

Hierarchy of Benefits in Technical and Commercial Ship Management with the Adoption of ISO 9000 : 2000 Standard

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ABSTRACT

With the advent of the new millennium, shipping is facing a challenge as commercial ship management gains considerable importance in the quest for continual improvement and business excellence. It is our view that national and international requirements in the shipping business should be harmonised with the commercial dynamics of ship operation and this should form the basis for shipping companies to effectively and efficiently adopt ISO 9000:2000 standard. This paper examines and evaluates the interactions between ISO 9001:2000, the ISM Code and STCW '95 convention with the objective of providing tangible benefits to ship operators.

In any business today, service quality and customer satisfaction are of paramount importance to attract new customers and also to retain existing customers. Additionally, commercial elements such as trading income, operating expenses and cash flow are the lifeblood of any business. This paper aims to address all the above issues in the context of ISO 9000:2000 standard.

The implementation of ISO 9000:2000 by ship operators should not merely be a paper exercise, but should be a vehicle for addressing their overall safety and commercial concerns. Additionally, this study explores the vast potential benefits in the areas of innovation and best business practices which are available for ship operators to capitalise in.

1. Introduction

Although the overriding commercial objective of shipping companies is quite understandably linked to generation of profit, it is apparent that ship operators are focusing more on reduction of daily operational costs rather than striving to deliver superior and more efficient services. This cost cutting approach manifests itself in several ways, such as a creeping reduction in the maintenance budget, employment of mixed crews whose competence and team-building

capability may be suspect and a reduction in the training budget. Notwithstanding such developments, there is an endless flow of rules and regulations being imposed by the International Maritime Organisation (IMO) together with new policies, procedures, surveys and inspections required by various national and international bodies. The result is that the master and crew on board ships today are faced with a dilemma on ways to address their priorities and this in turn has affected the all-important relationship between the shore management team and the floating staff.

In this respect, it is necessary to examine the ISO 9001:2000 Quality Management Systems standard, the International Safety Management Code and STCW '95 Convention requirements with the objective of harmonising the three and adopting an integrated system which is easier to follow and which reaps numerous benefits for ship operators.

Ship operators are being pressurised by various authorities and also by their clients to provide proof of the quality of their management and organisation. In the past, a large number of ship operators simultaneously implemented the ISM Code and ISO 9002:1994 (Er and Sogut, 1999). Companies which possess registered quality assurance certificates are now in the transitional phase of changing over to the ISO 9001:2000 standard.

The main objectives of the year 2000 revisions to the ISO 9000 standard is to give users the opportunity to add value to their activities and to improve their performance continuously by focusing on major processes within their organisations. Extensive surveys have been performed on a worldwide basis to understand the needs of all users of the quality management system standards. The year 2000 revisions take into account previous experience with quality management system standards (1987 and 1994 versions) and also emerging insights and best practices of generic management systems. These revisions have been brought about not only by ISO's seven-year review plan, but also by market demand (ISO/TC176-SC2/WG15 N376, 1997).

2. Literature Review

2.1 Salient Features of ISO 9000:2000

(Levinson, 2000) sums up the following improvements in the year 2000 standard:

- Definitions are user friendly and make for easier reading and application;
- Enhanced requirements in relation to effectiveness, continuous improvement and prevention of non-conformances;
- Better equips organisations to perform self-assessments;
- Allows greater compatibility with the ISO 14001 Environmental Management System standard;
- Adopts the Plan-Do-Check-Act cycle (*Appendix 1*), thus changing the standard from a manufacturing-based model to a process-based one (Wachniak, 1995). This therefore better facilitates implementation of total quality management.

2.2 Customer Satisfaction and Service Quality

Satisfaction is the customer's fulfilment response. It is a judgement that a product or service feature, or the product or service itself, provides a pleasurable level of consumption-related fulfilment (Oliver, 1997). In other words, this definition means that satisfaction is the customers' evaluation of a product or service in terms of whether that product or service has met their needs and expectations. Failure to meet needs and expectations is assumed to result in dissatisfaction with the product or service. In conducting satisfaction studies, ISO 9000:2000 advocates that ship operators should determine through some means (often focus groups) the important features and attributes for their services. They should then measure expectations and perceptions of their customers on those attributes as well as a rating of their overall service satisfaction.

