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The human relationships and safe and efficient ship operation

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THE HUMAN RELATIONSHIPS AND SAFE AND EFFICIENT SHIP OPERATION

By

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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 been 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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Title of Dissertation: **Human relationships and safe and efficient shipboard operations-an investigation**

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The research addresses the important objective of safe and efficient ship operations from a human relationships dimension. Examination is made of past and present endeavours in this field, noting a number of positive directions and intentions undertaken by International bodies. The study observes a surprising uniformity of approach, and sharing of visions, views and ideas that, in principle, are unprecedented when compared with the past.

However, the research shows that the gap between resolution and implementation remains in place due to socio-economic-politico issues as well as an inability to come to terms with reality. The linkages between competence and safety of ships are examined. The study finds that this has resulted in a general approach to dealing with safety, efficiency and human relationship issues, often in isolation or at the expense of each other.

In considering the inter-connected issues of manning, fatigue and service on board, it is noted that they are often de-linked from each other by industry in a fragmented way. The absence of minimum wage scales is seen as a further factor in making minimum uniform standards of training less achievable.

Investigation is undertaken of some maritime casualties and human relationship and other safety shortcomings are identified in these examples. In the aftermath of serious incidents, the tendency of political factors to create unilateral action for new legislation affecting ship design and construction is observed. The absence of similar responses by authorities to issues relating to under manning, fatigue, maintenance, human factors and non-compliance with existing legislation is similarly noticed.

The study concludes that such approaches retard the growth of a compliance and safety culture in the prevailing climate, a global quality culture will largely remain a utopian dream unless new positive endeavors prevail.

KEYWORDS: Human Relationships, fatigue, manning, ship operations, safety,

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LIST OF ABBREVIATIONS

APEC	Asian Pacific Economic Co-operation
AIS	Automatic Ship Identification System
BIMCO	Baltic and International maritime council
C/V	Clear Visibility
DC	Dangerous Cargo
DGS	Director General of Shipping
DPC	Dual Purpose Crew
DWT	Dead Weight Tonnage
ECDIS	Electronic Chart Display System
EEZ	Exclusive Economic Zone
FEU	Forty foot Equivalent Unit
FOC	Flag of Convenience
HE	High Effectiveness
HS	High Speed
ICS	International Chamber of Shipping
IFS	International Federation of Shipping
ILO	International Labour Organisation
IMO	International Maritime Organisation
ISM	International Safety Management
ITWF	International Trade Workers Federation
LO	Look Out
MAIB	Maritime Accident Investigation Board
ME	Moderate Effectiveness
MOU	Memorandum of Understanding
MTI	Maritime Training Institute
N/V	Nil Visibility
NE	Nil Effectiveness
O.N.	Official Number

OECD	Organisation Economic Co-operation and Development
OOW	Officer of the watch
P&I	Protection & Indemnity
PSC	Port State Control
R/V	Restricted Visibility
ROR	Rules of the Road- to mean Collision Regulations 1972
SCI	Shipping Corporation of India
STCW	Standards of Training Certification and Watch keeping
TEU	Twenty Foot Equivalent Unit
TSS	Traffic Separation Scheme
UNCTAD	United Nations Cultural Trade and Development Organisation
USCG	United States Coast Guards
VTS	Vessel Traffic Scheme
WB	World Bank
WTO	World Trade Organization
YOC	Year of Casualty

Chapter I Human Element Management

"We shall not cease from exploration and the end of all our exploring will be to arrive where we started and know the place for the first time"

T.S.Elliot

1.1 Objectives of the research

Ever reducing manning scales, shortages and surplus of man-power, continuous introduction of sophisticated technologies, reduced port-stays, absence of commitment from employers and de-skill of existing skills and introduction of new skills are all having an impact on human relations on board the ships. The combined effect of these factors will be examined, in the light of ever increasing regulation of the shipping industry. Focusing on how this change is to be absorbed by adopting modern training techniques for safe and efficient operations of the ships. Current training programs are generally based on past experience and on the job training that was the watchword of the industry. This now needs to be considered also.

