1996

A timely need for shipping companies to implement the ISM Code and establish a safety management system

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A TIMELY NEED FOR SHIPPING COMPANIES TO IMPLEMENNT THE ISM CODE AND ESTABLISH A SAFETY MANAGEMENT SYSTEM

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

MASTER OF SCIENCE

in

GENERAL MARITIME ADMINISTRATION AND ENVIRONMENT PROTECTION

1996

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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ACKNOWLEDGEMENTS

I acknowledge that all thanks belong to Almighty Allah, who participates in and oversees all human endeavour, in whom I trust and believe for inspiration.

I owe my earnest gratitude to M/S Pakistan National Shipping Corporation and the Directorate of Ports and Shipping wing for having nominated me to take up this course of study.

I am indebted to the Secretary General of the International Maritime Organisation for providing me with a scholarship from his special funds.

I wish to express my sincere thanks and deepest appreciation to worthy course professor Theodore J Sampson for all the education he has imparted into me with all the encouragement to pursue this course successfully. I am impressed with his dedicated personality.

I would also like to convey my sincere gratitude to the supervisor of my dissertation Lecturer P.G.Jeppesen without whose able guidance it was very difficult to accomplish this task.

My special thanks and appreciation to Cecilia, Susan and the rest of the library staff for their invaluable support and assistance during my research in the library and on the internet.

I would also like to express my gratitude to the distinguished professors and the staff of WMU, who have always been a source of knowledge and assistance during my stay in the university.

Finally I wish to express my heartfelt thanks to my dear mother, for her endless prayers, and to my dear wife Sofia and our beloved children Irfan, Adnan, Asra and Azlan for their patience, understanding and moral support.

May Allah bless us all.

ABSTRACT

Shipping operates in a dynamic environment as ever. The increase in the volume of trade, advancement in technologies and the world wide economic competitions and pressures have created enormous complexities in the shipping business. The need to prevent the loss of lives and damages to environment is felt much greater today than it was ever in the past.

This study while analysing the past history, present status and future expectations of shipping, aims at creating the requisite safety culture awareness and realisation of the timely need for remedial measures. The dissertation invites attention in general of all those having a responsibility towards safety of life at sea and in particular shipping companies.

Safety Management is hard to achieve with ignorance of Quality Management. In this dissertation Quality Management has been explained to its desired extent to understand its inevitable link with Safety Management Systems.

The ISM Code and its Safety Management System is basically designed to improve Quality Management Systems of shipping at least to a level where protection against loss of lives and damages to environment is secured to a globally accepted reasonable extent. This study emphasises upon the implementation of the code as soon as possible. The dissertation also convincingly suggests adoptable ways and procedures for the implementation of the code which is accessable and relatively easy to understand by the majority.

In formulating this dissertation the methodology used is the consultation of books on the topic as well as the relevant literature from international conferences, reflecting

on the author's own experience gained whilst working onboard various ships and ashore in the office of a shipping company, learning and collecting of relevant information through field trips, library research and valuable lectures received at the World Maritime University.

It is hoped that this dissertation will serve as a concise guide for shipping companies to realise the timely need for the implementation of the ISM Code. This study should also help to formulate procedures to establish a successful Safety Management System.

Shipping companies who are operating only the traditional cargo vessels, the compliance of the ISM Code shall be obligatory by the year 2002, while for those who are operating passenger ships including passenger high speed craft, oil and chemical tankers, bulk carriers,gas carriers and cargo high speed crafts of 500 gross tonnes and over the ISM Code shall be obligatory just in a matter of a little over one year from now. 1 July 1998.

However the thrust of the dissertation is to persuade such shipping companies about the need for compliance with the ISM Code as soon as possible not withstanding the regulatory obligations, in order to improve shipping safety.

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CEN	European Committee of Standardisation
COLREG	Collision Regulations
DOT	Department of Trade United Kingdom
ERP	Emergency Response Plan
HAZOPS	Hazard and Operatability studies
HELMEPA	Hellenic Marine Environment Protection Association
ICS	International Chamber of Shipping
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organisation
INTERTANKO	International Association of Independent Tanker Owners
ISM	International Safety Management
ISMA	International Ship Managers Association
ISO	International Standard Organisation
ITOPF	International Tanker Owners Pollution Federation
LRQA	Lloyd Register Quality Assurance
MARPOL	Marine Pollution Convention
MEPC	Marine Environment Protection Committee
MSC	Marine Safety Committee of IMO
OBO	Oil,Bulk and Ore
OCIMF	Oil companies International Forum
OPA	Oil Pollution Act of United States of America
RES	Resolution
Ro-Ro	Roll on Roll off
SIGTTO	Society of International Gas Tankers & Terminal Operators
SOLAS	Safety of Life at Sea Convention
STCW	Standard of Training and Certification Convention
VLCC	Very Large Crude Carriers

1.0. INTRODUCTION

The International Safety Management Code has not emerged all of a sudden. It is the results of many years of experiences and disastrous accidents at sea, which the shipping has gone through in the past and which the industry can not sustain any more, if it is to exist in terms of sustainable development in shipping of today.

To understand timely need of the ISM code, it is necessary to realise the importance of shipping in the international trade, and the dynamic environments in which the shipping has to continue to prosper with particular regard to the safety of life and the protection of environment.

1.1 Maritime trade demand and the shipping traffic.

Year	Loaded seaborne trade	Percentage annual change
1970	2.605 billion tonnes	13.0
1973 and 1979	World Oil Crises	
1980	3.704 billion tonnes	-2.0
1993	4.330 billion tonnes	2.6
1994	4.485 billion tonnes	3.6
1995	4.651 billion tonnes	3.7

Worlds Fleet Size (principal types of vessels)

1993	710.622 million dead weight tonnes
1994	719.804 million dead weight tonnes
1995	734.917 million dead weight tonnes

(percentage change 1994/1995. 2.1)

It is said that while a maritime demand may increase by 3-5 % a year on average for a period of 20 years, it can change by as much as 10-20 percent or even more in a year. (Ma,1995,Lecture2).

1.2 Maritime Environment and Accidents at Sea

Like all transport activities maritime transport activity is also prone to casualties in fact severe accidents. As a human instinct measures to prevent accidents have always been established to achieve safety of life at sea to a level corresponding to expected risks of accidents..

The shipping industry functions in a very dynamic environment. The complex and constantly changing maritime environment is very conductive to ship accidents endangering safety of life at sea and the environment.

Prevention of accidental pollution is also very closely linked to safety, as the crew is likely to be endangered by any incident which involves a breach in the integrity of a vessel sufficient to cause pollution.
Prevention of pollution is thus best achieved by preventing accidents. Conversely measures to prevent pollution are likely to improve safety.

To err is human. Man makes mistakes and provided it is not made deliberately, he learns out of his mistakes and the process of evolution continues.

1.3 Factors Contributing to Accidents at Sea.

Maritime transport has many error-inducing factors. It has a high ratio of incidents and near misses to accidents.
A disastrous maritime casualty is just the tip of an iceberg. It reveals very little if treated as an isolated incident. Every such incident is a pointer to the existence of many more unpublicised minor incidents and many more near misses.

However some of the more readily apparant factors contributing to accidents at sea may include the following:

1.3.1 Economic Recessionary Periods.

It has been observed by many a seafarer that during the shipping industry recession periods of the 1980s, the traditional quality, maintenance and performance standards were sacrificed to combat recessionary impacts. Greater emphasis was placed on cost reduction. As a result there was a temptation to reduce quality standards. Although quality and safety go hand in hand to accomplish long term benefits, the shipping industry appeared to be putting its long term interests at stake in order to achieve short term benefits.

1.3.2 Ageing of Ships.

In the early 1970s the oil industries were booming. The shipping industry was also affected positively with the result that many ships were constructed during those periods (especially tankers) and many new vessels were commissioned for trading at sea. All those ships are getting older now. The average age of the existing fleet of vessels is steadily increasing. Because of the recessionary economic environments, the ship owners do not find it profitable to invest in new fleet tonnage. Under the present regime of environment when it is specially necessary to pay more attention to the maintenance and upkeep of existing ships, some of the ship operators are taking unacceptable chances in respect of safety and environmental hazards.

1.3.3 Substandard Practices.

The open registry practice concept emerged after the second world war.This practice is being blamed by many as being one of the causes of substandard ships sailing in international waters today.

In 1993 the worlds biggest shipping flags were the two countries that were famous for second registry.

On account of relaxation in taxes and to some extent low operational costs , there are in the world a dozen countries which are practising open registry of merchant ships. However according to the United Nations statistics, five countries dominate the shipping trade market and combined they have attracted more than a third of the worlds total tonnage. These are the top second registry practitioner countries.

Unfortunately the misuse of the flag of convenience practices over the last two decades has severed the links of loyalty between ownership and crew and contributed on lower costs, exploitation, low morale and poor standard in shipping.This attitude developes lack of motivation and commitment to safety which in turn may become the cause of many serious accidents at sea.

The following is an example of a substandard Ro-Ro vessel. The defects were recorded as follows:.

- - The steering gear was unreliable, bridge engine controls were from two different manufacturers and neither pitch indicators or shaft tachometers functioned.
- - Deck plating was wasted and holed, the elevator watertight hatch could not be secured. The bow visor could not be locked and there were major fractures to the ramp hinges.
- - The ballast tanks were almost unusable due to corrosion. Some were blanked off, others had multiple leaks, one into the engineroom. The majority of sounding pipes were wasted.
- - In the accomodation there was no hot water because the boilers had burnt out, the toilets had no flushing systems and the air conditioning did not function.
- - There were in adequate glasses, crockery and cutlery, linen and blankets. The medical chest was empty.

- - Fire fighting equipment did not work, the fire main was blanked off to the superstructure. The breathing apparatus set was unusable.
- - The majority of life jackets were unusable, there was no starboard embarkation ladder and the life boats could not be swung out because the davits were too corroded.

Despite all above defects it was worthwhile to note that:

- A new safety certificate had just been issued.
- Many of the deficiencies appeared in the old class survey reports, but were absent in the latest ones.
- Port state inspectors had visited the ship on a number of occasions.
- The shipmaster took reasonable steps to inform the management company of the defects and requested that those affecting the seaworthiness of the vessel be made good. The master was dismissed. (NI, Seaway,1991, page 3)

1.3.4 Efforts of Maximisation of Profits.

The developments in the communication systems may be considered a remarkable achievement of this century.

Traditionally the shipmaster is fully responsible regarding the decisions in respect of the safety of crew, cargo and his ship. As such he was equally involved in the commercial decisions making process for his vessel.

In a depressed economic scenario commercial considerations may take precedence over safety aspects in the decision making process of the shipping companies ashore.

With the development of sophisticated, reliable and efficient ship - shore communication systems it is now possible to communicate with a ship at sea at all

times with very little efforts. Thus major decisions are made ashore by the owners and operators and conveyed to the master for implementation by the ship.

Although the Master still feels responsible for the safety of the ship its cargo and crew, he may find it very difficult to countermand an unsafe decision taken ashore. With the result that the role of the Master seemed diminished with the abuse of improved communication. It may be realised that no matter how much technology advances, the human beings can not be eliminated. The man on the spot namely the Master should be reinstated with authority.

1.3.5 Cyclic Nature of Freight Rates.

Generally it has been noticed that when the international freight market is prospective, more ships which mostly include older ones are taken out of lay-up and additional crew requirements are filled in by less experienced ones who might not otherwise be employed at sea. Such a ship would be a hazard at sea. The above practice is very much subject to the cyclic nature of freight rates. The opportunity costs of such practices is a disaster at sea sometimes.

1.4 Concerns of the International Maritime Organisation.

From the early days sensible maritime countries of the world had their concerns about safety and oil pollution at sea and depended a lot on co-operation from maritime countries all round the world.

Safety regulations have their origin in the loss of TITANIC in 1912. This disaster raised so many questions about maritime safety standards that it was decided to hold an international conference to discuss new safety regulations. This resulted in the adoption of SOLAS convention on 20 January 1914. It introduced new international requirements dealing with the safety of navigation for all merchant ships such as watertight and fire resistant bulkheads, life saving appliances and fire prevention and

fire fighting appliances on Passenger ships, Radiotelegraphy and establishment of a North Atlantic ice patrol. Due to out break of war, the convention could not enter into force. However in 1929, the second SOLAS convention was adopted which included several new regulations and also updated some of the existing ones.

The Oil pollution of the sea especially in ports and harbours was first recognised as a problem before the first world war and during the 1920s and 1930s various countries introduced measures to control discharges of oil within their territorial waters and provide deterrents in the form of fines for illegal discharges

Despite all above and subsequent regulations in respect of safety and pollution prevention, accidents continued to occur. In fact when we look upon accidents within the marine industry we find an alarming increase. Several accidents causing extensive loss of lives and extensive pollution have been too frequent during the last decades. Some accidents have had high impact on the society and public at large and triggered international regulations and conventions as well as national requirements the consequences of which are not totally foreseeable.