Gronroos (1984) service quality model comprises two main dimensions. The first of these is technical quality and it relates to what customers receive as a result of their interaction with the firm. The second dimension is functional quality and it is concerned with how the service is delivered. This model is shown in the figure below.

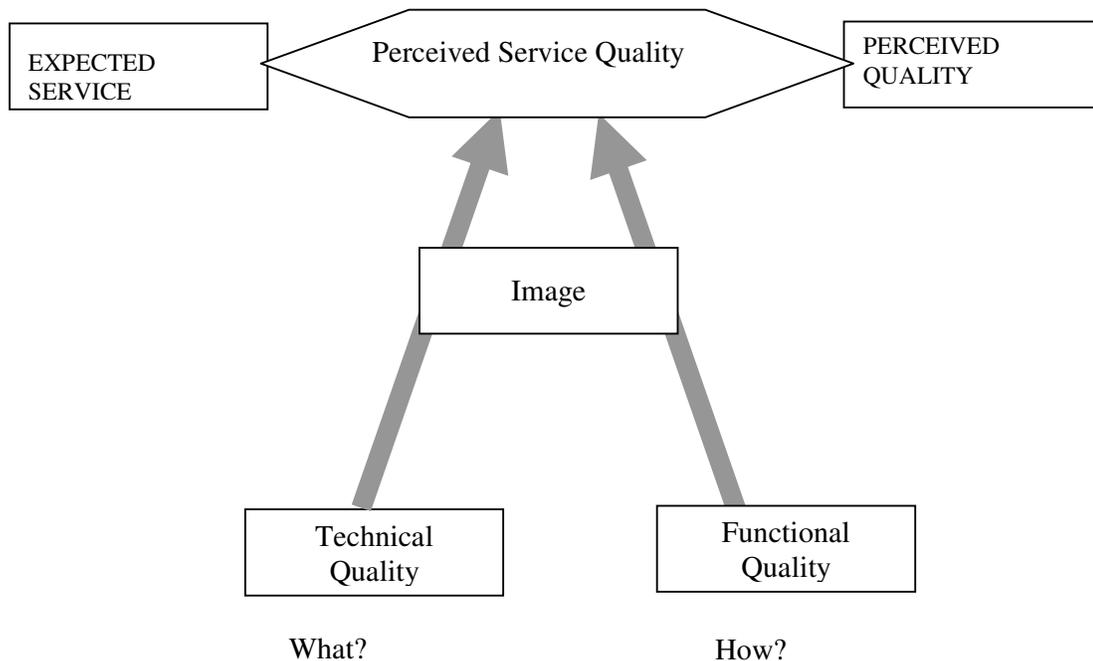
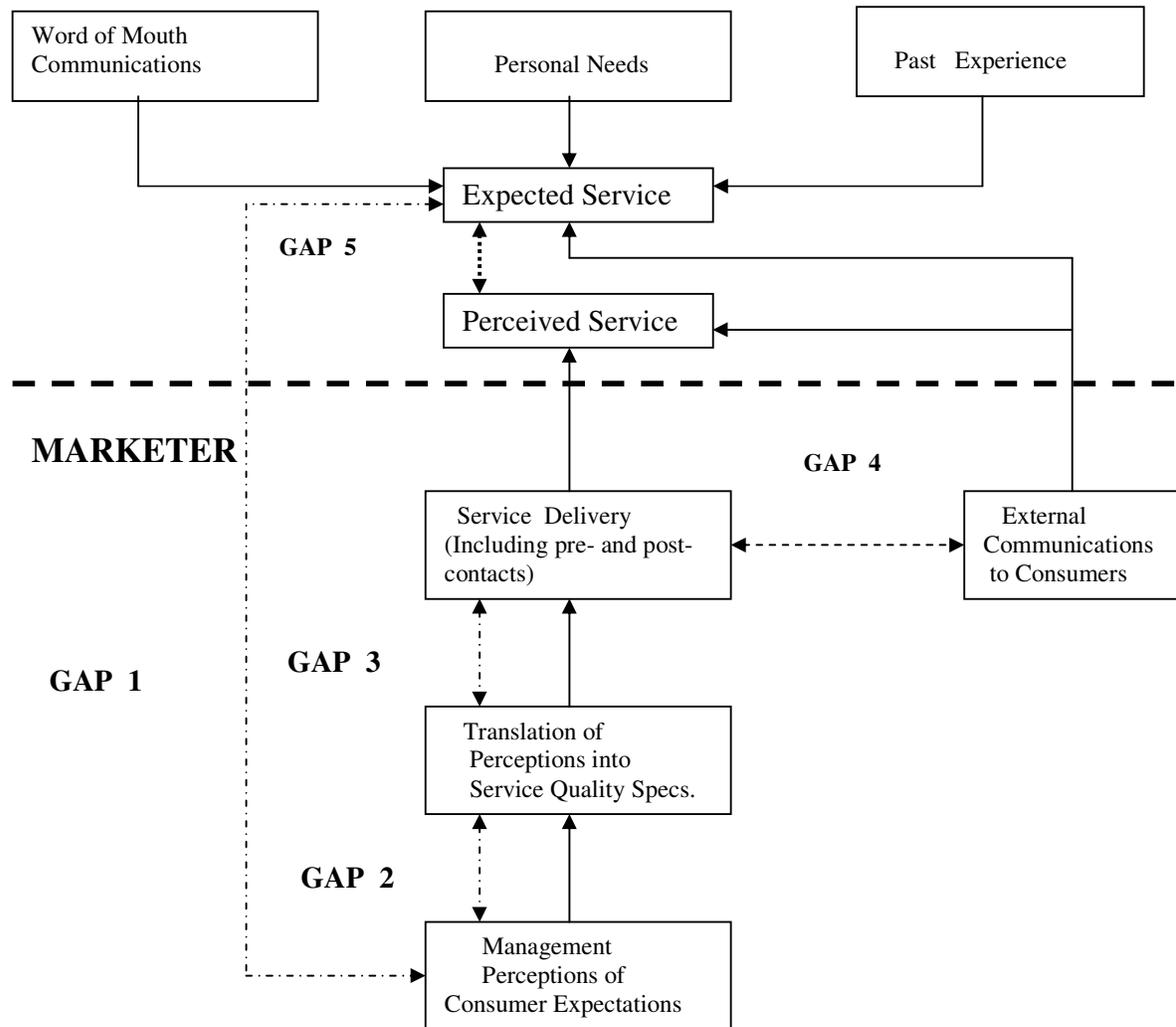


