement,
- Transportation from port to customer's premises,
- The handling of cargo documentation.

The result of expectations minus perceived quality produces words of mouth, which will affect the market share or profitability of the firm. Followings are the words of mouth collected from shipping magazines.

- An asian exporter : *The standard of customer*

service by most of the carriers is very good. Delays to vessels are our biggest problem, which happens with all carriers

- An asian exporter : *Most of the lines give the same standards of service, which we believe is a good one. The service we receive is much better today than it was in the past*
- An asian importer/exporter : *In our experience, all the major carriers offer the same quality of service across the trades that they operate in*
- A us-based importer/exporter : *Anzdl is very forward thinking and its service levels meet our criteria for documentation, sailing, equipment, bookings and more. Its customer service department works extended hours, so they are always there when we need them*
- A north european exporter : *We mainly use p & on as we find its standard service is very good - we have no complaints. I have to say, though, that some of the other major carriers are not as good. The main problem we find is the lack of a regular contact person with some of the lines when booking cargo with them*
- A north european importer : *We have found that the standard of customer service from the major carriers has improved considerably over the years. This has been particularly the case in accuracy of documentation*

5. 'SERVQUAL' dimensions applied to shipping/logistics

In order to provide good service to shippers

14) Containerisation International(1998), Keeping Customer Satisfied, October, p.39.

the dimensions which constitute quality should be identified. The model provided by Parasuraman et. al. is a good base to continue the discussion toward the quality dimension of shipping and logistics.

Parasuraman et. al.¹⁵⁾ has developed ten different determinants within the service quality after series of qualitative and quantitative studies; access, communication, competence, courtesy, credibility, reliability, responsiveness,

security, tangibles and customer knowledge. Definition and examples of the determinants within the shipping services can be seen in table 2. The right-hand side column of the following table shows the dimension of service quality in shipping and logistics, composed by the author, who arbitrarily placed the quality dimension according to the SERVQUAL dimensions. For example, 'reliability' in SERVQUAL dimensions

Table 2. Shipping services: customers' view of service quality

Dimension	Shippers' view
Reliability	<ul style="list-style-type: none"> · Delivery time · Issuing bill of lading on time and correctly · Delivering the cargo at the promised time
Tangibles	<ul style="list-style-type: none"> · Clean and undamaged containers · Modern looking equipments · Appearance of the invoice · Appearance of the communication materials
Access	<ul style="list-style-type: none"> · Convenient working hours · Accessibility by telephone easily
Communication	<ul style="list-style-type: none"> · Informing the shippers about the technical details
Understanding the customer	<ul style="list-style-type: none"> · Knowing the specific objectives of the shipper in terms of logistics
Security	<ul style="list-style-type: none"> · Confidentiality not giving the information about the customer to third parties
Credibility	<ul style="list-style-type: none"> · Reputation of the firm · Giving clear and right information about the logistics cost
Responsiveness	<ul style="list-style-type: none"> · Dependability in handling the problems · Responding the inquiry quickly
Competence	<ul style="list-style-type: none"> · Working with the personnel having expertise and knowledge
Courtesy	<ul style="list-style-type: none"> · Treating the shippers respectively and politely

Table 3. quality dimensions of shipping and logistics quality

Researchers	The dimensions of service quality
Pearson ¹⁶⁾	Flexibility, frequency of service, transit time, reliability, regularity,

15) Parasuraman, A., Zeithaml, V.A. and Berry, I.L. (1985), The Conceptual Model of Service Quality and its Implications for Future Research, *Journal of Marketing*, Vol.49, Fall, p.41.

16) Pearson Roy (1981), *Containerline Performance and Service Quality*, Marine Transport Centre, University of Liverpool, pp. 120-121.

Bardi ¹⁷⁾	Transit time, reliability, willingness to negotiate, financial stability
McGinnis ¹⁸⁾	Reliability, transit time
Matear and Gray ¹⁹⁾	Fast response to problems, avoidance of loss or damage, on-time collection and delivery
John and Stephen ²⁰⁾	Reliability, equipment availability, service frequency
Subbash and Srinivas ²¹⁾	Reliability, responsiveness
Bienstock ²²⁾	Timeliness items, availability items, condition items

means delivery time, issuing bill of lading on time and correctly, and delivering the cargo at the promised time.