The objective of this dissertation is focused mainly on human factor/relations, which is a central issue in deciding the end result of ships performance. Expectation of employers, authorities, society and personal expectations of seafarers need to be understood and how the seafarer copes with such demands and resulting pressures, stresses and fatigue.

The relevance of this dissertation is in the context of what is a correct management approach to human management for safe and efficient ship operation, which

reduces the accident risk, while bringing about better performance standards/results. Acceptance and implementation will serve the purpose of this dissertation`s recommendations to the benefit of the seafaring community and shipping industry for better performance.

This dissertation attempts to assess, examine, analyze and synthesize trends in manning, multilingual, multicultural crews and officers, STCW and related conventions/resolutions pertaining to human factors and elements, and to suggest solutions. In the event no lasting solutions are forthcoming, then issues are analyzed and synthesized to arrive at what is the current status and how it is evolving to deal with inherent peculiarities for review and debate.

1.2 Research Methodology

The investigation into human relationships and safe and efficient ship operations involved examination of existing instruments, the working of organizations and factors at play having direct impact on human relationships, safety and efficiency on ship operations.

The well maintained fleets of the developed world generally operate safe ships under FOC and also second registers. However, an undue advantage is derived by unseaworthy ship operators the under FOC, who are not easy to identify because of unknown nationality or from being more than one nationality. Attempts have been made and owners ships are identified by thorough research made by the organizations to establish the actual owners.

New databases, WMU dissertations, Internet articles, magazine articles, newspaper reports, information gathered during the attendance at the Master of Science course at WMU, field studies to various training and adminstrative centers in Europe and United Kingdom formed the basis of this dissertation. The singular most important received from almost all the respondents was that it is the competence of the crew on board the ship that makes a ship efficient and safe.

The process of information gathering and fact finding to assess the human relational aspect was most difficult as research work in this respect has so far not been conducted on merchant ships. The human relations on shipboard operation have assumed importance due to multiplicity of crew in terms of nationality, region, religion, language and culture. It is increasingly becoming a fact that multinational crews have come to stay as the process of globalization gathers momentum. Strategies required to meet this new challenge were assessed so as to evolve new directions in training.

Regarding the safety and efficiency aspect of ship operations surveys of past accidents and incidents, reports and technical details showed that it was adequately covered, but human relational dimensions and their impact were found to be somewhat ignored. It was possible to investigate all accident reports of the past but due to paucity of time and space available for writing this dissertation the author was constrained.

To highlight this neglected area two case studies were examined as an illustration that all accident reports of the past could be reexamined from a human relational viewpoint. The ideal tool could be the simulation of past accidents on simulators now extensively used for training. Research projects on this aspect could provide insights to find solutions to deal with causes of threats to safety and environment.

During the course of this investigation interviews with immediate seniors at the Maritime Training Institute, Mumbai and the Directors of my employers The Shipping Corporation of India Ltd. provided useful insights.The vast experience of the corporation in terms of number of ships, global magnitude of ship operation and diversity of seafarers employed on their ships for shipping operations on board influenced and inspired the author to a large extent. Almost thirty years of experience in the seafaring profession including eighteen years service at sea followed by shore positions as Marine Superintendent to training of seafarers exposed me to a large number of the intricacies of this professions yet the search for solutions to the emerging and existing realities continues.

Research projects conducted in Sweden, Australia, India, Japan, and USA provided important information and facts to understand the impact of various developments on seafarers. However information about relational aspect was scarce. More projects are needed to investigate and examine the human relational aspect in particular to the multinational crewed ships.The relational aspect of humans is qualitative in nature. It is the quality of relationships which is paramount. The quantification in this matter does not reflect the correct position. Therefore, quantiative approach was avoided to emphasize the qualitative approach. The minimising of mathematical and statistical data is desirable to create a backdrop on qualitaitive nature of issue under research.