Some of the more well known accidents are as follows:

1912 Titanic	SOLAS
1967 Torrey Canyon	OILPOL
1976 Amoco Cadiz	MARPOL / STCW
1987 Herald of Free Enterprise	IMO RES A 647
1988 Exxon Valdez	OPA 90
1989 Scandinavian Star	Management System Requirements
Ocean Blessing / Nagasaki Spirit	
Maersk Navigator	
Haven	
Braer	

Derbyshire
Estonia and now
Sea Empress as on 29 February 1996.

It is worth noticing that the public in general is only aware of disasters involving loss of passengers life and pollution. Very few outside the shipping world know of all the bulkcarriers accidents which has caused the loss of hundreds of seafarers life and seemingly continue to do so, although some decrease has been seen the last years.

In 1954, the United Kingdom organised a conference on the danger of oil pollution which resulted in the adoption of the international convention for the prevention of pollution of the sea by oil, following entry into force of the IMO convention in 1958.

In view of the enormous growth in the maritime transport of oil and the size of tankers, the increasing amount of chemicals being carried at sea and a growing concern for the worlds environment as a whole it was felt that the 1954 oil pollution convention was not adequate, despite the various amendments which had been adopted. The IMO assembly partly inspired by the Torry Canyon disaster 1967 decided to adopt a completely new convention. The conference was convened in 1973.

As for SOLAS, the ratification of the 1948 SOLAS convention took so long that it was felt necessary to adopt a completely new instrument. Hence the fourth SOLAS convention of 1960 which incorporated numerous technical improvements came into existence.

But during the 1960s membership of IMO was increasing. More and more countries had secured their independence and many of them soon began to develop their own merchant fleets. Efforts to keep the 1960 SOLAS convention in line with technical

developments by amendments were doomed to failure because of the nature of the amendment procedure adopted at the 1960 conference.

As a result the 1974 SOLAS convention was adopted which incorporated all the amendments to the 1960 SOLAS and included a new amendment procedure so that future amendments may be brought into force within an acceptable period of time.

In the meantime a series of accidents involving oil tankers in the winters of 1976 - 77, led to increasing pressure for further international action. As a result early in 1978 IMO convened an international conference on tanker safety and pollution prevention which adopted a number of important modifications to SOLAS as well as to MARPOL 1973.
Since the SOLAS 1974 had not entered into force, the conference decided to adopt a Protocol with the new amendment procedure. The protocol entered into force on 1 May 1981.

In addition with a view to reinstate centralised authority with regard to safety and environmental decisions, it was realised with great concern that the man-on-the-spot namely the Master on board the ship needed to be reinstated with authority. IMO Resolution A.443 (X1), adopted on 15 November 1979 states:

> Considering that maritime safety and protection of the marine environment must be the shipmaster's prime concern in all situations which arise and that economic and other pressures on the shipmaster should not at any time interfere with the decisions he must take in that regard.
>
> Considering further that the decisions on maritime safety and marine environment protection by the ship master should not be

unduly influenced by instructions given by the ship owners, charterers or other concerned.

Invites governments to take necessary steps to safeguard the shipmaster in proper discharge of his responsibilities in regard to maritime safety and the protection of marine environment by ensuring that:

(a) The shipmaster is not constrained by the ship owners, charteres or any other persons from taking in this respect any decision which, in the professional judgement of the shipmaster is necessary.

(b) The shipmaster is protected by appropriate provisions including the right of appeal, contained in, inter alia, national legislation, collective agreements or contracts of employment, from unjustifiable dismissal or other unjustifiable action by ship owner, charterers or any other person as a consequence of the proper exercise of his professional judgement.

The resolution never achieved the status of an international regulation. Although the Master's responsibility in matters concerning maritime safety and protection of the marine environment was accepted, his authority to countermand any decision taken ashore by the owner / operator, which may be detrimental to safety at sea and protection of the marine environment was not explicit. These facts led to the conclusion that there was an urgent need for control of owners and operators in matters concerning safety at sea and environment protection.

2.0 EVOLUTION OF SAFETY MANAGEMENT SYSTEM

2.1 Analysis of the Causes of the Accidents.

Effective strategies for management of safety and pollution prevention must be based on an in-depth understanding of the human element in maritime accidents.

It was and is obvious that the IMO and the shipping industry needed to address the human side of ship management in a new and better way. A sort of safety and pollution prevention management is necessary. Accidents do not just happen. Accidents are usually the results of often many contributing elements of which each one certainly is manageable.

A typical way of dealing with the circumstances a remedial measure by regulatory bodies is to impose more stringent construction and equipment requirements and to prescribe modifications to shipboard operational practices. This course of action leads to believe that accidents are caused exclusively by technical factors and that it is the technical causes which need to be remedied.

As such 80 % of the conventions such as SOLAS, MARPOL, Loadline, Class Rules etc. deal with technical matters and only 20 % (and not even that) deal with the human side.

Efforts to improve the safety of life at sea and equipment aboard sea going vessels, or to protect the environment in which those vessels operate has centred largely on technological innovations. Double hulls, advances in steering gear technology,

electronic navigation equipment, Arpa and stress monitoring equipment have all helped to reduce the number of accidents at sea.

But in spite of the advances made in the technology, accidents at sea continued to occur. Names hang like banners headlines in the marine consciousness. Herald of Free Enterprise, Exxon Valdez, Braer and Estonia. It has finally been recognised that the root cause of most accidents is the HUMAN ELEMENT. Almost 80 % of the accidents can now be labelled as related to Human Failure, which also can be named substandard practice and only 20 % fall into the category of Technical Failure.

Most accidents are caused by a combination of the two factors and most equipment or structural failures will ultimately have resulted from human failure, perhaps through carelessness in design, construction, or maintenance at an earlier stage.

In 1993 the UK and P&I club published its third annual analysis of major claims arising over the six years period from 1987 - 1992.

In the opinion of the research team 50 % of all cargo claims, 50 % of all pollution claims, 65 % of all injury claims and 80 % of all property damage claims were due to Human Error. Pilot error caused 34 % of major property damage claims.

Human error is the overwhelming dominant factor in claims of all sizes. In looking at major claims (those in excess of USD 100,000), the report found that more than 62 % were directly attributed to error by one or more individuals. This figure applies only to P & I club claims. Among those claims attributed primary to mechanical and structural failure there are many in which the human element has also played an important part.

Ships in the 10 - 14 years age bracket seem to experience the highest incident rate of Human error. This may reflect excessive pressure on ships designed to run with larger crews than is now the practice or accumulated lack of maintenance prior to the third special survey.

2.2 Human Error Element.

An accident is a chance combination of causes producing an unfortunate result.

Professor W Wagenor (1993) in his paper on behalf of SIGGTTO " Accidents at Sea: Multiple causes and impossible consequences define an accident as follows .

> Accidents appeared to be the result of highly complex coincidences which could rarely be foreseen by the people involved.
>
> The unpredictability is caused by the large numbers of causes and by the spread of information over participants. Also the nature of errors that are made indicates lack of understanding rather than a lack of motivation or risk propensity. Accidents occur because the behaviours that causes them is not seen as risky. Errors of information processing (mostly lack of attention) are made frequently but are under normal conditions, not punished by accidents.

2.2.I Errors and Violations.

Professor James Reason, in his book " HUMAN ERROR " first published in 1990, suggests that the most basic division should be between Errors and Violations in categorising Human Involvement.

Errors: Is a slip, lapse or mistakes on the part of an individual which is unintentional.

Violation: where rules or procedures that are in place are intentionally or deliberately not followed.

Errors and Violations may be Active or Latent.

Active : An error or violation usually associated with the performance of front operators (pilots, Control rooms, Crews and the like) has an immediate impact upon the system and leads directly to an incident / accident / near miss.

Latent : An error or violation most often generated by those at the "blunt end" of the system (designers, managers, construction crews etc.) which does not lead directly to an undesirable occurrence but remains doormat in the system until such a time when it combines with a series of events to trigger and result in an accident.

Errors occur at different level of Skill. Latent errors are considered to be more pervasive, more dangerous and far more difficult to detect than Active errors.

When it comes to potential, preventative or remedial measures the distinction between the two can help to identify the most effective approach. The categories commonly used are those defined by Professor Reason and are given below with some examples.

Skill Based Errors: Those errors which occur often at a level where we are not conscious that we have made them, because the error is made in carrying out a skill that is largely automatic. The navigating officer of the watch inadvertently switches the radar to three miles range instead of the six miles range - as a consequence he believes that targets are twice as far

away as they really are. The officer knows how to operate the equipment but he makes a mistake.

Rule Based Error: In carrying out tasks that are familiar but require our attention we apply rules concerning how we know a particular situation operates. Errors are liable to occur if we are not attentive, for example, the navigating officer of the watch fixes the ship's position solely by the use of one single electronic means of navigation (Radar or Loran....) or even work wiyhout double checking his observations visually.

Knowledge Based Errors: In encountering unfamiliar situations we must develop new rules and ways of operating . Errors at this level are related to problem solving and applying past experience to new situations. A Tanker approaching port requests steam on deck for manoeuvring purposes. An experienced engineer simply opens the steam valve resulting in excessive "water hammer" and subsequent failure of the steam line, thus rendering the vessel incapable of completing mooring operations.

Skill Based Violations: An electrician working on a live switch board without wearing the correct protective clothing or standing on rubber mats. He is aware of his violation but it is easier for him to cut corners and complete his task before the afternoon tea break.

Rule Based Violation: The navigating officer of the watch knows very well that international COLREGS require ships to reduce speed in bad visibility yet he chooses to ignore that rule and to proceed at full sea speed in dense fog.

Knowledge Based Violations: A seaman wilfully disregards the knowledge and training he has received by entering an enclosed space without taking appropriate precautions. He is overcome by toxic fumes and collapses.

2.2.2 Human Behavioural Conditions.

The consultants currently engaged in the comprehensive review and revision of the 1978 STCW convention have identified several categories of human behavioural conditions which can contribute to accidents and which could be influenced at least to some degree, with proper training and improved shipboard practices and operational arrangements.

The consultants have recognised that casualties typically result from a chain of events which include human action or inaction or misjudgement by someone involved in the events. Training for effective human intervention can break the chain before a human error can lead to a casualty. The items in the following outline have been derived from a consideration of casualty reports and other data as well as from a general appreciation of human nature and human behaviour.(Clipsham,1995,9)

1. Inattention / Lack of concentration

Contributing Factors
- stress, anxiety
- fatigue
- extended periods of responsibility
- recklessness /carelessness

2. Confusion

Contributing factors - too little time to assess situation & determine effective action
- too many tasks required to be performed at once
- failure to prioritise tasks properly
- too many decisions to make, or factors to assess, or facts to remember at once (cognitive overload)
- misinterpretation of data
- ambiguous relation ship between Master and Pilot
- ambiguous relationship between Master & officer in charge of navigational watch
- insufficient information exchanged when changing watches
- insufficient hand over procedures

3. Procedural problems

Contributing factors- failure to follow proper procedures
- inadequate procedural guidance
- inaccurate procedural guidance
- failure to co-ordinate with others
- procedures performed too fast
- failure to verify completion of task
- inadequate testing of systems

4. Improper use of equipment/instrument/installations

Contributing Factors - unfamiliar with shipboard arrangements
- unfamiliar with specific item of equipment (including new equipment)
- misuse of equipment, in a manner not consistent with recommendations & users manual
- using equipment for purposes other than intended by manufacturer

5. Management and Morale problems

Contributing Factors
- Untrained individual(s) assigned to task
- improper assignment of duties
- ineffective supervision of individuals who are not fully trained for duties
- defuse order-giving, unclear instructions
- rapid personnel turnover
- irregular wages/pay
- poor food and social conditions

6. Information Problems

Contributing Factors
- Inefficient system of information flowing to and from management
- inadequate information available
- inaccurate record keeping
- inaccurate reports
- too much information available
- conflicting / ambiguous information available

7. Communication problems

Contributing Factors
- lack of common language
- ambiguous communication
- speech disability

8. Knowledge/ experience problems

Contributing Factors
- failure to recognise threatening or potentially hazardous conditions
- inadequate theoretical knowledge
- inadequate practical experience
- outdated / obsolete knowledge
- inadequate ability to read and write

- failure to make effective use of physical use of senses (sight, hearing, touch, smell and tastes) for early detection of adverse developments

9. Poor judgement

Contributing Factors
- failure to anticipate a developing problem
- failure to call for assistance when needed
- misinterpretation of data
- failure to appreciate equipment limitations
- failure to appreciate human limitations

There are of course other human element factors which relate primarily to physical or mental fitness, fatigue, drug and alcohol abuse, eyesight and hearing disability as well as crew morale and motivation and shipboard management. While such human element factors are complex and can not be resolved solely by training they should not be neglected.

2.3 Review of Causes of Accidents.

The following is a review of causes of accidents conducted by the P & I club to carry out a more searching inquiry with the object of reducing claims. This appeared in the September issue of Seaway 1993(Capt M.Pickthorne,RD,EXC,BA,MNI).

The parameters used to conduct the review were: ship type; age; flag; and class.