Table 3 shows what sort of factors are regarded as the dimensions of quality in shipping and logistics. The most common factors stipulated as the dimensions of quality concept are listed as reliability, transit time, etc.

6. Quality control and standards

Quality control in shipping operation has been widespread recently while the principle of quality assurance has been used in many other industries for a long time already.

Some definitions taken from the ISO quality standards are useful for further explanation.

- Quality policy: The overall quality intentions

and direction of an organisation as regards quality as formally expressed by top management.

- Quality management: That aspect of the overall management function that determines and implements the quality policy. This is authorised by top management.
- Quality assurance: All those planned and systematic actions necessary to provide adequate confidence that the product or service will satisfy given requirements for quality. This is a structured sequence of events.
- Quality control: The operational technique and activities that are used to fulfil requirements for quality. This is the check of compliance.
- Quality system: The organisational structure,

17) Bardi Edward J., Bagchi Prabir K. and Raghunathan T.S. (1987), Motor Carrier Selection in a Deregulated Environment, *The Logistics and Transportation Review*, Vol.23, No.4, p.5.
 18) McGinnis Michael A. (1989), a Comparative Evaluation of Freight Transportation Choice Models, *Transportation Journal*, Winter, p. 43.
 19) Matear Sheelagh and Gray Richard (1993), Factors Influencing Freight Service Choice for Shippers and Freight Suppliers, *International Journal of Physical Distribution and Logistics Management*, p. 28.
 20) Kent John L. and Parker R. Stephen (1999), International Containership Carrier Selection Criteria: Shippers/Carriers Differences, *International Journal of Physical Distribution and Management*, Vol.29., No.6, p.40.
 21) Mehta C. Subbash and Durvasula Srinivas (1998), Relationship Between SERVQUAL Dimensions and Organisational Performance in the Case of a Business-to Business Service, *Journal of Business and Industrial Marketing*, Vol. 13., No. 1, pp. 44-45.
 22) Bienstock, Carol C., John T. Mentzer and Monroe Murphy Bird (1997), Measuring Physical Distribution Service Quality, *Journal of the Academy of Marketing Science*, 25(1), p. 31.

responsibilities, procedures, processes and resources for implementing quality management. This monitors process and eliminates causes of unsatisfactory performance.

- Quality audit: 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. Two kinds of audit exists-internal and external.
- Quality loop: The conceptual model of interacting activities that influence the quality of a product or service in the various stages ranging from the identification of needs to the assessment of whether these needs have been satisfied.

(1) ISO 9000 series

International organisation for standard (ISO) developed a quality system standard called ISO 9000 series which are related with the processes that create products and services.

A well designed, well implemented, and carefully managed ISO 9000 quality system provides confidence that the output of the process will meet customer expectations and requirements.²³⁾ Some of the typical benefits of the ISO 9000 are;²⁴⁾

- Improved discipline as individuals within a company become more conscious of their activities and contribution,
- Continuous improvement by built-in mechanism,
- Process improvement through analysis and reengineering as appropriate,
- Identification and elimination of redundant procedures and routines,
- Training of new employees and existing employees,
- Effective processes that add value to the business.

ISO 9000 has three main standards directly related with the certification. The most famous and well-known certificates are ISO-9001, which covers design control requirement.(see table 4) whereas ISO-9002 is for the quality assurance in production and installation, and ISO-9003 is for quality assurance in final inspection and test.

ISO-9002 is divided into the following sections:

- Management responsibility
- The quality system
- Contract review
- Document control
- Purchasing
- Purchaser supplied product

Table 4. Types of ISO 9000 series

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

23) Johnson L. Perry (1993), *ISO -9000 Meeting the New International Standards*, Mc-Graw Hill, USA, p.6.

24) Jackson Lindsay (1996), *Is a Quality Standard the Vehicle to Satisfying Customers?'*, *Transportation & Distribution*, V.37, N.6 , June, p.62.