Useful data from trade unions and news items on seafarer`s exploitation were also readily available, but verification, examination and investigation to establish facts were generally difficult because of the multiplicity of nationalities involved and constantly changing crew mix.

The most important observation about the new data bases in the formative stages of development was the inability to obtain and maintain the manning and certification records of persons serving onboard merchant vessels. An urgent action in this direction is proposed. The data bases have to take this factor into account as the competence of crew from an individual and relational aspect is the most important factor governing safe and efficient ship operation. The new databases like Equasis were found to be in formative stages and manning information was not one of the priority areas in comparison with technical and commercial data.

1.3 General Introduction

Humanity has progressed and scaled glorious heights, where man is apparently conquering challenges posed by nature by learning to negotiate with it and creating new challenges of his own making. Ships generally operate in global arena in the so, called free market, where market forces (world trade) and events of importance determine the trends of shipping business. The gamut of activities of shipping is

managed and run by global citizens. Seafarers are leading role players who undertake the work of moving commodities over the high seas.

The market mechanisms control the direction and destiny of the seafaring profession. Competition to win in any activity is a welcome and healthy input for progress and prosperity of the society. However, where it is leading to that is to be understood. The cheapest in terms of money leans to an element of unhealthy compromise. The element of mindless compromise is an issue which ignores many relevant, reasonable and rational matters of greater importance. Winning is important in a commercial pursuit but the damage it does to many, for the benefit of a few, has its own implications for the seafaring profession.

Seafarers are after all humans who stand up to face the challenge of the sea; they are the first bearers of this awesome burden and are utilised as an exploitable commodity. Relationships among seafarers have a direct connection with the market mechanism. The volatile and cyclic nature of industry reduces the commitment levels from ship owners (employers) to seafarers (employee).

The tradition-ridden maritime industry has to evolve itself to provide better commitment levels from employers and employees. Flag of Convenience (FOC) ships today are more of an order of the day than the exception. They provide, the best form of deregulation and a very large degree of flexibility to the ship owners with a minimum degree of commitment. FOC ships are a product of unrealistic laws and actions of over zealous competing social and political forces demanding impossible commitments from ship owners, which has pushed even the genuine ship owners towards FOC.

The commitment levels are to be assessed by examining elements, issues and forces /factors at play. These are human element management, shortcomings of humans when faced with practical adversities, cultural and language disparities, being the last, but not the least in the order of importance perhaps most essential to the safe and efficient ship operation.The commitment of employer and employee is central to quality, which is the watchword of our modern society .The endeavours to

attain aims, objectives of quality can only be commenced through a commitment of all.

1.4 Human Element –The Problem

Mankind ships around 5 billion tons of merchandise on the high seas every year UNCTAD, (1998/2000). This activity is performed against the forces of nature. While undertaking this massive endeavor, many unexpected and undesirable events occur. The responsibility for the same has to be accepted by all those who are involved in this Herculean effort. This rather large movement on the high seas in itself is a burden on the environment. This activity, illustrated in the tables and graphs shown as under, is predicted to increase by 40% in the next ten years.