Various questions were asked and answers found. For instance what type of ships hit docks most often? Not ferries who go in and out of docks every day but bulk carriers who may only go in and out only once a month. This is because the ferry has specialist equipment such as bow thrusters. It also goes in and out of the same port all the time and the Captain and the ship's crew become very skilled at berthing their vessel in the same place Bulkers of course have little practice, use many different ports and are large unwieldy ships without special manoeuvring devices.

Excluding the headline - garbing major incidents who are the greatest pollution risks? Not tankers but ordinary dry cargo vessels which are more likely to have an over spill while bunkering than a tanker is while loading.

Their analysis told them who were the worst risks by flag and by class among their members. A list was produced showing those ships likely to have the worst claims record. They comprised the following

1 - old reefers carrying chilled cargoes.

2 - declassed (for oil) OBO carriers.

3 - old parcel tankers on the spot market.

4 - VLCC's operated by pure speculators.

5 - tween deckers of any age, size or descriptions

In fact the last named on the list was described as the worst of them all . By age of vessels, the majority of cargo claims were generated by those in the 16 to 19 years age group

In finding out the underlying causes of the accidents some quite surprising results came to light. For example taking personnel injury claims it was noted that over 50 % were categorised as due to the carelessness of the individual workers. This was considered as the primary cause, but examination in depth showed the following results:

Lack of supervision 30 %; Over confidence 15 %; Lack of training 7 ½ %, Lack of maintenance 10 %; Lack of procedures 7 %; Man not attentive 10 % and others 20 %. These figures were compiled for the number of claims for personnel injury only and it will be noted that carelessness (Man not attentive) is attributed to only 10 % of the underlying causes. Research into other types of claims such as contact damages and pollution damage showed similar differences.

It is not sufficient to know that 80 % of accidents are caused by Human Errors , but it is useful to know that 50 % are related to out of date procedures. In fact this gives an indication where to concentrate the remedial efforts.

2.4 Recent IMO Efforts

By the late 1980's it was widely recognised that safe, pollution free and efficient ship operations require good management both ashore and on board. Investigations following the loss of the Ro Ro ferry Herald of Free Enterprise, on 6 March 1987, revealed a lack of standards in management of safety in shipping.

At the 15th session of the IMO assembly, in November 1987 the United Kingdom proposed that it was necessary to develop international standards for safety management in shipping. This led to the adoption of Resolution A 596 (15) which recognised that the great majority of maritime accidents are attributed to human related causes and that the safety of ships will be increased by improving operating practices. Resolution A 596 (15) requested the MSC and MEPC to urgently develop guidelines concerning shipboard and shorebased management procedures for safety operation of Passenger and Ro Ro ferries. In early 1987 the tanker Exxon Valdez ran aground in Prince William Sound, Alaska, spilling 270,000 barrels of Prudhoe Bay Crude Oil into an ecologically sensitive environment. Even before formal investigations were concluded accusative fingers were pointed at the evident failing in the safety management systems, both on board and ashore. This added impetus to the process of development of Safety Management Guidelines by IMO. Resolution A 647 (16), IMO Guidelines on Management for the Safe Operation of Ships and for pollution prevention was adopted on 19 October 1989. Although these guidelines were recommendatory in nature, it was a substantial step, by IMO , towards encouraging shipping companies to put safety and environment protection measures high on their list of priorities.

Resolution A.647 (16) also required the MSC and MECP to periodically review these guidelines and consider need for amendments in the light of experience gained. Recommendation for amendments to these guidelines were made by MSC at its 59th session and by the MEPC at its 31st session. These recommendations were incorporated into the guidelines . At its 17th session the IMO Assembly adopted Resolution A: 680 (17), the revised 'IMO Guidelines on Management for the Safe Operation of Ships and for Pollution Prevention', on 6 November 1991. These revised guidelines were also subject to review by the MSC and MEPC.

The joint MSC / MEPC working group used these revised guidelines as a basis for development of the 'International Management Code for the Safe Operation of Ships and for Pollution Prevention', (ISM Code). The ISM code was annexed to Resolution A. 741 (18), which was adopted by the IMO Assembly on 17 November 1993.

2.4.1 Efforts of Shipping Industries Towards Safety Management System.

The shipping industry has always been in the fore fronts in the search of quality of service which was never possible without safety and environmental protections. While developing their various programmes, they too realised that an efficient management is after all very vital for the achievement of their goals.

As early as 30 April 1991, the International Ship Managers Association (ISMA) was established. Their contribution to the global safety and environment appeared in the form of Code of Ship Management. This group of Ship Management Companies which was famously known as the " The Ggroup of Five" worked extensively in the development of a comprehensive Quality Code for Shipping which was completed in December 1990. As it is today the conditions necessary to become a member of the ISMA is the compliance with the ISMA Code. In 1995, ISMA already had around 40 member companies, who operate an aggregate of around 1900 seagoing ships totalling 60 million tonnes dead-weight. (Meyor,1995, Page 367)

Classification Societies did not lag behind in their contributions to safety and environmental protection. Following the rest of the shipping industry, leading classification societies developed safety and quality management classification services in the early 1990s. There is a new concept of 'Total Safety' growing up in the boardrooms of classification societies which would eventually contribute to safety and environment protection.

According to the Carver report, there is a general tendency to shift from a prescriptive approach to a Safety Plan approach by means of a formal safety assessment.

This more scientific approach is of the utmost importance and will contribute to improving ship safety. It must be applied to new buildings at the design stage.

The principle behind the Total Safety Concept is to provide the maritime sector with comprehensive safety information on the ship, its management and crew. (Livois, 1996, 144)

It was in March 1990, that the Norwegian Ship owners Association published the 'Guidelines on quality management for ship operation'. The purpose of such a guideline was to provide guidance in the development and implementation of management for ship operation with regard to safety and environment protection. Primarily the guidelines were intended for companies responsible for the operation of ships carrying oil, chemicals or passengers. These guidelines were developed in line with the IMO Resolution A. 647 (16).

HELMEPA (Hellenic Marine Environmental Protection Association) of Greece co-operated with different associations which represented Greek Ship owners and Seafarers in order to publish guidelines based on IMO Resolution A. 680 (17). These were named voluntarily Guidelines on Management for Safe Ship Operation and the Prevention of Pollution.

Contributions by way of publishing of Standards and Recommendations by the following bodies need to be appreciated.

- International Chamber of Shipping (ICS)
- Oil Companies International Marine Forum (OCIMF)
- Society of International Gas Tankers & Terminal Operators (SIGTTO)
- International Tanker Owners Pollution Federations (ITOPF)
- International Association of Independent Tanker Owners (INTERTANKO).

The P&I club towards their contribution to maritime safety and environmental protection have set up their own standards for the safety management of ships on the following aspects.

- - written procedures
- - safety policy
- - ship maintenance schedule
- - manning and training policy
- - contingency plan
- - publications

With regards to the efforts towards safety and pollution prevention the club has always upheld the initiatives of the IMO and the shipping industry. In fact it is required by the club that ships should carry the standard publications or equivalent where relevant.

The Lloyds Register Quality Assurance (LRQA) has launched a scheme which incorporates the requirements of both the International Standard Organisation and the International Maritime Organisation Resolution A. 741/18, to suit its purposes on the grounds that safety and environmental protection are integral to effective shipmanagement system. They have also published a comprehensive guidelines for ship managers interested in Safety Management Systems.

3.0 QUALITY RELATED TO SAFETY

3.1 Quality in Shipping

Ensuring safety of personnel, property and environment is of paramount importance in the functions of any shipping company management.

Safety in relation to quality may be defined as a perceived quality that determines to what extent the management, engineering and operations of a system are free of danger to life, property or environment.

The achievement of above objectives can not be accomplished without the fitness for use, operational reliability and contractual performance of the service rendered by a shipping company. These are indeed the key elements of quality of service.

A series of well publicised marine disasters have focused attention, throughout the world on the existing poor quality of service in terms of the short comings of substandard ships and sub standard shore management etc. The result of all this attention has been the recognition that it is high time and there must be a move towards improvements in the quality of service in the broad spectrum of the shipping industry.

In order to provide safe and environmental friendly shipping strict adherence to the key elements of quality of service is absolutely necessary for the entire of the shipping industry.

Hence in the changing shipping industry today, quality of service is very much linked with the safety. The quality and safety management are not transient issues any more and preferably should be addressed together.

For a shipping company willing to comply with the doctrines of quality of service in its true essence, it is necessary to understand the three key elements of quality of service.

3.2 There are three key elements of quality:

- - fitness for use
- - operational reliability
- - contractual performance

1. Fitness for use:

Fitness for use may be described as the total composite product and service characteristics of marketing, engineering, manufacturing and maintenance through which the product and service in use will meet the expectation by the customer.

2. Operational Reliability:

Clearly part of a product or service will depend on its ability to function satisfactorily over a period of time and it is this aspect of performance that is giving the phrase operational reliability.

It is the ability of the product or service to continue to meet the customer requirements. Operational reliability ranks with quality in importance, since it is a key factor in many purchasing decisions where attentions of the customers are being considered. Many of the general management issues related to achieving product or service quality are also applicable to operational reliability.

3. Contractual Performance:

This aspect of quality of service is not possible without the service being properly managed. It just does not happen at its own. Clearly it must involve everyone in the process and be applied throughout the organisation.

Failures to meet the requirements in any part of a quality chain has a way of multiplying, and failure in one part of the system creates problems elsewhere, leading to yet more failures, more problems and so on. The price of quality is the continual examination of the requirements and our ability to meet them. This alone will lead to a continuing improvement of the whole philosophy of quality of service.

3.3 Quality Related Terminology.

The term quality, its definitions and various other terminology and their interpretation are stated in quite different styles by almost all the famous authors of the subject. At this stage, it is felt necessary to express the definitions and interpretations as they have been used in the preparation of the following part of the concerned subject.

Quality: It is the adequacy of a product or service for the real present and future needs of users. In some instances quality is associated with a statutory requirement to establish if a service is fit for purpose.

Adequacy: This can be defined as a perfect relation or equivalence where something appropriate corresponds perfectly to its purpose, and and is therefore suitably adopted.

Safety: A Perceived quality that determines to what extent the management, engineering and operations of a system are free of danger to life and property.

Process: The transformation of a set of inputs, which can include actions, methods and operations, into desired outputs in the form of products, information, services or general results.

Quality Policy: The over all quality intentions and directions of an organisation as regards quality, as formally expressed by the top management.

Quality Assurance: All those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for quality.

Quality Control: This consists of checking after the fact that a product complieswith statutory or contractual requirements.

Quality Management: That aspect of overall management function that determines and implements the quality policy.

3.4 Quality Control in Shipping Industry.

To optimise quality objectives, it was necessary to have some form of quality assessment. It was the manufacturing industry which initiated the process of quality assessment. Basically it meant the post production inspection by the customer of the finished product to detect and reject all those products which did not comply with the standard specifications set by the industry. This method of quality assessment by the end user of the product was termed as quality control.

The quality control procedures adopted brought about extra expenses in the form of wastes, reworking or rejecting of non conforming products. These expenses were considered as a cost of quality which indeed added to the costs of the finished products.

Likewise in the shipping industry, in order to improve upon the quality of services, a number of measures were adopted to ensure a rigid quality control. The measures of quality control adopted are evidenced with various mandatory and contractual requirements imposed on the shipping companies.

Undoubtedly the objectives of the mandatory and contractual requirements effected through a number of surveys and inspections are to achieve a required standard of quality in shipping. The point of argument could be that these numerous surveys and inspections to a certain extent are carried out by organisations having their particular interests in the various aspects of the common maritime adventure. The purpose of such examinations appear to be focused merely on to ensure compliance with mandatory obligations or fulfilment of contractual requirements. Their contributions towards building up of quality assurance in the system it self appear to be very little.

The focus of many a quality effort adopted appears to be mis-directed. In most organisations 90 % of the quality efforts goes into finding what is wrong and putting it right, and only 10 % into preventing it going wrong in the first place, an investment in prevention looks the better bet. (Milican,1993,35).

It is noticeable practically on board ships that the quality assessments are carried out through a number of assessors as follows:

- - Flag State surveyors looking after the interests of the administrations
- - Port State surveyors looking after the interests of their administrations.
- - Terminal Operator surveyors looking after the interests of the terminal
- - Classification surveyors influencing the interests of the charterers, shippers and consignees.
- - Surveyors looking after the interests of P & I clubs
- - Underwriters looking after the interests of hull and machinery
- - Surveyors dealing with damage claims, e.g. salvage associations

- - Time charterer's surveyors
- - Voyage charterer's surveyors
- - Potential charterer's surveyors

From the point of view of shipping companies the aforesaid tools are adopted by the vested interests of all those concerned (but the shipping company) in ensuring their own comforts and survival.

For shipping companies such a host of surveyors and inspection is very expensive. In fact over-emphasis on these examinations as a quality tool could be counter-productive.
Moreover an inspection or survey can only certify that an item fulfils a requirements or specifications, at the time of the inspection. This can create a complacent attitude. An inspection can not assure continuous compliance with requirements.