Figure 1: The service quality model by Gronroos (1984)

Parasuraman, Zeithaml & Berry (1985) conceptual model of service quality (SERVQUAL) suggests criteria that consumers employ in evaluating service quality. This was based on a series of focus group interviews in service and retailing organisations using five service categories namely: appliance repair and maintenance, retail banking, long distance telephone, securities brokerage and credit cards. Ten determinants of service quality were originally identified and labelled as tangibles, reliability, responsiveness, competence, courtesy, credibility, security, access, communication and understanding. The authors subsequently

(1988) recast the ten determinants of service quality into five specific components - tangibles, reliability, responsiveness, assurance and empathy. The gap model is shown in the figure on the next page.

CONSUMER



Source: Parasuraman A., Zeithaml V.A., & Berry L.L., (1985), *Journal of Marketing*, Vol.49, (April), p44, Figure 1.

Figure 2: The SERVQUAL (GAP) model

3. Methodology

We have made a comparative study of the various elements of ISO 9001:2000 and those of the ISM Code and the STCW '95 convention with the objective of eliciting common grounds, so that an integrated standard can be established. Additionally, we have endeavoured to establish relationships between the elements of ISO 9001:2000 and the commercial

dimensions of trading income, operating expenses and cash flow, which undoubtedly are the core commercial considerations of ship operators.

4. Analysis and Findings

4.1 Comparative study of ISO 9001:2000 and the ISM Code

It is imperative to dove-tail all the elements of the Safety Management System (as required by the ISM Code) into the ISO 9001:2000 Standard. This is absolutely essential especially to demonstrate compliance during verification audits. In this respect a comparison table depicted in *Appendix 2*, highlights the interrelationships of the various elements of the ISM Code with those of both the ISO 9001:1994 and ISO 9001:2000 standards.