- Product identification and traceability
- Process control
- Inspection & testing
- Inspection, measuring & test equipment
- Inspection & test status
- Control of non-conforming product
- Corrective action
- Handling, storage, packing & delivery
- Quality records
- Internal quality audits
- Training
- Statistical techniques

(2) ISO 14000 for environmental protection

An environmental standard has come out as a form of ISO 14000, which is a voluntary standard. But if you choose not to meet the international standards it will become trade barriers for your company or its products

The standards of ISO 14000 require that targets and objectives be defined at every functional level within the company and be continually upgraded. The objectives must be consistent with quality, health and safety policies, and must include commitment to pollution prevention and waste minimisation. The certification of ISO 14000 requires compliance with four basic elements:

- Implementation of an environmental management system
- Assurance that procedures are in place to maintain compliance with applicable regulations and laws
- Commitment to continual improvement, and
- Commitment to overall prevention of pollution and waste minimisation.

The ISO 14000 will give a deep impact on logistics because the logistics function is responsible for transportation that makes up an environmental threat. The benefits of ISO 14000 includes waste minimisation, long-term cost savings, reduced injuries let alone customer trust and satisfaction.

7. Quality assurance in shipping

The operation of merchant shipping is specialised and complex, and cargo transportation by sea carries with it the hazards which might otherwise lead to a loss of property such as ship and cargo, endanger personnel, or result in environmental damage. The issue of safe handling of a ship has been a concern for international society, which eventually applied quality management concept to the shipping industry. The shipping industry is presently governed by rules and conventions developed by both national and international authorities.

The shipping quality system may be defined as 'a system where cargoes are efficiently and effectively moved and transferred according to existing international and national laws, statutes, rules, regulations and internationally accepted codes of practice in order to avoid losses to human resources by protecting health and safety; where damage or losses to ships and their equipment, to the cargoes carried and to the environment are prevented; where the conservation of energy and materials are achieved.'²⁵⁾ The quality system in shipping is designed in such a way as to achieve the following goals:

- quality of service for the safe transportation

25) The Nautical Institute(1994), *The management of safety in shipping*, London, p.139.

Table 5. The dimension of operational quality management system

1. operation	<ul style="list-style-type: none"> • navigational procedure • engineering procedure • cargo operation procedure
2. safety	<ul style="list-style-type: none"> • fire-fighting equipment • lifesaving equipment • personnel protection
3. management	<ul style="list-style-type: none"> • ship administration • health and safety • pollution awareness
4. equipment	<ul style="list-style-type: none"> • Hull and superstructure • engine and cargo spaces • cargo handling equipment • cargo monitoring equipment
5. space environment	<ul style="list-style-type: none"> • accommodation • machinery spaces • other spaces

and custody of goods;

- optimised performance of service in terms of efficiency and effectiveness;
- prevention of losses in human lives, materials, property, and energy; and
- protection of the environment.

Quality assurance in shipping follows two ways-ISO 9002 and ISM code. ISO 9002 comes from a more generalised background, and is often criticised for its inclination toward manufacturing sector not service sector.

IMO(International Maritime Organisation) has developed International Management Code for the Safe Operation of Ships and for Pollution Prevention to set international standard for the safe management and operation of ships, which comprises safety management system(SMS) as its sub-systems.

ISM code is a specific code for ship management and safety prepared by maritime

society. On operational level, this code is designed to ensure all the aspects of safe operation of ships, and it can be categorised into five parts-operation, safety management, equipment, space and environment-.

The introduction of a safety management system(SMS) requires a company to document its management procedures to ensure that all conditions, activities and tasks, both ashore and onboard affecting safety and environmental protection, are planned, organised, executed and controlled in accordance with legislative and company requirements. A SMS enables the company to measure its performance against a documented system, allowing areas for improvement to be identified and implemented.

The following is an example of quality policy of a shipping line.