We can already see that a lot of efforts is being directed towards finding out what is wrong and then setting it right.
The emphasis of quality tool should be on proactive, rather than reactive approach. Ideally quality can not be inspected into product or services, customers satisfaction must be desired into the whole system. Conformance checks then make sure that things go according to plan. (Oakland,1989,8)

Therefore 90 % of the quality efforts should be devoted to prevention of non conformities and 10 % to quality control. This quality control should consist of a conformance check or verification during the process and not after the process is complete.

For a shipping company this could be best demonstrated by comparing the considerable efforts which goes into training and resources needed to fight a fire,

rescue a casualty or evacuate a ship, to the minimal amount of effort spent in providing education, correct procedures and resources to prevent the occurrence of an incident in the first place.

Perhaps the most radical changes that must take place will be in this area of forward thinking and planning in all aspects of management of shipping.

The system must address the satisfaction of the customers expectations. This often tends to be taken for granted. Where the ship has failed to meet expectations the results are sometimes so expensive that litigation may almost be inevitable and the actual costs of the failure is increased by the legal costs which are incurred in settling the dispute.

In view of the customer satisfaction to be designed into the whole system rather than inspection of quality into finished product or service stage, the advantage in the shift of emphasis to prevention was realised.
Quality Assurance measures were thus adopted by the manufacturing industry from the 1980's onwards. It was recognised that the system would built in the quality concept into the product or service. Hence quality assurance was accepted as a sound management technique to optimise long term profitability.

The growing interests in the quality standards led to the International Organisation for Standards (ISO) initiating work in 1983, on an International Standard using existing British Standards (BS 5750) as its basis, where several years of user experience were taken into account.

In 1987 the ISO 9000 series of five standards were approved by the European Committee of Standardisation (CEN) as a series of five European Standards (EN 29000 to 29004) without modification.

The ISO 9000 series Quality Standards, published in 1987 was adopted by the manufacturing industry to provide quality assurance for their products.

At present the ISO 9000, is a series of six interrelated standards.

ISO 9000: 1987 Quality management and quality assurance standard guidelines for selection and use.

ISO 9001: 1987 Quality systems - Model for quality assurance in design development, production, installation and servicing.

ISO 9002: 1987 Quality systems - Model for quality assurance in production and installation.

ISO 9003: 1987 Quality systems - Model for quality assurance in final inspection and tests.

ISO 9004: 1987 Quality management and quality system elements - guidelines.

ISO 9004-2 1991 Guide to quality management and quality system elements for services.

The principle concept of the ISO 9000 series quality standards is that an organisation should achieve the 3 objectives specified in ISO 9000 series.

1 The organisation should achieve and sustain quality of the product or service produced so as to meet continually the purchasers stated or implied needs.

2 The organisation should provide confidence to its own management that intended quality is achieved and sustained .

3 The organisation should provide confidence to the purchaser that intended quality is being or will be achieved in the delivered product or service provided. When contractually required, this provision of confidence may involve agreed demonstration requirements.

ISO 9002 is considered to be the most appropriate model for contractual situations when the specified requirements are stated in terms of an established design or

specific action such as a ship and shipping operations. Hence by the late 1980's, the shipping industry adopted this series as its quality assurance techniques.

It is to be noted that the elements of 9002 need to be adapted for application to the shipping industry. In doing so consideration need to be given to safety of life and property at sea, safe navigation, compliance with national and international regulations and customers requirements.

For the purposes of the ship and its operations, the term 'purchaser' does not only mean the customer of the transportation service offered by the shipping company. This term needs to be viewed in a broader perspective. The Flag state, Port state, and Society in general are all entities with expressed and implied needs such as for safety and environmental protection to be fulfilled by the service offered by the shipping companies.

3.5 Total Quality Management

The term quality has for too long been misused to its application as solely for the purposes of conformity to a specification. Total quality concept would reflect a company's ability to respond effectively to the multiple needs of the market. In its broader spectrum it calls for an organisation and its resources should be concentrated on providing the right response to the changing needs of every customer, which includes the flag state, port state and the society as well. The application of the concept is based upon the internationalisation of quality with a focus on the principles of continuous improvement.

There are two possibilities to achieve Total Quality at present

- - Quality Assurance Program
- - Quality Improvement Program

Each of the two programs have their own merits and demerits. A Quality Assurance Program is based on a strict approach towards achievement of quality and as such it

necessciates controls of documentary evidence to be produced to the customer in accordance with the contract. The great advantage of this system is that it minimises the risks of errors if followed strictly.

A Quality Improvement Program provides for adaptability to the situation and opportunity for creativity in the system but if such a creativity is not utilised for carefully channelled and targeted projects, it would prove out to be a waste of precious time and energy.

In order to comply with Quality Assurance Program two factors are essential:

- - Internal audit
- - Periodical management review

Thus the quality control and assurance are achieved on the basis of acknowledged commitments.

The main aim of a Quality Improvement Program is to achieve a better overall performance of the existing system with the idea of simplifying the system whenever possible and improve the efficiency. The two objectives are sought through:

- - annual quality improvement goals and
- - voluntary suggestions expressed by the employees.

As a result the Quality Assurance Program provides confidence in the Total Quality System and its continuance is ensured an awareness of all ideas for improvement, where as the intrinsic motivation of the individual in Quality Improvement Program are made to contribute to the Total Quality Systeln. (Chavel,1995,24) .

The theories of Total Quality Management are relevant to the Shipping industry, provided these are adapted to the maritime situations. (Millican,1992,50) states:

> The practices methods and tools which have proved to be successful when used in manufacturing should not be ignored but

neither should they be copied without modification in an entirely different context or in a different culture.

Shipping companies have had no difficulty in applying traditional management methods in ways which fit their particular circumstances and the working and culture of the industry. The same has to be done with the tools and methods of quality management if they are to become an integral part of the way the company operates and not just the proverbial flavour of the mouth.

However while applying Total Quality Management Systems in a shipping company, its success would still depend upon the four basic requirements i.e. Leadership with commitment, Organisational goals, Total quality culture and the proper Training.

4.0 THE ISM CODE, BENEFITIAL TO SHIPPING COMPANIES

> I am instituting a new order of business which will put safety where it belongs; in the hands of the owner and operator. We cannot enter the twenty first century with the attitude of business as usual.
>
> Attributed to Admiral Kime (USCG)
> DNV (1995)

The International Safety Management Code is the standard for establishing a system for the safe management and operation of vessels and for pollution prevention. This system will have to be approved by the Flag administration or an organisation recognised by it. Shipping companies which will adopt the ISM Code shall be issued with a Document of Compliance by the Flag administration or an organisation recognised by it.

For the first time in the maritime history the company ashore (the office and not just the ship) has to be approved and have a certificate. Thus the Document Of Compliance would serve as a licence to be an operator of ships.

4.1 Reasons for Compliance with the ISM Code.

There are at least four good reason for the adoption of the ISM Code.

- - It makes the ship a safer place to work, provides safe working practices and develops a safe working environment on board the ship.
- - It protects the sea and the marine environment.

- - It clearly defines the jobs for the individual, and therefore it makes it easier for the employer and the employees. It will boost the morale of the employees thereby increasing their efficiency.
- - It would attract good crew, passengers, shippers, charterers, even classification societies and underwriters and the P and I Clubs.

Above all it is the law. Compliance with the ISM code is required by Chapter IX of the SOLAS 1974 Convention.
The code was adopted by the IMO through Resolution 741 (18). This was given mandatory effect by the contracting Governments for the SOLAS 1974, on 24 May 1994.

A new chapter, chapter IX - Management for the Safe Operation of Ships, chapter IX sets out definitions relevant to the ISM Code. It also covers application of the regulations, obligations relevant to establish and maintain the Safety Management System, certification, verification and control to be established by the Flag state
This amendment will be considered to be accepted on 1 January 1998, under the tacit approval system. The amendment shall enter into force on 1 July 1998. Passenger ships including passenger high speed craft of 500 gross tonnes and over are required to comply with the provisions of chapter IX of SOLAS 1974 not later than 1 July 1998. Cargo ships and mobile offshore drilling units of 500 gross tonnes and above are required to comply with these regulations by 1 July 2002.

4.2 ISM Code Requirements

The ISM code and the IMO guidelines have a functional approach rather than a detailed approach. This has been done with a purpose to suit adaptability of different kinds and circumstances. Therefore it is not a " Cooks book " and leaves a lot of room for improvements and adjustments according to further developments. Adhering to its basic objectives it is a continuous self correcting approach.

The code is divided into the following 13 sections.

1. General

This gives an introduction to the general purpose of the code and its objectives.

2. Safety and Environment Protection Policy

The company must put in writing its policy on the safety and the protection of the marine environment and make sure that everyone knows about it and follows it.

3. Company's Responsibilities and Authorities

The company must have sufficient and suitable people both in the office and on board the ships with clearly defined roles and responsibilities.

4. Designated Person Ashore

The company must appoint a person in the office responsible for monitoring and following all SAFETY and ENVIRONMENTAL matters of the vessels.

5. Master's Responsibility and Authority

The master is responsible to make the system work on board. He must help his crew in following the system and give them instructions when necessary.

The master on the ship shall uphold safety and pollution matters above all other considerations.

6. Resources and Personnel

- The company must employ the right people on board and in the office and make sure that they all:
- - know what their duties are
- - receives instructions on how to carry out their duties
- - get trained when and if necessary.

7. Development of Plans for Shipboard Operations

It is required to plan the work on the ship and follow the plan when working.

8. Emergency Preparedness

Every one should be prepared for the unexpected (emergency) . It can happen anytime. The company should develop plans for responding to emergency situations on board its vessels and practice them.

9. Reports and Analysis of Non Conformities, Accidents & Hazardous Occurrences.

No person or system is expected to be perfect. This section of the system gives a way to correct it and improve it. It is necessary to make a report on finding anything wrong including accidents and hazardous situations. It should then be analysed so the whole system can be improved.

10. Maintenance of the Ship and Equipment.

The vessel and its equipment must be maintained in a good condition. Compliance with the rules and regulations is imperative. It is also essential to maintain and frequently test those pieces of equipment that are important for safety and environmental protection. Records of the works carried out must be maintained.

11. Documentation

The safety Management System must be put in writing i.e. documented and controlled. Such documents must be available both in the office and on board ships. It is a requirement to control all the paperwork related to the system (records and forms).

12. Company Verification and Control

The company must have its own internal methods for making sure that the system works and is improving.

13. Certification, Verification and Control.

The flag administration or an organisation recognised by it, will have to send external auditors to check the company's system in the office and on board each ship.

After it has satisfied that the system is working the flag administration will issue a Document of Compliance for the office and a Safety Management Certificate for each ship.

SOLAS 74 - chapter IX defines the identity of an entity called 'company',

Company means the owner of the ship or any other organisation or person such as the manager, or bareboat charterer, who has assumed responsibility for the operation of the ship from the owner of the ship and whom by assuming such responsibility has agreed to take overall duties and responsibilities imposed by the international Safety Management Code.

Chapter IX requires the company to comply with the requirements of the ISM Code.

(IMO Guide lines on the application of the ISM Code).

4.3 Benefits to Shipping Companies.

In the past decades, people have seen enough results of disastrous accidents at sea. The cash amount of financial losses have literally thrown many a shipowner out of business while others are struggling to survive.

In general up to 4.6 % of the running costs of a modern Panamax type bulk carrier are attributed to insurance related items. The cost of an accident is not always in cash terms but in the human tragedy with loss of ships and the damage caused by environmental catastrophes. At times this has resulted in the formulation of unilateral laws by the port states who would always wish to protect their territorial interests. It

is also not uncommon that the media coverage would exaggerate in describing a particular situation to give a big blow to the individual company's reputations.

Preventing losses means saving of money. While implementing the ISM Code it is an opportunity for shipping companies to become efficient enough to prevent such losses and save money.

Undoubtedly the development and the implementation of the ISM code would cost money to the shipowners. The expenses involved in the implementation of the ISM Code would be comparatively less for better established, safety conscious shipping companies, where a sort of a safety management system has always been in practice in good old traditional way. Perhaps there would be some expenses involved in including the procedures of the shipowners office into the system, its monitoring and control.

Whatever the expenses be, it may be considered as an investment. It is indeed difficult to establish the balance between the costs and benefits so as to work out the return on the investment. The fact is that costs are apparent, mainly direct and quantifiable. The benefits on the other hand are something in the future, arguable and could be interpreted anyway.

Although the benefits are difficult to quantify on account of compliance with the ISM Code, the benefits may include:

- - cost saving
- - improvement of the physical condition of the ship
- - increase of productivity
- - reduction of off hire
- - reduction of average
- - reduction of number of accidents

But then these benefits need to be measurable. Taking the example for a particular ship the measurement need to be compared with a standard value. Then the standard deviations from the standard value must be worked out. It is also necessary to analyse the general trend. All this process take time to show up its results and during this period the chances are that some of the parameters would have changed. It is therefore not easy to make an exact estimation of the return on investment.