Clause 7 of the ISM Code, i.e. development of plans for shipboard operation corresponds to the functional requirements of the ISO 9000 Standard. Additionally, the various procedures required by the ISM code under the categories of routine, critical and emergency shipboard operations correspond to the quality measures and process-based requirements of the ISO 9000 Standard. Clause 9 of the ISM Code which deals with the reporting of accidents, hazardous occurrences and non-conformities corresponds with the element of non-compliance management of the ISO 9000 Standard. The master's overriding authority in the context of the ship's safety management system can be incorporated into the company's procedures manual.

We suggest that the following items (which cover the requirements of both the ISM Code and ISO 9000 Standard) are included in the master's review report and in the agenda of safety committee meetings.

- effectiveness of quality procedures
- quality records and checklists
- responsibilities of crew members
- efficiency of quality awareness
- various resource needs
- performance of internal and external communications
- the results of audits conducted by the accreditation authority

4.2 Comparative Study of ISO 9001:2000 and STCW '95 Convention

The STCW'95 convention plays a significant role in the training, qualifications and certification requirements of seafarers. Hence, similar to the ISM code, its requirements need to be dove-tailed into the ISO 9001:2000 Standards. In this respect a comparison table depicted in *Appendix 3*, highlights the interrelationships of the various requirements of the STCW '95 convention with those of both the ISO 9001:1994 and ISO 9001:2000 Standards. It is possible to differentiate quality management training into three categories, i.e. training imparted prior to joining ship, onboard theoretical training and onboard practical training. The organisation of effective drills and exercises makes a significant contribution to onboard practical training. A combined ship-shore drill can also be included which will familiarise ships' personnel with procedures required to communicate with terminals and port authorities.

4.3 Contribution of ISO:9000 Standard towards Ship Operators' Commercial Interests

Ship operators' budgetary monitoring and performance traceability can be determined by the investigation of three major commercial dimensions, i.e. trading income, operating expenses and cash flow.

Trading income refers to the income generated by the commercial activity of the vessel, such as freight income, charter hire or passenger revenue less the costs directly related to earning that income. These costs include brokerage commission, port and agency costs and when trading on a voyage basis, bunker costs and the costs of preparing and surveying the cargo holds or tanks. In order to achieve manageable calculations, the trading income of vessels which spot trade is usually calculated using a time charter equivalent rate multiplied by the number of trading days less the estimated off hire. ISO 9001:2000 standard requires ship operators to monitor their trading income in accordance with clause 5 (Management Responsibility), clause 6, (Resource Management), clause 7 (Product Realisation) and clause 8 (Measurement, Analysis and Improvement). The detailed interrelationship between trading income and the elements of ISO 9001:2000 is depicted in *Appendix 4*.

Operating expenses refer to the cost of manning, maintaining, storing, providing insurance for the vessel and having it ready in all respects to commence trading. Costs associated with a vessel's technical management are commonly referred to as 'Running Costs' (RC). RC is a universal measure of a vessel's operating costs and generally includes expenses involving crew, deck stores, engine stores, cabin stores, surveys, victualling, provisions, hull and machinery, P&I, spare parts, lubricating oil, repair and maintenance, communication and management. The detailed interrelationship between operating expenses and the elements of ISO 9001:2000 is depicted in *Appendix 5*.

Cash flow relates to the costs involved in owning a vessel. If a vessel is financed by a bank loan it includes loan interest and depreciation (on a profit and loss accounting basis) or loan interests and loan instalments (on a cash flow basis). Additionally, cash flow includes the monetary differences between trading income and operating expenses. Clause 5 (Management Responsibility) and clause 6 (Resource Management) have major effects on the cash flow of ship operators. The interrelationship between cash flow and ISO 9001:2000 requirements are depicted in *Appendix 6*. The direct and indirect effects of these clauses on the actual operation can be managed by utilising forward and backward decision-making processes in a company's structure. Hence the continuous improvement of quality can be achieved by taking into consideration the efficiency of both the technical and commercial aspects of the shipping business.