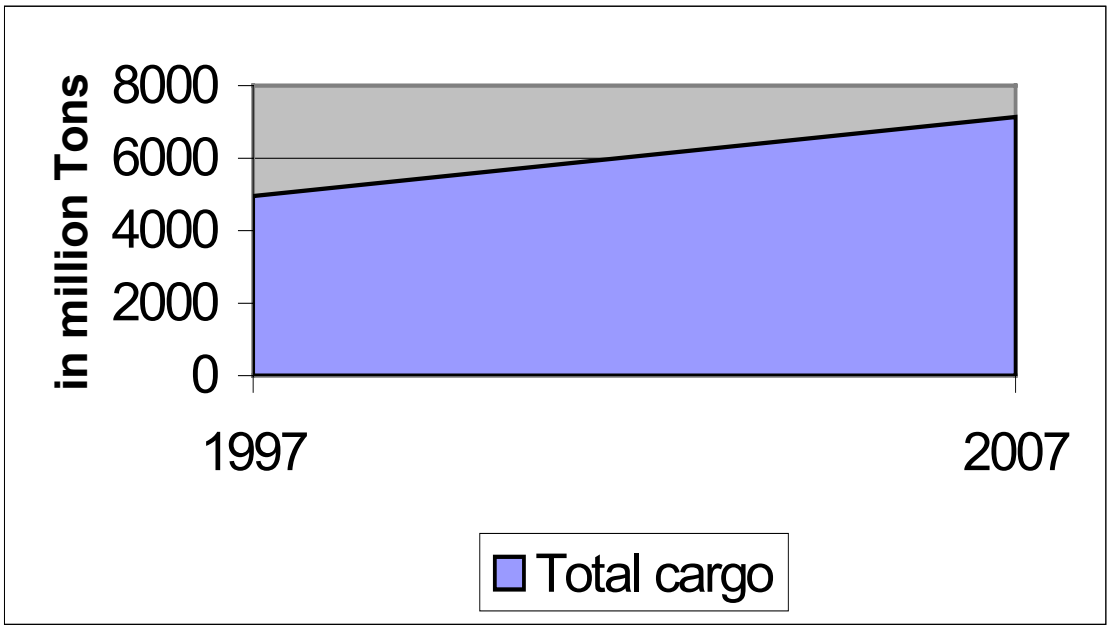
OIL	5 MAJOR BULKS*	OTHER DRY	TOTAL
2172	1157	1624	4953

Source: Unctad 1998

*Iron ore, Grain, Coal, Bauxite, Phosphate

Table No. 1.1 showing quantity of cargo shipped on Global basis

In Million Tons



Source: World Bank/OECD data Graph by Author

Figure 1.1 Showing Expected Global trends in cargo movement

1.5 Relevance of Human Matters

Human aspects, factors and elements engaged in the above endeavor, have not received sufficient professional attention, which they deserve. IMO resolutions A-680 (17), A-742 (18), A-772 (18), A-850 (20), STCW 78 Convention (Revised) and ISM code of SOLAS `74 are major start points in this direction. Earlier resolutions and instruments in this context from the IMO were appreciable, but in terms of effectiveness they remained in the cold. The sense of urgency in this matter was seen to be taking shape, in the implementation of STCW (Revised) Convention and the ISM code. Positive co-operation by a large number of maritime nations was unprecedented in accepting and implementing the above instruments concerning human aspects.

The encouragement and inspiration of positive developments, as stated above, have given a fresh impetus to strive for safer ships and cleaner seas. The effect of implementation is reflected in the declining accident rate and the number of lives lost at sea have shown a declining trend. At the same time deaths due to occupational health hazards are receiving attention, due to a suspected increase, Nielsen, D. (2000) reported lack of information because of under reporting/ under-stating or unwillingness to part with the information by many Administrations. Despite the recent trends of increasing world trade, world tonnage increase is not proportionate, as was in the past; apart from the size of ships having increased this can well be a pointer towards better output, with the same input because of efficient utilization of the existing resources.

Attempts are [IMO Resolutions A 884(21), A 850(20)] now being made to examine human issues more closely and investigate this matter to evolve methods to deal with this most central issue. The interface between man and machine is critical. A ship maintains its seaworthiness so long as the seafarer responds to the dynamic actions of the forces of the sea by observing and judging the impact of the forces at play. Cairns, (1967) observed the machine itself cannot perform the action.