However to make a business decision , we need to be convinced that the benefits in compliance with the ISM code are greater than the expenses of the implementation. Thus it need to be proved that:

1 Non compliance of ISM code costs money
2 Cost savings due to implementation of the ISM code
3 Cost savings are greater than the costs of implementation of the ISM Code.

The costs of non compliance at times is very obvious. An example of this could be the foundering of the Herald of Free Enterprise because the bow door was not properly secured.

To prove 2 & 3 above, a case study was made a few years ago for a shipowner with 25 ships.

A total time of two years was utilised in the implementation of the system.

The total costs of 400,000 USD was utilised for the implementation of the system.

The break down of this figure is as follows.

- - staff time 100.000 USD
- - external assistance (including payment to two extra employees during the period of implementation) 100,000 USD
- - Training courses and meetings 150,000 USD
- - misc 50,000 USD

Hence in order to implement the ISM Code, the costs involved was an yearly interest on the loan of 400,000 USD and administration costs. In the case referred to, the costs of management was said to be around 100,000 USD per year.

Cost Savings due to implementation of the ISM Code.

Repair costs.

Costs for repairs, planned as well as unplanned, should definitely be reduced as a result of the implementation of the ISM Code, because the number of unexpected break-downs should be reduced due to a more systematic supervision.

Prior to the implementation of the ISM Code, the cost was found by regression analyses of the actual costs. The cost model used for this purpose looked like this:

Cost = a0 + a1*size + a2*power + a3*age + a4*productivity + a5*main engine type (two stroke/four stroke) + a6*shaft generators (yes/no) + a7*main engine fuel quality + a8*auxiliary engine fuel quality.

(a subscript denotes constant)

A model of this kind will normally reflect about 75 % of the costs. The remaining 25 % are due to other parameters including the individual performance of the crew members.

The standard deviation from the mean value of the repair cost was found to be about 50,000 USD. (Munk & Madson, 1995,3)

With the implementation of the ISM Code, all ships were found to be performing as well as the best third. The saving was worked out to be about 25,000 USD per ship. A saving of just 20,000 USD per ship per year is therefore not unrealistic after a couple of years with ISM Code in practice.

Improved Physical Condition.

Improvements in the physical condition may safely be regarded as savings of cost. The physical condition of a ship may be evaluated by giving marks to the different areas and pieces of equipment on board for instance between 1 and 5, 1 denoting a perfect condition and 5 denoting an unacceptable condition. The sum of the mark will then form a measure for the condition of a ship.

Increased Productivity.

Increased productivity may also be regarded as savings of cost. Engine hour per year, kw hour per year, transported tonnes dead weight times nautical miles per year and number of port calls per year may be used as measures for productivity.

Reduced Off hire days

Number of off hire days is a good and easy established measure for the efficiency of the shipboard management. Further, it is easy to transform this value to a cost value.

Reduced Average cases

Number of cases of average is an easy measure, too. A cost value is normally found but a measuring value for the severity is difficult to define.

Reduced number of Accidents

Number of personnel accidents is also a good measure, but it is difficult to define a measuring value for the severity of an accident and impossible to attribute cost values to the individual accident.

Cost Saving is greater than the Costs of the implementation of the ISM Code.

Alone with reference to the savings in the repair costs of the case referred to above. All costs regarding the implementation of the ISM Code would be recovered, if the saving is realised only for 5 ships.

Savings caused by reduced Off hire days, reduced number of cases of Average and reduced number of Accidents are then pure profits to the shipping company. However the most important benefits, namely safety, prosperity and commercial developments, are of immaterial nature and cannot be compared directly to the implementation costs.

4.4 Quotable Quotes

A major accident has the potential to cause multiple fatalities and / or extensive pollution and the COSTS can be enormous. The bill for Exon Valdez spill amounted to 2.5 billion USD. **(BELLAMEY)**

Some of the problems of not identifying the COSTS of non compliance with ISM code are in hind sight. What is obvious is that poor safety operations increase risks leading to disasters. **(ANGAS)**

If you think safety is EXPENSIVE try an accident. **(Chairman British Railway)**

Prevention is not only better but CHEAPER than cure. There is no necessary conflict between humanitarian and the commercial considerations. Profits and safety are not in competition on the contrary safety at work is good business. **(BUTLER)**

Defects are not free, somebody makes them, and gets paid for making them. Prevention is the COST of getting it right. Appraisal is the COST of finding that you have got it wrong and Failure is the COST of getting it wrong. **(GRANNEY)**

5.0 IMPLEMENTATION OF THE ISM CODE IN A SHIPPING COMPANY

Having realised the long term benefits and advantages and the timely need to comply with the ISM code an establishment of a well designed safety management is extremely essential. Such a system shall help to reduce not only the disastrous incidents but will also to a great degree reduce the probability of minor casual accidents on board ships to achieve long awaited objectives of safer ships and cleaner oceans.

5.1 Pre requisites of successful implementation.

Safety at sea is not achieved by regulations and mere pieces of papers, or by fancy pieces of equipment. What is important to realise is that it requires willingness and a complete commitment effort from top to bottom on board the ship as well as on shore organisation. This is only achieved by complying with the following pre-requisites:

- - safety culture
- - motivation
- - training

5.1.1 Safety Culture

One of the most important and difficult tasks to achieve is the derivation of a proactive attitude, at all levels within a company, towards safety and pollution prevention issues. For this purpose, it is essential that all the company's personnel

are in the position to perform effectively the duties imposed by the safety management system, which in turn depends on the allocation of sufficient resources.

A positive safety culture means caring for the safety of the organisation's activities and out comes.

This caring for safety should be reflected in the norms, beliefs, roles, attitudes and practices within the organisation. A positive safety culture is one in which not only those with a specific safety function care about adverse out comes, but also front line workers and their management as well. This means that safety is important to all personnel at all levels and are integrated with the daily practices at the different levels of action.

Every employee of the shipping company should understand the factors of individual failures which are undesirable in a shipping company for safety reasons. These may include, mischief, ignorance, misjudgements, folly, negligence, alcohol/drug, laziness, lack of seriousness, undue fatigue, sloppiness etc.

Good ship management depend on a culture of safety where safety issues are given high priorities in the boardrooms as well as on board the ships. This culture which will encompass all aspects of a company's shipping operations will undoubtedly influence the successful running of the company and its ships at all levels.

Figures from the Health and Safety Executive show conclusively that between 70 and 90 percent of accidents have their root causes in organisational failure, Investigations into the disasters of the 80's such as the Herald of Free Enterprise, the Piper Alpha and the Space Shuttle Challenger all proved beyond doubt the truth of this conclusion.

It is therefore important for the shipping companies or ship operators to know some of the salient factors which play a role in organisational failure to achieve safety culture. Some of them may include, management style, rules and regulations,

communications (including language problems), time pressure, morale and appreciation.

The participative decisions making democratic leadership style and individual job satisfaction are all positively co- related with low accident rates. At the same time excessive bureaucracy may successfully prevent a few accidents but in doing so it may create unfavourable attitudes that will more than out-do the benefits.

Sea going personnel must have the full support of efficient intelligent management to perform properly. Really excellent crews can make ships run well despite poor management for a short while, but poor management is bound to undermine morale with the result that good crew members will leave and accident rate will rise.

Excellent management will always have the ability to convert poor crews into good crew by motivating and training of those who are trainable and willing to work. Equally important is getting rid of those who are not trainable and not willing to work. There is nothing unfair and unethical about it. It is against the best interests of safety and thus the well-being of seafarers as a whole to allow irresponsible misfits to remain at sea to cause harm to the responsible majority. Many a flag state and union leaders of today acknowledge this, and they are a great help to management in promoting safety.

The highest standards of safety management would of course be achieved through a step by step process aimed at continuously improving the system on the basis of experience gained.

5.1.2 Motivation

Motivation could be defined as the feeling that drives someone towards a particular objective. The aim of the motivation is to create conditions such that the people in the organisation can achieve their own goals by directing their efforts towards the success of the Safety Management System and the shipping company as a whole.

The available personnel may bring miraculous results in the overall efficiency and output of the organisation if resourses are exploited positively.

For seafarers and for the people in the shipping companies, generally money and benefits with job security are the strongest motivators. Together with this recognition for good work and loyalty would provide the job satisfaction to the people involved in the development, implementation and successful continuation of the Safety Management. In addition rewards for safety must be encouraged by the shipping company.

5.1.3 Training

The importance of training and education in any management system need to be emphasised again especially in the fields of safety, operations of ships and its maintenance. With the advancement of technology, the need is yet greater on the ships of today with complicated equipment and smaller crews.

Shore based personnel and shipboard personnel who are expected to undertake functions related directly to the proposed safety management need to be trained in relevant aspects of the safety management system.

For Shorebased Personnel

The company should conduct properly constituted training courses, which will have to be followed up by a period of on -the-job familiarisation. In this regard drills and exercises may be utilised to make up any deficiencies in the training as well as the safety management system.

To update them with any proposed major changes, the shorebased personnel will also require refresher courses at regular intervals. Newly appointed personnel and those who are newly assigned duties related to the system are required to undergo a familiarisation programme before assuming their responsibilities in the system. This programme shall include reading and understanding of all safety management system

documentation, computer based familiarisation programme, video instructions and on-job-training.

For Shipboard Personnel

The familiarisation programme necessary for the ship board crew other than the master, senior officers, watch keeping officers/engineers should include the following

- - Safety and environmental policy
- - Ship particulars
- - Organisation chart
- - Safety and pollution hazard & precautions
- - Safety and pollution prevention practices.
- - Video instruction on safety management system.

In the preparation of the above information, publications of the International chamber of shipping would be very helpful.

The familiarisation programme for watch keeping officers / engineers shall include all above and in addition:

- - reading and understanding the company's shipboard safety management system documentation.
- - computer based familiarisation programme.
- - stipulation of minimum handing - over - period.

As for the master of the ship and senior officers, they should be formally briefed by the company prior to their joining of ships with information as below:

- - all information required by watch keeping officers / engineers as stated above.
- - overview of the safety management system
- - specific details of the safety management system on board the ship.

It is a good practice of shipping companies to maintain a record of the safety management system training undergone by their personnel.

5.2 Policy Commitment for the Safety Management System

An example of such a policy document is given below. **Fig 5.1**

HEALTH, SAFETY AND THE ENVIRONMENT

The management wish all the employees to be fully aware of the company policy on health, safety and protection of the environment.

The aims of the policy are:

TO PROTECT THE HEALTH AND SAFETY OF ALL EMPLOYEES AND OTHER PERSONS. TO CONSERVE THE ENVIRONMENT. TO AVOID DAMAGE TO PROPERTY.

In all activities account will be taken of the need to :

Aim for the elimination of work-related injuries and illness.
Aim to avoid all pollution and protect the environment.
Aim to comply with both the letter and spirit of all relevant legislation and International Conventions.
The management:

Believe all injuries on board can be prevented by high standards of safety consciousness, personal discipline and individual accountability.

Will actively promote employee participation in measures to improve their health and safety both ashore and on board ship.

Will keep employees fully informed of known or potential hazards that might affect them.

Will use their best efforts to prevent accidents and minimise harm from accidents that may happen.

Require the commitment of all employees to safe operating practices and to work towards the elimination of personal accidents and unhealthy practices.

KNOW YOUR SHIP, KNOW YOUR JOB

THINK SAFE; BE SAFE *Source: Codrington (1991, 178)*

Adhering to the requirements of the ISM Code and the IMO guidelines on the same, it is the requirement to set up a safety and environmental protection policy with commitment from the top.

A safety and environmental protection policy should be consistent with the laid down objectives of the ISM Code and the company's safety management objectives. The shipping company must establish, implement, review and maintain a clear written safety and environmental protection policy. It is this document which should provide the guidance in the direction of maintaining an efficient safety management system. As a requirement of commitment by management, it is necessary that the top representative of the shipping company fully understands and signs this document.

5.3 Tools of Implementation

A good shipping company which has a good background of safety culture, motivation and training should have not much difficulties in the development and implementation of the safety management system by using the following appropriate tools for the purpose:

- - safety assessment (identification of risks)
- - documentation as per the requirements of the code
- - monitoring of the system
- - review of the safety management system.

5.3.1 Safety Assessment (Identification of Risks)

In a successful safety management system of a shipping company the aim of the organisation is to focus on the development and implementation of controls which could ideally provide harmless means to achieve the objectives of safety and environment protection. Safety assessment is a systematic process employed in identifying and then analysing the risks and hazards which are associated with all activities or operations carried out. It is a very useful tool in establishing the risk.

A hazard is an undesirable physical risk which is capable of giving harm and / or damage to a person, property and / or environment. In this regard a risk is the probability of a hazard occurring in a specified period or under specified

circumstances and conditions. The safety assessment is principally carried out in the following steps:

- - identification of risks
- - analysis of the causes of the risks
- - evaluation of risks.

It is extremely necessary for a correct application of the process of safety assessment that it should be based only on establishing how safety is actually being managed and not on how it is expected or believed to be managed. The efforts should be truly unbiased and without any pre conclusions. With such safety assessment applications, the procedures and methods thus developed shall result in a less hazardous style.