5. Managerial Implications

ISO 9000:2000 emphasises that top management of shipping companies are proactively involved in the organisation, maintenance and improvement of the quality management system. It aptly defines quality policy and measurable quality objectives (relevant to different functions and levels). It ensures that employees are aware of the importance of complying with national and international regulations, and also in meeting their customers' needs, expectations and desired level of satisfaction. When the requirements are not met,

improvement strategies have to be implemented and their results evaluated and conveyed to top management. This forms the basis of continuous improvement.

Major oil companies like Chevron, Texaco, Exxon, Mobil and BP accept ISO 9000:2000 standard as a reference for the initiation of their vetting processes.

Several reputable shipping organisations like P & O Nedlloyd, Hapag Lloyd, NYK, Clipper, Teekay, Chevron, BP and Zodiac have embraced ISO 9000:2000 and have gained tangible benefits. Some of the benefits that ship operators can hope to achieve by adopting the year 2000 standard are:

- Reduction in unforeseen expenses as a result of reduced accidents and casualties.
- Reduction in delays and detentions as a result of Port State Control inspections.
- Reduction in number of deficiencies and non-conformities raised by classification society and flag states.
- Reduction in the number of cargo claims and disputes with charterers.
- Ease of compliance associated with vetting inspections of oil majors.
- Reputation and competitiveness in the fulfilment of long-term contracts.

6. Conclusion

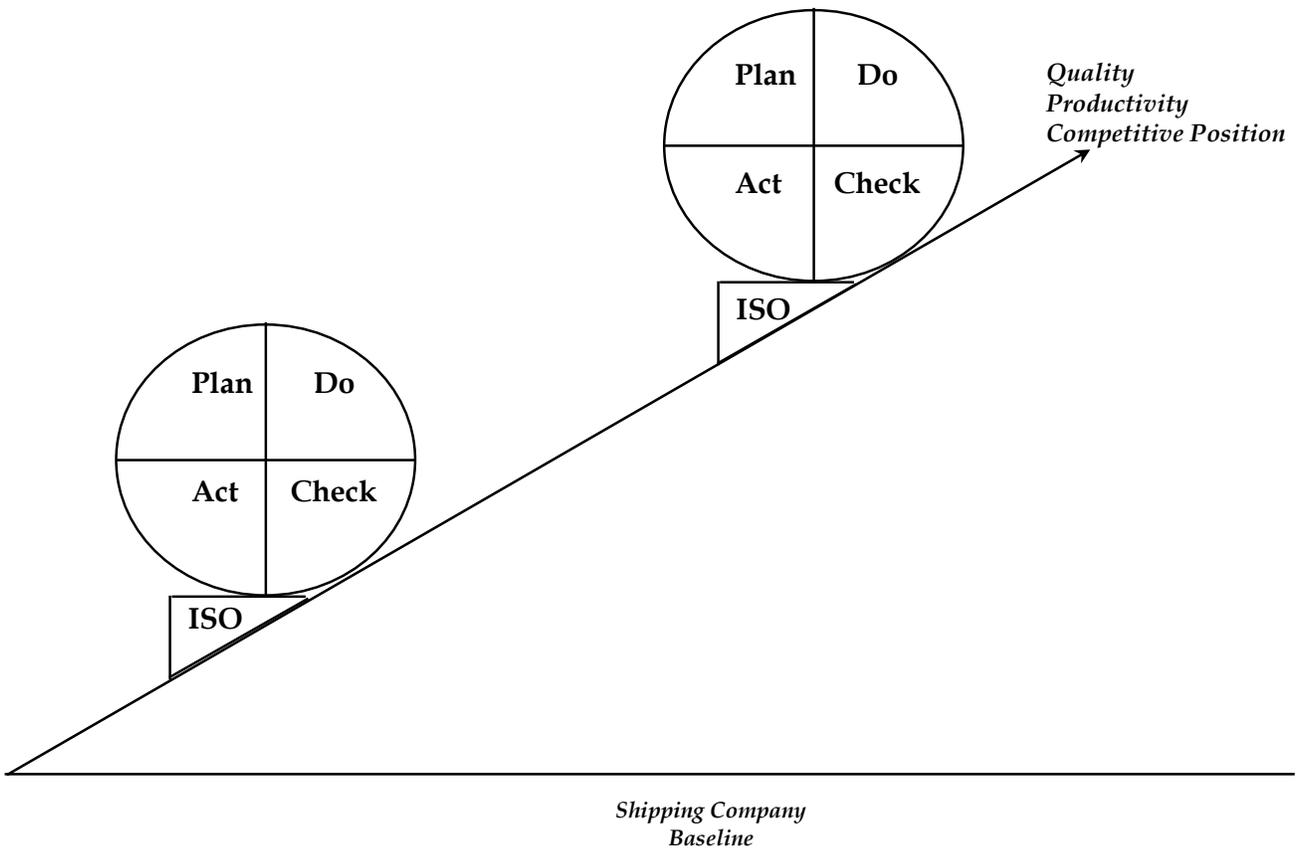
We have examined and evaluated the interactions between ISO 9000:2000, the ISM Code and STCW '95 convention. From our findings it is clear that ship operators can gain immensely by adopting an integrated system based on ISO 9000:2000. Not only can they reap benefits in relation to the technical management of their ships, but more importantly they can improve their service quality and enhance customer satisfaction. This will ensure a long-term survival and profitability for their shipping business as a result of existing customer retention and attraction of new customers.