Quality Policy of Yang-Min

For upgrading our service quality, improving our work efficiency, reducing our operational costs, promoting environmental protection measures, and laying a firm foundation for our long-lasting business activities, we have adopted the following policies:

Basic policy on Service Quality

Finding out the cause

Examining any problems in time, studying the basic cause thereof, exploring the possible counter measures, carrying out these measures realistically to effectively solve the relevant problems.

Participating by all

For a shipping company, services offered include soliciting cargo transportation contracts, loading cargo on ships, ship navigation, transportation and delivery of cargo consignments; all these are closely related operations. All members of the company including those aboard ships and working ashore must strive for excellence, in co-ordinating and accomplishing their duties.

Innovating and Improving

Achieving self-improvement and breakthrough for better opportunities and incessant growth with accumulative efforts and steady exertion.

Satisfying the customers

Constantly striving for a better understanding of our customers' requirements and continuously making improvements on service to suit their needs.

Safety Policy

Safety for personnel -

To provide good operational environments for seafarers and shore personnel to ensure their safety in operations.

Safety for ships -

To make proper management and maintenance for ships and equipment for ensuring their safety in operation.

Safety for shipment -

All cargoes consigned or entrusted by customers will be placed under proper and constant supervision and control beginning from the receipt of cargoes until their delivery at the destination of shipment.

Environmental Protection Policy

To abide truthfully by the international treaty on prevention of pollution of ocean environment.

Seeking better service is Yang Ming Line's commitment. Yang Ming is customer-oriented. Through the joint effort of the staff, on ships or on the shore, at home or abroad, Yang Ming will continue its pursuit of innovation for excellence. We pledge to satisfy the customers with more "Punctual, Speedy, Reliable, and Economical" service.

ISM(International Safety Management) code

International shipping industry produced its Code of Good Management practice in Safe Ship Operation around 1985 to give guidance towards safe transportation by sea. Some countries including the UK and Nordic countries put forward proposals which at last was developed to 'The Guidelines on Management for the Safe Operation of Ships and for Pollution Prevention.' After further revision of the guidelines International Safety Management code has been given a birth.

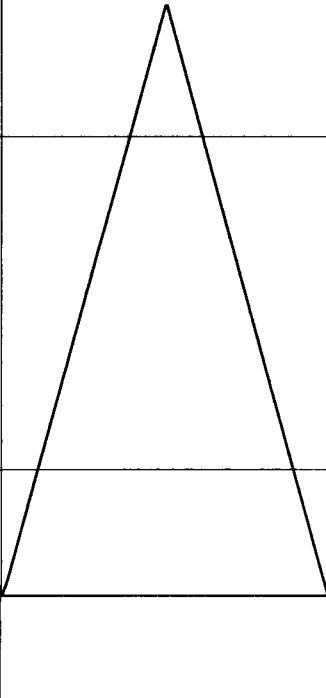
This management code entered into force in 1998(1st July) for passenger ships, tankers, bulk carriers and high-speed craft, and in 2002(1st July) for other cargo ships and mobile offshore drilling units.

ISM code, after some revisions, was made mandatory through a new chapter IX to SOLAS. Under the regulations of the new Chapter IX of SOLAS, administrations are responsible for ensuring that, on the prescribed dates, each new or existing ship flying its flag holds a Safety Management Certificate(SMC) and that the operating company holds a document of Compliance(DOC) for that type of a ship. The administration may request another contracting government or recognised organisation to issue such certificates and periodically verify the proper functioning of the SMS.

The structure of the ISM code can be described as following diagram of Table 6.

The nature of the mandatory code has changed, from the initial proposal based on ISO9000 quality assurance principles to

Table 6. ISM triangle

Who?	ISM triangle	main objective
Top management		The objectives of the code are to ensure safety at sea, prevention of human injury or loss of life, and avoidance of damage to the environment, in particular to the marine environment, and to property
Shore personnel		Safety management objectives of the Company should, <i>inter alia</i> : 1. provide for safe practices in ship operation and a safe working environment; 2. establish safeguards against all identified risks; and 3. continuously improve safety management skills of personnel ashore and aboard ships, including preparing for emergencies related both to safety and environmental protection
Ship personnel		The ISM code requires that the SMS should ensure: 1. compliance with mandatory rules and regulations; and 2. that applicable codes, guidelines and standards recommended by the organisation, administrations, classification societies and maritime industry organisations are taken into account.