Referring to the ISM code objectives which require a company to establish safeguard against all identified risks, the hazard identification will provide the basis for fulfilment of the requirements.

Ross (1994, 226) has classified methods of hazard identification as follows:

> Hazard identification techniques generally fall into two categories, comparative and fundamental methods. The comparative method would simply consider all previous hazards encountered on similar ships or ship systems, and consider if these hazards were present on the proposed ship or system. A more thorough technique is a fundamental method known as Hazard and Operability Studies (HAZOPS). The intent here is to examine systematically all project activities and processes through the use of keywords or a combination of guide words and parameters using a multi disciplinary approach.

- HAZOPS will examine processes and activities both on board and in the shore management in order to identify likely hazards and operational problems. Thorough hazard identification will require a complete understanding of the process or activity being examined. The study will be

most effective when conducted by a multi disciplinary team. The team should consist of experienced ships staff, ships superintendents, fleet safety manager, personnel manager, commercial manager, maintenance and repairs manager and training manager. The team must have a chairman who is familiar with HAZOP methodology. The discussion and findings must be recorded. Members of the team must have a thorough knowledge of their area of specialisation and its relevance to safety management systems. The HAZOPS team should focus upon various activities and operations carried out separately for each type of ship the company has (general cargo, container, oil tanker etc), in a systematic fashion and identify all hazardous malfunctions and faulty processes. Relevant publications and sources of information need to be referred to, such as:

- - national legislation, codes and guidances from a ships flag state state.
- - international Conventions, codes and recommendations
- - product information
- - expert advice and opinion
- - record of previous accidents and incidents within the organisation and other organisations
- - personnel knowledge and experience of managers and employees
- - industry or trade association guidelines, (e.g. IMO; ICS; ISF; OCIMF; CEFIC; SIGTTO).

The hazards which are linked with almost all types of ships and which need to be considered will inevitably include fire, explosion, collision, stranding or grounding, personnel injury, pollution, pirate attack etc.

Additionally on tankers there are hazards of carrying highly dangerous cargoes, uncontrolled release of hazardous cargoes, inadvertent mixing of incompatible cargo, reaction of cargo with air, water or other materials.

While developing shipboard procedures, those procedures which have a potential of creating the identified hazards such as above must be closely examined during analysis of the causes of hazards.

Through procedures particular attention should be drawn to the need to adhere to strict instructions for such shipboard operations where an error may immediately cause an accident or a situation which could threaten people, the environment or the ship. Some of the examples of Critical Operations for which Critical Procedures will be required are found in the IMO Guide lines on the Implementation of the ISM Code.

A triggering event usually provides the initial failure in a system and then proceeds through a sequence of events until it culminates in a hazardous outcome. The cause analysis process traces the chain of events in every operation or activity to identify the event which has caused the hazard. There are two methods employed in the cause analysis process. These are **Event Tree Analysis** and **Fault Tree Analysis**. In the Event-Tree Analysis method, it is necessary to flowchart every relevant procedure or activity. The point of commencement of the analysis is the point of failure in the sequence of procedure. The probable event sequence after such a failure in the system are traced to find which combination of events will precipitate a hazardous situation. The intention of this exercise is to establish how a triggering event could lead to a specified hazardous outcome (pumproom explosion). If a branch of the trace leads to a non hazardous outcome it is not traced any further.

The limitation of this method is that the same outcome could also arise from other causes which would not be apparent from a single trace. The advantage of this method is that a whole range of outcome can be analysed from the same tree.

The fault-tree analysis method starts with the hazard as the starting point and traces backwards to identify the faults which lead to the hazard. This method is less complex as only those faults which directly contribute to the hazardous outcome need to be traced . Each hazardous outcome can be represented by a separate fault tree in which many events interact to produce other events by a simple logical relationship (And, Or etc.). Separate outcomes will require separate trees. The fault-tree analysis method may be termed as a top-down technique and is often the preferred method.

On conclusion of cause analysis, a description of the hazard development process is obtained and receptors are identified. Receptors are persons, environment, ship/shore system and property affected by the hazardous event.

Once the hazards are identified and their cause analysed, it is necessary to evaluate the risk of estimating the probability of occurrence and assessing the consequence of the hazard. The probability and consequences of a hazard can be evaluated by its effect upon receptors. A qualitative analysis can be undertaken.

In a qualitative evaluation a judgemental ranking of the hazard from past experience, is expressed on a qualitative scale for the likely hood and consequences of the hazard. A qualitative scale and method of evaluation was proposed in a submission (MSC 65/24/2) by the U.K, at the 65th session of the MSC in May 1995. An example of the scale is given in table 5.1. High risk hazards will be located in the top right hand corner of the matrix. The matrix will make it simpler to identify unacceptable risk levels and develop controls to reduce the risks to acceptable level.

When developing controls the following criteria can be used:

- control measures for risks which could create catastrophic consequences, even if they are infrequent, should be given greater priority than risks which create only small losses.

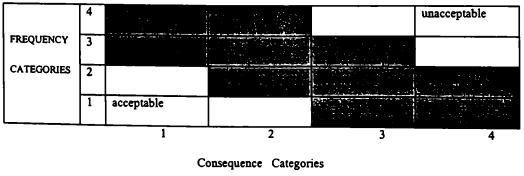
- where two risks have the same consequences the control measure should address the one with the higher likelihood first.

Examples of such scales are: Table 5.1 Source: MSC 65/24/2

RANKING SCALES	
LIKELIHOOD	
Scale	**Definition**
1 'extremely improbable'	Not expected to occur within the installations lifetime
2 'improbable'	Isolated incidents of this type have been known and could be expected in the installations lifetime
3 'probable'	Would expect an occurrence within a 10 year time frame
4 'frequent'	Would expect several occurrences within a 10 year time frame
CONSEQUENCES	
1 'Minor'	Only minor injuries expected
2 ' Major'	Major injury to operator predicted
3 'Severe'	Single fatality
4 'Catastrophic'	Multiple fatalities

Having defined the scales, a group of operators with relevant experience can be brought together to place judgmental ranking on the hazards. These rankings are placed on a matrix format which allows the high risk hazards to be identified

Example of risk matrix



qualitatively in order that only those hazards of significance are carried forward to fault or event tree development. If appropriate, ranking can be applied during the hazard identification exercise, as part of the HAZOP study.

An example of a risk matrix is given above. According to the example scale given above, high risk hazards would fall in the top right hand corner of the matrix.

5.3.2 Documentation

All activities which can affect safety and environmental protection must be analysed through safety assessment process in order to categorise them as critical and special activities, so that procedures for key activities could be written with due diligence according to their level of importance.

It is required of a company to provide laid down procedures in the safety management system documentation for;

- - shipboard operation (ISM Code 7.0)
- - emergency preparedness (ISM Code 8.0)
- - non conformity, accident, hazardous occurrence reports (ISM 9.0)
- - ship maintenance (ISM Code 10.0)
- - maintenance of documentation.

Procedures should not be written in a way that will result or stop an operation being undertaken. It is not necessary to produce endless pages of procedures. In fact in order to gain ready acceptance by the people who have to read and use the manual, the presentation of the information contained within them is an important part of

making the documentation user friendly. Therefore the documentary system must be sensible, easy to operate and easy to understand,. The use of flow diagrams, sketches, drawings and checklists will go a long way towards having easily understood procedures and work instructions. The understanding of the documentation will be a crucial element in the satisfactory implementation and operation of the safety management system.

The whole process of documentation need to take into account the safety and environmental protection policy, national and international regulations and the results of the safety assessment.

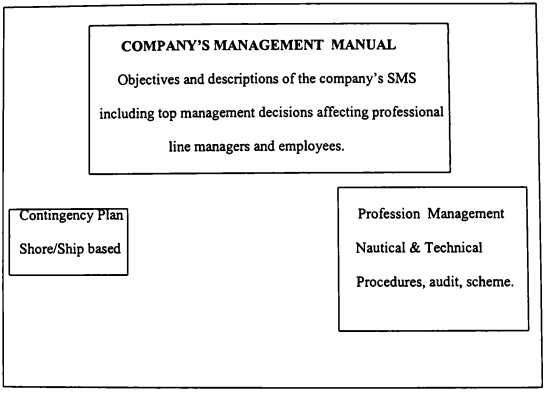
It is therefore strongly recommended that manuals and documents should be drafted by some one of the appropriate discipline, i.e. navigation procedures by an experienced deck officer, and engine room procedures by an experienced engineer. Once the draft is prepared it should be reviewed by the management representatives to ensure that laid down procedures follow a common format. The management representatives should ideally comprise of a superintendent ashore with seafaring experience.

How many manuals a shipping company will be required to produce to meet the requirements of the ISM Code is not specific. It is a matter which each company will have to consider knowing their own operational scopes. A large fleet with many different types of ships and trades may have to have a bigger pile of manuals than a relatively modest sized shipping company with only a few different types of ships or special trades.

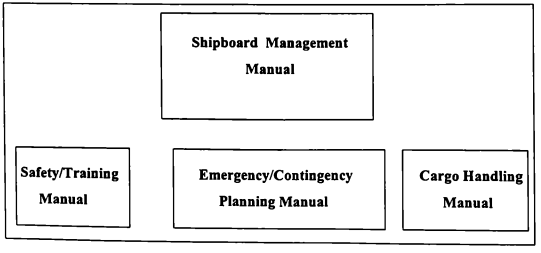
It is most likely that the Main Company Manual may comprise of several large loose-leaf folders. Each section of the listed contents may be contained in separate folders. Such a structure for reference documentation will make it easy for updating documents when corrections are required to be done.

Below is the **Proposed Structure of Documentation** as modified from Guidelines on the application of the ISM Code (1994, 32)

MAIN COMPANY MANUAL **Fig 5.2**



MAIN SHIPBOARD MANUAL **Fig 5.3**



The following table provides an example of a list of contents of a Company Management Manual. **Table 5.2**

COMPANY MANAGEMENT MANUAL

List of Contents

Modified from: Training course documentation, Piraus, January 1995, DNV

Safety and Environmental Policy

It is necessary that the Safety Management System of a company should be exactly in lines with the Safety and Environmental policy. The first section in the contents of this Main Company Manual should speak for this.

Trade and Fleet Information

In this section of the contents, there should be a brief description of the company's business with particular reference to the trade. The section shall in addition contain a formal strategy it intends to adopt for the implementation of the stated Safety and Environment policy

Organisation

The structure of the organisation and all the departments of the shipping company together with their inter relationship must be expressed clearly. It should also define the responsibilities of the individual and their communication relationship such as contact, ship/shore, relevant authorities, and other relevant organisations. The section should also describe the overall job descriptions of all personnel involved with the company's Safety Management System. Sometimes it may also be necessary to provide more a detailed description separately in the task description of the Office Management Manual. The section should also state the laid down procedures for the delegation of responsibilities in the case of an absence of senior decision makers. In compliance with the ISM Code, the nomination of Designated Persons who are entrusted with the responsibility and authority by the company to perform inspections and verification must be formally identified in this section. This must also define the duties and responsibilities of the Designated Persons. Safeguards to preserve the independence of the Designated Persons are also required to be stated.

Safety Management

In this section of Safety Management the description of the Safety Management System should provide an overview of the documentation both shipboard and ashore through a block diagram or equivalent means, so as to enable hierarchical structure of the manuals and documents to be understood by the users. The documentary procedure and frequency for periodical reviews and evaluation of the Safety Management System will be portrayed by drawings or in description in this section. The principle and methods of accident/near misses/non conformity reporting, and management review/verification shall be outlined here.

Personnel Safety

This section of the Company's Management Manual is dedicated to Personnel Safety. All matters regarding occupational health and safety of employees should be dealt with in this part of the manual. The set procedures to inform shipboard personnel regarding health hazards of oil, chemical and liquefied gas cargoes must be clearly defined. If the company has established a health maintenance programme for shipboard personnel, then this section should cover the details about this.

Environmental Pollution Prevention

This section is dedicated to environmental pollution prevention. The policy of the company in this regard must be reiterated by writing. It should also outline the procedures intended for the prevention of pollution on part of ship and shore management. If the shipping company has oil tankers in its fleet, it would be a good practice for the company's environmental pollution prevention measures to be in consistense with the Safety of Pollution and Environmental Protection (SOPEP).

Safe Shipboard Operations

For safe shipboard operations, the International Chamber of Shipping guidelines on the paragraph 7.0 of the ISM Code, necessiates the formal identification of shipboard operations where safety and pollution prevention are important. classifying key shipboard operations into special and critical shipboard operations is achieved in this section. Similar information is also provided in the Shipboard Manual. The required safeguards and the monitoring functions are to be clearly defined in this section.

Personnel and Training

In compliance with the requirement of paragraph 6.0 of the ISM Code , the company is required to provide details of the personnel and their training in the Main Company Manual. This section must describe the procedures adopted by the shipping company for the selection and recruitment of ship's personnel. It should also indicate the manning requirements, qualifications and medical fitness. The procedure adopted for briefing to the senior officers prior to their joining of ships in order to ensure that they are fully conversant with the Safety Management System must be mentioned in this section of the manual. Likewise procedures for familiarising new personnel and those personnel transferred to new assignment in connection with safety and a pollution prevention must be defined. The company's policy on drug and alcohol with a description of the measures for its enforcement on the ship need to be stated. All the training requirements both for the shipboard and shore based personnel is described for this part.