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Appendix 1

The Deming Cycle



Appendix 2

Comparison of elements of the ISM code, ISO 9001:1994 and ISO 9001:2000

ISO 9001:1994	ISO 9001:2000	ISM CODE
1 Scope	1	Preamble of the Code
2 Normative reference	2	Resolution A.788(19)
3 Definitions	3	1
4.1 Management responsibility		
4.1.1 Quality policy	5.1 + 5.3 + 5.4.1	1.4.1 + 2.1 + 2.2
4.1.2 Organization	5.5.2	1.2.2 + 3.2
4.1.2.1 Responsibility and authority	5.5.2 + 6.2.1	5.1 + 5.2
4.1.2.2 Resources	5.1 + 6.1 + 6.3	3.3 + 6.1 + 6.2 + 6.6
4.1.2.3 Management representative	5.5.3	4
4.1.3 Management review	5.6.	12.2 + 12.5
4.2 Quality system		
4.2.1 General	4.1 + 5.1 + 5.4.1 + 5.5.5	1.2.2 + 3.1
4.2.2 Quality system procedures	4.2	11.3
4.2.3 Quality planning	5.4.2 + 7.1	1.4 + 3.2
4.3 Contract review	7.2.2	-----
4.4 Design control	7.3	-----
4.5 Document and data control	5.5.6	11.1 + 11.2
4.6 Purchasing	7.4	-----
4.7 Control of customer-supplied product	7.5.3	11.2.1 + 7
4.8 Product identification and traceability	7.5.2	7
4.9 Process control	7.1 + 7.5.1 + 7.5.5	7 + 8.1 + 8.2 + 8.3 + 10.1 + 10.2 + 10.3
4.10 Inspection and testing	7.1 + 7.5.1 + 8.1 + 8.2.4	10.2 + 10.3 + 10.4
4.11 Control of inspection, measuring and test equipment	7.6	10.3 + 10.4
4.12 Inspection and test status	7.5.1	10.2
4.13 Control of nonconforming product	8.3	9.1
4.14 Corrective and preventive action	8.4 + 8.5.2 + 8.5.3	9.2 + 10.2.2
4.15 Handling, storage, packaging, preservation and delivery	7.1 + 7.5.4	7
4.16 Control of quality records	5.5.7	13
4.17 Internal quality audits	8.2.2	12.1 + 12.3 + 12.5 + 12.6
4.18 Training	6.2.2	6.3 + 6.4 + 6.5 + 12
4.19 Servicing	7.1 + 7.5.1	-----
4.20 Statistical techniques	8.1 + 8.2.3 + 8.2.4 + 8.4	-----