'mundane' safety management code.

Safety Management Certificate(SMC)

This certificate is issued for a period of five years, after verification of the DOC for that particular type of ship, after verification that the ISM code requirements are being met and, inter alia, have been in operation on the ship for at least three months.

Document of Compliance(DOC)

This document is issued for a period of five years, following verification that the ISM code requirements are being met and that the company's SMS has been in operation for at least three months, and at least for three months on each type of ship operated by the company. The objective evidence should, inter alia, include records from internal annual audit performed by the company, both ashore and onboard. The validity of the DOC is subject to annual verifications, within three months or after the anniversary date. The verification should include examination of the statutory and classification records for at least one ship of each type to which the DOC applies.

International regulations on shipping safety

Shipping has gone through serious accidents in its development stage. Accidents at sea may result in serious loss of life and property, causing pollution of the sea. Because of its characteristics of operation, international community has been collaborating on shipping

safety issues, resulting in the treaties. Followings are the summary of the international regulation²⁶⁾.

Safety regulations against the ship

• Solas

Solas(International Convention for the Safety of Life at Sea) is a comprehensive measure of minimum standards for the safe construction of ships and for basic safety equipment(e.g., lifesaving, fire prevention, and radio equipments) on board. It also instructs operational procedures, particularly on emergency procedures. It contains some regulations on regular surveys of the safety equipments and the issue of certificates of compliance.

• Marpol

Marpol(International Convention for the prevention of Pollution from Ships) contains measures to prevent sea pollution caused by ship accident as well as ship's routine operations. The annexes in the convention cover five forms of major pollution sources-pollution by oil, noxious liquid substances in bulk, harmful substances carried in packaged forms, sewage and garbage-.

• Colreg

Colreg(Convention on the International Regulations for preventing Collisions at Sea) gives instructions on how to drive a ship in various situations. It sets safe speed in restricted visibility, action to avoid collision, procedures to observe in narrow channels. Annexes of the regulation describes how to set navigational lights and warning shapes.

26) The Nautical Institute(1994), *The management of safety in shipping*, London, p.50.

- **International Convention on Load Lines**

International Convention on Load Lines sets the minimum permissible freeboard²⁷⁾. The freeboard changes according to the season of the year and the navigating sea area of the ship. For example, a ship navigating tropical area can have narrower freeboard, subsequently allowing more cargo into the ship.

Safety regulations against the seafarer

- **ILO Convention 147**

ILO Convention 147 is Merchant Shipping Convention that set minimum standards of the living quarters of a ship and employment standards such as minimum age medical care, examination and training. It requires governments to set effective legislation on safe manning standards, seafarers' competency and social security.

- **STCW**

STCW(International Convention on Standards of Training, Certification and Watchkeeping for Seafarers) lays down the requirements on seamen training, certification and qualification for officers and ratings forming part of a watch.²⁸⁾ All such seafarers are required to have a certificate, endorsed in a uniform manner.

- **IMO resolution A.481(XII)**

IMO resolution A.481(XII) describes on the principles of safe manning. it gives basic principles and detailed guidance to be observed by governments when assessing the safe manning of ships. It recommends that all

governments provide the ships registered in the nation with a document specifying the minimum number and grades of qualified seafaring personnel in terms of safety.

- **IMO resolution A.443(XI)**

IMO resolution A.443(XI) describes how to protect shipmasters from the influence of shipowners for the safety of ships and environment. For the purpose it tries to ensure: (1) the shipmaster is not constrained by the shipowner, charterer or any other person from taking in this respect any decision which, in the professional judgement of the shipmaster, is necessary; and (2) the shipmaster is protected by the appropriate provisions such as the right of appeal, contained in, *inter alia*, national legislation, collective agreements or contracts of employment, from unjustifiable dismissal or other unjustifiable action by the shipowner, charterer or any other person as a consequence of the proper exercise of his professional judgement.