Rules, Regulations, Laws and Codes

Realising the fact that the regulatory environment of shipping is continually changing it is necessary for the Safety Management System to ensure continued compliance

with the updated rules, regulations, laws and codes. This part of the Main Company Manual will describe the process and procedures adopted in ensuring that all the concerned persons on board and shore are updated with the latest contents of the inforce regulatory regime. The purpose can be served by delegating a department in the shore management the responsibility of communicating the updated information on the relevant rules, regulations, laws, recommendations and codes.

Administration

It is needless to say that a good ship board administration is required to ensure safe ship operations. All administrative procedures to ensure safe operation of ships must be laid down. This would among other things include matters such as safety, maintenance, spares, stores, docking, repairs, communication, data system and filing system.

Documentation

For proper management of the documentation in the Main Company Manual, it is equally important to provide laid down procedures for identification, distribution, collection and maintenance of Safety Management System documents, drawings, manuals, instructions and other publications. The procedures to incorporate changes in the documentation must also be clearly defined.

Auditing and Review

Auditing and review is a part of the Safety Management System . The laid down procedures for conducting internal audit and review of the Safety Management System must be mentioned in this part of the Main Company Manual . Procedures for reporting audit findings and escalating the findings to higher management if not

responded to within specified period of time, should be provided. A list of the specific areas to be audited should be mentioned. It is also necessary to mention the qualification of audit personnel.

PROFESSIONAL MANAGEMENT MANUAL.

The departments of the shipping company likely to be involved could be personnel, operations, maintenance & repairs, insurance and purchase in addition to fleet safety department.

Table 5.3

PROFESSION MANAGEMENT MANUAL

List of Contents

1.0 Professional activity

2.0 Personnel and Training

3.0 Main Shipboard Manual

In order to ensure practicability of these documented procedures it is recommended that each section of this manual is authorised by relevant departments and signed by the heads of department. This process will help involving various departments into the Safety Management System and thereby promote the Safety Culture in the Company.

However an exclusive fleet safety management department is inevitably required to be incharge of the Safety Management System and as such ensure co-ordination with other departments to achieve the objectives of the company's Safety and Pollution Prevention policies.

Professional activity

The section of professional activity require the inclusion of the following important matters:

- - ship technical operations, procedures, special and critical operations
- - ships maintenance system. Essential and critical functions (maintenance manual)
- - communication with ship
- - assistance to ship in day to day operations
- - mandatory regulations. Certificates. Assistance to master
- - deck and bridge operations, procedures, special and critical operations
- - bridge and navigational equipment and publications.

Personnel and Training

The section of personnel and training is required to contain the following necessary information regarding training requirements of personnel:

- - mandatory training courses
- - specialists training courses
- - up grading courses
- - annual training plan budget
- - basic education, certificates (recognised/approved institutes)
- - for crew members, selection procedures, technique and criteria
- - language requirements and testing

- periodical performance evaluation, its information and follow up
- deck cadet and engine trainee training programme

Main Shipboard Manual

The section of Main Shipboard Manual, will provide a duplicate copy of all the documentation of Safety Management System, kept on board the ships. Besides the Shipboard Management System, the section provides the manuals of Safety/Training, Cargo handling and Emergency/Contingency plans.

CONTINGENCY PLAN

The Shore based Contingency Plan and The Shipboard Contingency Plan must work in conjunction with each other. For all practical purposes these should be a common plan which would cover both the shipboard and shore based emergency response. Basically such a plan should include the following:

a. Contingency Policies

b. Emergency Preparedness Ship and Shore

c. Emergency situations, Procedures/Checklists

c. Oil Pollution (cargo, bunker, lube oil)

d. Additional requirements of Oil Pollution Act (OPA)

Meeting with the needs of a contingency plan (Ship and Shore), an **Emergency Response Plan** has been developed which would provide emergency guidance to both shipboard and shore based personnel. The Emergency Response Plan is

intended to optimise the emergency response time and to ensure maximum shipboard and shore based preparedness in the case of an emergency.

Fig 5.4

EMERGENCY RESPONSE PLAN

List of Contents

(MacGregor, 1994, 14)

1.0 In the Introduction section of the ERP, the geographical coverage area of the plan must be defined. Purpose and scope may be translated as the reason of having such a plan and whether the intended plan is a local, regional, national or an international Contingency Plan.

2.0 Proper communication within the ships personnel is as important as the ship shore communications which must be established properly and in accordance with the laid down procedures. The section should emphasise on the use of a common language which is also expected to be understood internationally. It should provide a guide line on matters such as:

- - activation of the emergency plan
- - on board communications
- - maintaining ship shore contact
- - situation reports

All the proceedings how so ever small they may appear must be recorded. A procedure of record keeping must be defined in this section. In emergencies, obligatory as well as voluntary reports may have to be made. A guideline for making such reports must be included. In the events of out side agencies getting involved, proper methods of notification and dealing with subsequent inquiries shall need to be stated as well.

3.0 This section requires a complete description of the overall emergency response structure. It is to be noted that there would be separate structure for ships and a separate structure for shore based emergency organisation.

The following details are required for Shorebased Organisation.

- - emergency response organisation ashore
- - outline of the shipboard emergency response organisation
- - location of shorebased emergency headquarters
- - method of mobilising shorebased emergency responders
- - duties of shore personnel who are allotted a role in the ERP
- - procedures for post-emergency assessment on board.

In the case of a Ship Emergency Organisation, the following is stated in the ships copy of the ERP.

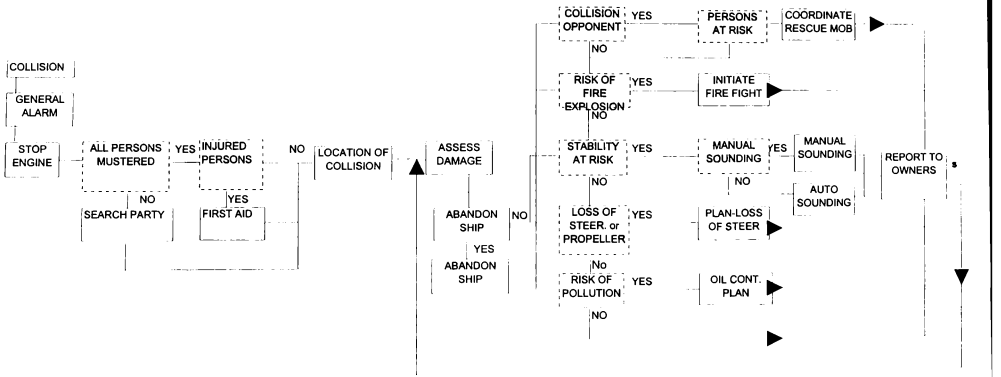
- - emergency response organisation on board
- - duties of ships personnel in the shipboard emergency organisation
- - procedure for post-emergency assessment on board

4.0 For various specified emergencies in this section, emergency response procedures, flow charts and checklists are stated for both the Shorebased Organisation and the Shipboard Organisation. An example of a flow chart is shown on the next page.

5.0 Training and Drill section of the manual require the specification of the training needs for emergency responders for both onboard and ashore. Many of the safety conscious maritime nations and international regulations specify requirements for drills. It is recommended to take these requirements into account when developing this section. A proposed program of Shipboard drills for various emergencies is shown on the page after next. Likewise a program of Shorebased drills for such emergencies may have to be established separately and incorporated in the shorebased copy of the ERP.

The following is the follow up procedure when an accident (collision) has occured represented as a flow chart for collision in a Contingency Plan

Fig. 5.5



=Action = Decision **s** = End of action

Table 5.4 Sample Programme Of Drills

Month	Fire Drill	Boat/Man Overboard drill (MOB)	Pollution drill	Emergencies
JANUARY	Major Fire in accommodation	Boat and MOB drill	Exercise and review the oil spill equipment	Bow Collision
FEBRUARY	Fire in Cargo Holds/Tanks	Boat and MOB drill	Notification and communication procedures	Loss of Steering
MARCH	Fire in Engine room	Boat and MOB drill	Exercise and review the bunker procedure and the SOPEP/VRP plan	Grounding
APRIL	Fire in Engines stores room	Boat and MOB drill	Mandatory oil spill reporting for a coastal voyage and for a regular port of call	Collision in cargo space
MAY	Fire in Galley	Boat and MOB drill	Oil spill during bunkering	Loss of propulsion
JUNE	Major Fire in accommodation	Boat and MOB drill	Organisational set-up on board in case of an oil spill	Injury
JULY	Fire in Cargo Holds/Tanks	Boat and MOB drill	Notification and Communication procedure	Helicopter operations
AUGUST	Fire in Engine room	Boat and MOB drill	Exercise and review of the oil spill equipment	Collision in Engine room
SEPTEMBER	Fire in Cabin	Boat and MOB drill	Exercise and review of the bunker procedures	Loss of Steering
OCTOBER	Fire in Deck Stores Room	Boat and MOB drill	Exercise and review of the SOPEP/VRP plan	Grounding
NOVEMBER	Fire in Forecastle Stores Room	Boat and MOB drill	Notification and Communication procedures	Injury
DECEMBER	Fire in Engine room	Boat and MOB drill	Mandatory reporting requirements and communications in case of an observed oil spill	Helicopter Operations

SOPEP = Shipboard Oil Pollution Emergency Plan, VRP = Vessel Response Plan (OPA 90)

E/A/C East Asiatic Company, Shipping Ship Management Services, (1995, 9)

6.0 Details required in the Emergency Response Plan for the ship are as follows:

- copy of the muster list
- general arrangement plan
- fire control plan
- life saving equipment plan
- stability information
- list of plans, drawings and manuals on board with their locations.

7.0 The Emergency Response Plan contains a section which will provide contact lists for the emergency responders. It should contain contact lists for:

- company contacts
- ship interest contacts
- coastal state contacts
- port contacts.

8.0 This section will help ensure the following important objectives.

- all copies of plan documents are maintained up to date
- copies of new documents, or revisions to existing documents are distributed correctly
- information passes through a validation and approved system before being included in the plan
- records of production, issue, distribution, revision and withdrawal of copies of plan documents are maintained
- the format, presentation style and appearance of plan documents are regulated.

From the Main Shipboard Manual **Table 5.6**

SHIPBOARD MANAGEMENT MANUAL

List of Contents

Clear written procedures, and/or flow charts/check lists are to be provided for the contents of the Main Shipboard Manual in their respective sections.

1.0 Introduction

- validity of the document.
- a format to record revision, correction and updating of the manual
- a distribution list, indicating all the locations at which a copy of this manual is available.

2.0 Safety and Environmental Policy

- general nature of the company's policy relating to safety and environment.
- shipboard priorities to ensure successful implementation of the above policy.
- re-affirmation of IMO Res A443 (XI) which clarifies the master's overriding authority in matters concerning safety and pollution prevention.

3.0 Organisation.

- a description of the overall safety organisation of the company.
- a description of shipboard organisation chart, indicating department, personnel and lines of reporting.
- list of duties and detailed job description of all personnel on board in matters related to safety and pollution prevention.
- the inter relationship's responsibilities and authority between the ship and departments in the shore management must be described.
- the role and identity of the Designated Person(s) must be detailed.

4.0 Safety Management.

- recording procedures and methods of daily verifications by the ship master to ensure compliance with master's standing orders and prescribed operational

procedures.

- - at intervals of less than one year, method and procedure for the documented periodical evaluation of the overall efficiency of the safety management system as a master's review.
- - requirements of the safety committee meetings and the procedure of its record.

5.0 Personnel

- - describes the normal manning scale for the vessel.
- - describes the minimum manning scale.
- - defines the level of competence and fitness for each person on board.
- - describes procedures for handing/taking over command of the vessel, including details of specific matters to be checked at such times must be clearly described
- - details the prescribed familiarisation procedures when change of personnel occurs
- - defines fleet drug and alcohol policy and random testing procedure for substance abuse
- - recording of external training undergone by shipboard personnel.

6.0 Shipboard Operations.

All procedures documented should incorporate international and national legislation and relevant industry guidelines. For each operation, the duties of personnel involved must be clearly defined. As all shipboard operations can affect safety and pollution prevention, companies may consider analysing the procedures of operational practices through safety assessment methodology in order to categorise them into

Critical and Special Operations. This is necessary not only to prioritise operational sequences but this will help in allowing maximum level of attention while writing procedures for those shipboard operations which are crucial to safety and to the protection of environment. Some of the normal shipboard operational practices which require documented procedures are published in appendix 4 of IMO guidelines 1994 on the implementation of the ISM Code.

7.0 Inspection and Maintenance of safety devices and equipment.

- - procedures to define the planned maintenance system for safety equipment, communication equipment, load line items, pollution prevention equipment.
- - description of how the test and inspection must be carried and the procedure for making and following-up repair specifications.