Appendix 3

Comparison of elements of STCW '95, ISO 9001:1994 and ISO 9001:2000

ISO 9001:1994	ISO 9001:2000	STCW 95 (A-I/8, B-I/8)
1 Scope	1	A-I/8 para. 1
2 Normative reference	2	A-I/8 para. 2, B-I/8 para. 3
3 Definitions	3	
4.1 Management responsibility		
4.1.1 Quality policy	5.1 + 5.3 + 5.4.1	B-I/8 para. 1.1, B-I/8 para. 4.1, B-I/8 para. 5.1, B-I/8 para. 7.1, B-I/8 para. 7.2
4.1.2 Organization	5.5.2	B-I/8 para. 4.3, B-I/8 para. 5.1, B-I/8 para. 7.2, B-I/8 para. 7.3, B-I/8 para. 7.4
4.1.2.1 Responsibility and authority	5.5.2 + 6.2.1	B-I/8 para. 1.2, B-I/8 para. 4.3, B-I/8 para. 7.3, B-I/8 para. 7.4, B-I/8 para. 7.6
4.1.2.2 Resources	5.1 + 6.1 + 6.3	B-I/8 para. 1.2, B-I/8 para. 4.2, B-I/8 para. 4.3, B-I/8 para. 7.2, B-I/8 para. 7.4, B-I/8 para. 7.5, B-I/8 para. 7.6
4.1.2.3 Management representative	5.5.3	-----
4.1.3 Management review	5.6.	B-I/8 para. 4.5, B-I/8 para. 5.1, B-I/8 para. 5.3, B-I/8 para. 7.1, B-I/8 para. 7.2, B-I/8 para. 7.6
4.2 Quality system		
4.2.1 General	4.1 + 5.1 + 5.4.1 + 5.5.5	B-I/8 para. 2.1, B-I/8 para. 2.2, B-I/8 para. 4.2, B-I/8 para. 7.1
4.2.2 Quality system procedures	4.2	B-I/8 para. 6.1, B-I/8 para. 6.2, B-I/8 para. 7.2, B-I/8 para. 7.6
4.2.3 Quality planning	5.4.2 + 7.1	B-I/8 para. 1.3, B-I/8 para. 2.1, B-I/8 para. 2.2, B-I/8 para. 4.2, B-I/8 para. 7.1, B-I/8 para. 7.2, B-I/8 para. 7.6
4.3 Contract review	7.2.2	B-I/8 para. 7.2
4.4 Design control	7.3	B-I/8 para. 4.2, B-I/8 para. 5.1, B-I/8 para. 5.2, B-I/8 para. 7.6
4.5 Document and data control	5.5.6	B-I/8 para. 5.3, B-I/8 para. 6.1
4.6 Purchasing	7.4	-----
4.7 Control of customer-supplied product	7.5.3	B-I/8 para. 5.1, B-I/8 para. 5.2
4.8 Product identification and traceability	7.5.2	B-I/8 para. 4.2, B-I/8 para. 5.2, B-I/8 para. 7.5
4.9 Process control	7.1 + 7.5.1 + 7.5.5	B-I/8 para. 2.3, B-I/8 para. 4.2, B-I/8 para. 5.2, B-I/8 para. 7.2, B-I/8 para. 7.5, B-I/8 para. 7.4, B-I/8 para. 7.6
4.10 Inspection and testing	7.1 + 7.5.1 + 8.1 + 8.2.4	B-I/8 para. 2.4, B-I/8 para. 4.4, B-I/8 para. 5.2, B-I/8 para. 7.2, B-I/8 para. 7.5, B-I/8 para. 7.6
4.11 Control of inspection, measuring and test equipment	7.6	B-I/8 para. 4.4, B-I/8 para. 5.2
4.12 Inspection and test status	7.5.1	B-I/8 para. 4.2, B-I/8 para. 4.4
4.13 Control of nonconforming product	8.3	A-I/8 para. 3.3, B-I/8 para. 6.3
4.14 Corrective and preventive action	8.4 + 8.5.2 + 8.5.3	A-I/8 para. 3.3, B-I/8 para. 6.3
4.15 Handling, storage, packaging, preservation and delivery	7.1 + 7.5.4	B-I/8 para. 5.2
4.16 Control of quality records	5.5.7	B-I/8 para. 5.3, B-I/8 para. 6.1, B-I/8 para. 6.2, B-I/8 para. 7.5, B-I/8 para. 7.6
4.17 Internal quality audits	8.2.2	A-I/8 para. 3.1, B-I/8 para. 1.4, B-I/8 para. 2.4, B-I/8 para. 4.5, B-I/8 para. 5.3
4.18 Training	6.2.2	B-I/8 para. 5.2, B-I/8 para. 7.5,