8. Quality Assurance in Maritime Education

Quality assurance has now become the issue of the 1990s as far as the shipping industry is concerned. The principle of quality assurance is a self-examination process that is designed to lead to continuous improvement in operation, in this case, in education. When shipowners are keen to establish quality assurance program, maritime college should train students to be qualified in entering that system of quality assurance. The graduates of maritime institutions will be exposed to TQM as soon as

27) Freeboard is the gap between water level around ship and the lowest sheltered deck.

28) Watch means usually the duration of 4 hours in which ship progresses and a pair of an officer and a rating keeping an eye on the movements of other vessels in the bridge.

they are entering the Q.A. shipping company.

If a maritime college is to train people for employment by quality assured shipowners whether under the national or foreign flags, it should incorporate TQM.

1. TQM could consist of three components, which should be integrated: (1) the students(the clients), (2) the course(processor-1), the whole college(processor-2), and (3) the employers (the customers). We concentrate only on the processors.
2. A maritime college could design the best course of teaching and assessment methods. The college should also establish systems for re-validating older courses at intervals of three to five years, and for validating or approving new courses.
3. Total quality management finally must produce a quality manual which explains and interprets the quality policy and which clearly states the procedures to be followed in following matters:
 - Course design
 - Teaching
 - Assessment methods
 - Staff development
 - Course management
 - Hardware procurement
 - Maintenance
4. After the setting up of quality manual, the following should be established
 - A documented quality management system
 - Statistical process control
 - Quality manager(who has to ensure consistency in quality levels, continuous improvements, and the elimination of waste across various departments or sections.)
5. The quality management of maritime education can be listed as the following(very briefly):
 - A defined organisational structure with
 - (1) the responsibility, authority of personnel,
 - (2) the personnel to perform inspection and verification for compliance with the quality requirements.
 - Selection and recruitment of college staff-the qualifications and experience qualifications
 - Staff development-encouraging and enabling staff to upgrade their qualifications
 - Course design and course development
 - (1) involving employers and students as well in course design
 - (2) ensuring that up-to-date information on developments in the global shipping industry are received and disseminated throughout the college.
 - Records- indexing, filing, storage, maintenance and disposition of quality records.
 - Document control-procedures to control all documents(obsolete documents and changes to documents) and data that relate to the requirements of the Quality Manual.
 - Quality system
 - (1) establish and maintain a documented quality system.
 - (2) the documented quality system, procedures and instructions should be effectively implemented.
 - (3) planned periodic reviews of the quality system
 - Internal quality audits-to verify whether quality activities comply with planned arrangements and to determine the effectiveness of the quality system
 - External quality audits-TQM can be claimed to be established when it is audited and certified by an independent body.

6. The subjects to be taught at maritime institutions should comprise three systems: technical system, operational system and human system.

(1) Technical system

This system consists of following sub-systems

- Hull
- Engine Room
 - Electrical installations
 - Propulsion
 - Services
 - Steering
 - Pollution prevention
- Navigation
 - Navigation
 - Moorings
 - Pollution prevention
 - Steering
- Cargo
- Safety
 - Fire protection and fighting
 - Life saving systems
 - Communications
 - Medical
 - Others such as Air conditioning, accommodation and food preparation

(2) Operational system

This system consists of following sub-systems

- Navigation

- Propulsion
- CIQ and administration
- Emergency procedure

(3) Human system.

This system consists of following sub-systems

- Organisational behaviour
- Human relationships

9. Conclusion

This article has explained what quality of service of shipping is and how the quality of maritime education can be improved or guaranteed. The common characteristics of shipping industry and maritime education is that they are service industries that require quality assurance system.

Quality assurance has now become the issue of the current decade as far as the shipping industry is concerned. This article has applied the principle of quality assurance of shipping companies to maritime education.

Maritime college should train students to be qualified in entering quality assurance program which shipowners have established because the graduates of maritime institutions will be exposed to TQM as soon as they enter the shipping company. This article finally demonstrated how the quality assurance system in maritime education can be set up.