8.0 Rules, Regulations, Laws and Codes.

- - provide a list of the applicable publication available onboard.
- - provide an update a master list of all standing certificates of the vessel.
- - procedures to ensure the availability of up-to-date publications onboard.

9.0 Non Conformities, Break down and Accidents.

This defines the requirements for the master to report accidents and hazardous occurrences including all the near misses. It should provide a standard format for reporting, together with the description of making such reports.

Table 5.7 below is a Non-Conformity Report. Source: INTERTANKO

1	VESSEL		PLACE / DATE		
2 TYPE OF OCCURRENCE	YES	3. LOCATION OF NON-CONFORMITY	YES	4. OBSERVED/ DISCOVERED BY:	YES
Accident / Incident		Vessel		Flag State Authorities	
Near Accident / Incident		Head Office		Port State Authorities	
Inspection "no findings "		Sub Contractor		Class	
				InsuranceCompany Rep.	
				Charterer	
				Vessel Personnel	
				Ship Manager	

5. IMPLICATIONS / CONSEQUENCES

Authorities/Class Recommendation	Yes	Pollution	Yes		Yes
Ship Manager Recommendation		Detention		Technical	
		Personnel Injury		Structural / Hull	
		Grounding		Safety Equipment	
		Collision		Personnel	
		Cargo Claims		Health Condition	
				Navigation	
				Communication	

6. OBSERVER'S INITIAL EVALUATION

	Yes		Yes
Standard Practice		Substandard Qualification	
Substandard Condition		Lack of Training	
Substandard Procedure		Substandard Routine	
Substandard Maintenance			

7. SERIOUSNESS OF INJURY / LOSS		Yes
Major	Loss of life or permanent / prolonged disablement and / or expenses > USD 10000	
Average	Temporarily disabled / off duty / repatriation and / or expenses > USD 10000	
Minor	No loss of ability to perform duty and / or expenses > USD 1000.	
8. SHORT DESCRIPTION OF THE NON- CONFORMITY :		

10. Document Control.

- - provide a document master list indicating holder, location and current revision details of each document.
- - procedure defining control of all documents related to the SMS
- - procedures to ensure that obsolete documents are replaced with current issues.

11. Safety / Training Manual.

The existing Solas Regulation III / 51 require ships to carry the instructions and information on life saving appliances provided in the ship and on methods of survival to be included in a Training Manual. By extending the scope of this manual to accommodate safety and emergency training and drill, the new manual may safely be addressed as Safety / Training Manual. Thus this manual should among other things explain in details:

- - frequency and description of safety drills.
- - alarm signals.
- - use of fire hoses, nozzles and hydrants.
- - use of breathing apparatus, emergency life saving apparatus and oxygen resuscitator.
- - use of personnel safety equipment and fireman's outfit.
- - operation of main and emergency fire pumps.
- - functions of fire detection system.
- - use and upkeep of hand-held radio transceivers.
- - first aid and emergency medical treatment procedure.
- - donning of lifejackets and immersion suits, as appropriate.
- - muster at assigned stations.

- - boarding launching and clearing the survival craft.
- - release from launching appliance.
- - methods and use of devices for protection in launching areas where appropriate.

12. Cargo Handling Manual.

Due to the complexity of different types of cargo being carried at sea, the company should develop a cargo handling manual suitable to the types of cargo their ships are handling and the particular types of ships the company has in its fleet. The handling of such cargoes shall be clearly defined in the shipboard cargo manual in the interest of safety and environmental protection. While developing these procedures relevant codes of safe practices for different cargoes must be consulted.

13. Emergency / Contingency Planning Manual.

It should comply with the basic requirements of a Contingency Plan as specified for the Main Company Manual. A tailored version of the Emergency Response Plan to suit the requirements of the individual ship shall be kept and maintained on board each ship of the company.

5.3.3 MONITORING

In order to ensure that the established safety management system is functioning as it is desired to function, it is necessary to set up a system of monitoring. This is principally achieved by international auditing of the system and dealing with non-conformity reports.

The prime objective of the internal auditing is to determine existence of the commitment of the safety and environmental protection policy. The audit should confirm whether defined procedures in the manual are in accordance with the current requirements of the relevant regulations. The audit should verify that the process or routine is in accordance with defined procedures with cross checking of records to

procedural requirements with particular reference to procedures which are not the norms e.g defects, accidents, delays etc. The audit should confirm what is actually happening in practice. Thus the audit of a SMS ensures that the system, procedure and the work instructions are being followed. The audits as well as possible corrective actions should be carried out in accordance with documented procedures.

Frequency of internal audit of a management system depends upon:

- - the number of shorebased personnel involved directly in activities of safety functions of the company.
- - the size of the fleet.
- - the types of vessels in the fleet.
- - reports on non conformities.

Once a system is implemented, as a general rule of thumb each area should be audited internally atleast once a year. Due consideration should be given to arranging audits at mutually acceptable times and ensuring that every one involved knows about it. Failure to do such simple planning can demotivate the staff.

To ensure that the findings of the audit are acted upon, the Corrective Action Loop forms a fundamental part of any management system. It is important that once the system has been established that it remains alive. The implementation of corrective actions as a result of the audit is the key method by which a system will evolve and mature. The corrective action loop system must be effective irrespective of crew changeovers. The following are the two corrective action systems:

- - conduct follow up audits.
- - the relieving master to review outstanding corrective actions at hand over.

Procedures in the manuals must ensure that all findings are made known to the relevant personnel involved. The non compliance notes will require the person responsible for the area being audited to sign acceptance of the findings as verifiable evidence.

It is the requirement of the ISM Code and the ISO 9000 system, that the personnel conducting internal audits should be independent and not have any direct responsibility for the areas audited. It is a further requirement of ISO 9000 that internal auditors are trained for the purpose.

As the internal auditors should have credibility in the areas they are auditing, it is strongly recommended that only personnel with seafaring experience and thorough and in-depth knowledge of the ISM Code are given the task of auditing the vessel. Internal auditors should possess the tenacity to defend the system and educate auditees.

In order to comply with the monitoring aspects of SMS, the shipping company should set up an audit team. For a modest size of a shipping company the audit team may consist of three members. The team must have a formally identified leader. It is necessary that the team establishes an audit program and schedule. In setting up the schedule of the audits due consideration must be given to time constraints such as vessel's commercial schedule. The audit team must familiarise themselves with the departure / ship specific documentation before the audit. It is always a good practice to preview the previous audit reports and results.

The auditing process should commence with a pre-audit meeting. It is necessary for the team to explain the scope and basis of the audit to the responsible personnel of the area being audited. The audit team shall require relevant information from the personnel regarding the area being audited. This pre audit meeting shall be useful in creating a friendly environment for a free flow of communication between the auditors and the personnel of the area being audited.

It is the sole objective of the internal audit to seek objective evidence that the described procedure is being followed in its true spirits. As such it is required of the audit team to maintain a record of compliance and non compliance in accordance with the procedures prescribed in the Main Company Manual.

The audit should conclude with a formal post audit meeting. The purpose of this meeting would be to summarise the audit findings and formally presenting this to the ship master or the head of the department as the case may be.

The final audit report should be prepared by the audit team and filed. A copy of this report should be presented to the Designated Person with an advanced copy to the head of the shipping company. It is the responsibility of the shipping company to review the audit reports during the periodical review of the Safety Management System. (Larking, 1995, 3)

The ISM Code requires the incorporation in the Main Company Manual of the procedures ensuring that non conformities, accidents and hazardous situations are reported to the company, investigated and analysed.

- - It is therefore the duty of the master to report back to the company all such occurrenciesing of the non conformities. The report from the master must indicate as to how the particular event came in existence and also as to how was it finally resolved. In addition the report should include the following information:
- - time and date of event
- - personnel involved in event
- - status of machinery during the event
- - damage to equipment
- - time of event record.

The internal audit team under the direction of the company should conduct a thorough investigation based upon the report of the accident, near miss or unsafe

conditions. The sole purpose of the investigation will be to establish remedial measures to prevent recurrence of the event. The event must be analysed during the investigation to establish the cause such as unworkable procedure or a personnel problem.

Where the analysis of investigation reveals the cause to be, unworkable procedure or inadequate procedure, it may necessiate an amendment or reinforcement of the existing procedures in the Manuals.

If the results reveal to be the cause of non compliance or the incorrect applications of the correct prescribed procedures, the personnel need to be trained.

The records of all such findings and their outcome must be maintained. These records help in identifying any latent trend. Such learning must also be communicated not only to the relevant personnel in the organisation but also to the training institutions for further education to mariners.

5.3.4 PERIODICAL REVIEW OF SAFETY MANAGEMENT SYSTEM.

It is a good practice of the shipping companies to periodically review their Safety Management System before it is exposed to external periodical verification of the SMS.

Such a periodical review must be conducted in accordance with the defined procedures in the Main Company Manual and the outcomes documented accordingly.

The periodical review of SMS is in consideration to the following two factors.

- - due to complexity of maritime industry, the legislation, conventions, codes, standards and regulations are likely to change under the influence of the dynamic maritime environment
- - the results of audit, inspections and survey will provide new information.

6.0 CONCLUSIONS AND RECOMMENDATIONS.

Even though shipping is the most regulated industry it has not helped as much as it should. One of the readily apparent keys to the problem is that perhaps the industry, or the people within the industry have not timely enforced and/or complied with the regulations. The reasons behind this are complex. But the changes in the shipping industry in the last decade has its contributions to these reasons.
These changes may include:

- - reduced manning scales
- - multi language and multi culture crews
- - lack of experienced staff
- - strong commercial pressure
- - personnel stress
- - more complex operations

What has been recognised for a number of years is that approximately 80% of accidents are caused by human error.

This is one area where the international maritime community has started to emphasise " Hunian Error Element". The task facing all shipping companies is to ensure that every action affecting safety or the prevention of pollution taken at any level within the company is based upon sound understanding of its consequences.
In this regard the IMO Resolution A 741 (18) (the ISM Code) emphasises:
"-------recognising also the most important means of preventing maritime casualties and pollution of the sea from ships is to design, construct, equip and maintain ships

and to operate them with properly trained crews in compliance with international conventions and standards relating to maritime safety and pollution prevention -----"

Recent studies into the human error element have also revealed that 70 to 90% of the accidents related to human error involvement were caused by lack of a management system.
The IMO Resolution A 741 (18) (the ISM Code), addresses this as:
"------- recognising the need for appropriate organisation of management to enable it to respond to the need of those on board ships to achieve and maintain high standards of safety and environment protection, and -------".

Shipping exists in a dynamic environment as ever. New things keep coming up all the time, technology is advancing very rapidly, life at sea is changing accordingly. As such it is not always possible to see what is the cause and what could be the results.

Under such uncertain forecasts, a self correcting management system such as the ISM Code system should be the best possible solution for the shipping of today.

Yet as with all management systems the ISM Code is only as good as the sum of its parts. If at any stage any one of the involved parties does not accept the tenants of the code, or does not embrace the requisite commitment with an almost evangelical zeal, the inevitable result will be an expensive waste of time, energy and resources and will lead to the collapse of the ISM Code and its morale.

Flag state administration also have a lot of role to play towards the success of the ISM Code. There must be no relaxation of the requirements of the ISM Code in order to attract tonnage to their respective registries and avoid migration of tonnage to more amenable flags.

The most important aspect of the code is to enforce an obligation on a shipping company to set down safety management objectives by developing, implementing, and maintaining its own system. Commercial practices must not be emphasised over safety and environment protection matters. The master of the ship who is required to uphold safety and environment protection over any other consideration must be safe guarded to pursue his just decisions. This will necessitate the commitment not only from the flag administrations but also from all those in the marine industry with a responsibility towards safety at sea.

The underwriters and P&I club should take a leading role as well in rewarding the shipping companies who realise the timely need of the ISM Code by complying with its requirements and penalise the shipping companies who consider it all to be an undue necessity. The tolerance, or otherwise, of sub-standard vessels and crews which link of course a) their profit, and b) the world opinion should hold centre stage.

In many a cases, classification societies will be authorised for the verification of the shipping companies and their ships for the issuance of Document of Compliance and Safety Management Certificates, on behalf of the flag states. As such these classification societies should not be acting as consultants to shipping companies for ISM Code certifications.

However the overall effectiveness of the implementation of the ISM Code will be marked by two extremes:

- - its minimal effect on companies which are thinking and planning ahead and implementing good management schemes.

- - its potential for dramatic effect on those shipping companies who wait until pushed by the legislation and at the last minute fail to surmount the steep leaning curve.

In reality, if a practical, accessible ISM Code is put into practice involving all staff, it will provide real benefits to the shipping companies such as:

- - improved maintenance
- - reduced accidents and casualties
- - better communication
- - a better trained and more competent workforce
- - reduced off hire days
- - reduced costs of repairs and liabilities

The shipping companies must now realise that compliance with the ISM Code will provide them with an opportunity for improved performance together with many other benefits as highlighted above. It should not therefore be seen as a burden at all.

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