ISO 9001:1994	ISO 9001:2000	STCW 95 (A-I/8, B-I/8)
		B-I/8 para. 7.6.4, B-I/8 para. 7.6.6
4.19 Servicing	7.1 + 7.5.1	B-I/8 para. 7.2
4.20 Statistical techniques	8.1 + 8.2.3 + 8.2.4 + 8.4	B-I/8 para. 7.2

Appendix 4

Interrelationship between ISO 9001:2000 and Trading Income of ship operators

		Clause No.	ISO 9001:2000 Clause Name
TRADING INCOME	Trading days within the budget period	5.1	Management Commitment
		5.2	Customer Focus
		5.4.1	Quality Objectives
		5.6.2	Review Input
		8.2.1	Customer Satisfaction
	8.4	Analysis of Data	
	5.6.3	Review Output	
	5.5.3	Internal Communication	
	6.1	Provision of Resources	
	7.2.3	Customer Communication	
8.2.2	Internal Audit		
8.2.3	Monitoring & Measurement of Process		
8.4	Analysis of Data		
5.6.3	Review Output		
8.5.1	Continual Improvement		

Appendix 5

Interrelationship between ISO 9001:2000 and Operating Expenses of ship operators

	Clause No.	ISO 9001:2000 Clause Name	ISM Code Interrelation
OPERATING EXPENSES	Crew Cost	6.1 6.2.2 6.4	Provision of Resources Competence, awareness and Training Work Environment Clause 3.3 Clause 6
	Repair & Maintenance Cost	5.5.1 6.3 7.5.1 7.5.2 7.5.3 7.6 8.3	Responsibility & Authority Infrastructure Control of Production & Service Provision Validation of Process for Production and Service Provision Identification & Traceability Control of Monitoring & Measuring Devices Control of Nonconforming Product Clause 10 Clause 9
	Stores & Spare Cost	7.4.1 7.4.2 7.4.3 7.5.3	Purchasing Process Purchasing Information Verification of Purchased Product Identification & Traceability Not Applicable
	Victualling & Pantry Cost	7.4.1 7.4.2	Purchasing Process Purchasing Information Not Applicable
	Insurance Cost - Franchise & Uncovered Average	7.2.2 7.2.3	Determination of Requirements Related to Product Reviews of Requirements related to Product Clause 3. Company
	Dry-docking Cost	5.5.1 6.3 7.5.3 7.6 8.3	Responsibility & Authority Infrastructure Identification & Traceability Control of Monitoring & Measuring Devices Control of Nonconforming Product Clause 10 Clause 9
	Classification & Survey Cost	5.5.1 6.3 7.5.3 7.6 8.3 8.4	Responsibility & Authority Infrastructure Identification & Traceability Control of Monitoring & Measuring Devices Control of Nonconforming Product Analysis of Data Clause 10 Clause 9
	Luboil Cost	7.4.1 7.4.2 7.4.3	Purchasing Process Purchasing Information Verification of Purchased Product Clause 10
	Communication Cost	5.2 5.5.3 7.2.3	Customer Focus Internal Communications Customer Communication Clause 6 Clause 9 Clause 8
	Management Cost	4.2 5.5 5.6.3 8.2 8.5	Documentation Requirements Responsibility, Authority and Communication Review Output Monitoring & Measurement Improvement Clause 1.4 Clause 3 Clause 4 Clause 5 Clause 6

Appendix 6

Interrelationship between ISO 9001:2000 and Cash Flow of ship operators

		Clause No.	ISO 9001:2000 Clause Name
CASH FLOW	Cash Flow (Profit & Loss – Difference between Trading Income and Operating Expenses)	5.4.1	Quality Objectives
		5.4.2	Quality Management System Planning
		6.1	Provision of Resources
		8.2.2	Internal Audit
		5.6.2	Review Input
	Loan Interest	6.1	Provision of Resources
	Loan Instalments (Depreciation)	6.1	Provision of Resources
		8.2.3	Monitoring & Measurement of Process
	Cash Flow (Profit & Loss)	5.6.3	Review Output
		5.4.2	Quality Management System Planning
5.4.1		Quality Objectives	