1.6 Expectations and Demands

Shipowners and authorities demand and expect commitment, loyalty, good judgement, competence and all the virtues from the seafarer, so as to operate safe, efficient and profit making ships at all times. On the other hand, a seafarer has to contend with, not only the demands and expectations of his employers and authorities also the following mentioned issues:

- Job security/continuity
- Acquiring new skill, competence, knowledge, understanding, proficiency
- Social and emotional needs
- Unprecedented fast paced changes introduced in the maritime industry

Shipowners dilemma is well summed up by Sohmen, (1990) as under:

> "As shipowners we are constantly faced with difficult decision between overall cost cutting considerations in terms of total compliments on board ships. There is no hiding reality that a traditionally very competitive and lately hostile commercial environment has seen manning numbers reduced to fairly low levels, while the general dearth of personnel led to the acceptance of personnel with lower skills in many a shipping operation. It becomes a vicious circle: fewer people like to go to sea, so the less capable apply and are chosen, lowering the status of the profession in the eyes of public leading in turn to a further unwillingness by many to seafaring as a worthwhile career path.
>
> When we are down to a public perception that going to sea is still always a possibility when all else fails, we shall not get the calibre of staff we really want and the industry needs."

1.7 Changing Patterns

The introduction of new technologies generates unforeseen problems, which are compounded in the scenario of multilingual and multicultural crews with attendant communication gaps. Ships operating under traditionally non-maritime national registries, generally known as flags of convenience, comprise more than sixty percent (and increasing) of world tonnage as reported by Hawkins, (1999). (ISL, 1999) and are now more of an order of the day than an exception. The management of these ships is neither easily visible, nor transparent, as determined by Bergantino and Marlow, (1998) as is the case with the management of national flagships. Flag of convenience has its own unique features; it involves frequent change of registry, classification and large turnover of the crews, special management skills being required to manage the aforesaid feature. Of course, the

new registration authorities are generally more obliging and flexible, because each change is tailor made to suit the interest of the shipowners. This is aptly stated by Spruyt, (1994) who described these as designer flags embroidered mainly to suit owner's requirements.

1.8 New Technology and Related Issues

The changeover phase, from existing technology to the new technology, is most crucial. New technologies are not proven, because facilities for research and viability studies are not only costly but are not so readily available. Sufficient focus and attention is not given to this aspect. Until such time as the equipment is made mandatory, the demand for the new technology remains inadequate from a business point of view of the manufacturers. This is because of the inability of manufacturers to project cost benefits in acceptable terms results in an unreasonable approach to this attendant issue as reported in Fair Play, (29october, 1998). The Sea (May/June, 2000). Reported, …The inquiry report said, "Too much for one man to do cruise ship collision blamed on overloaded watchkeeper ". Maritime Accident Investigation Board, Press release No.248 (2000) confirmed the aforesaid. It goes on to report too much information and too much work for the officer of the watch. These are the main reasons sited for why Norwegian Dream collided with the container ship EverGreen in the English Channel in August 1999.

The transition phase from paper navigational charts to ECDIS has generated debate; combined usage of Raster navigation charts with paper chart backup is working against the introduction of new technology on a global scale. Shipowners do not want to bear extra costs due to dual requirement. The benefits of new technology of real time navigation with an ECDIS are denied to navigators. The regulators have not been able to adequately address the advances in technology. Aalst, (May/June, 2000). Examined this issue and argued:

> "IMO regulations do not permit use of the world wide available raster navigation chart without paper chart backup. As a result many shipowners

decide not to invest in electronic chart display system, thus avoiding extra costs considering the benefits of real time navigation with electronic chart display and information system, It seems that IMO is on the wrong course for the wrong reasons"

Transition from old to new technology has its own challenges, dilemmas and paradoxes.

1.9 Human Relationships

Human factors at play on board ships result in human relationships. A group of persons performing their functions and applying competencies in unison or in tandem work towards common objectives. This entails teamwork and teaming up. The outcome of a team effort is generally not the sum total of the efforts of each member of the team. A good team effort produces results that are much above the sum total and much below the sum total, if team effort is found wanting. Human relations are integral to dealing with the stressful working environment in the marine conditions.

Adamson, (2000). Stated, bulk carriers now spend 98.5% of their time at sea and also added a word of caution… that here is a point at which technology is so sophisticated that our ability to intervene becomes compromised.

The ever-reducing manning scales confirmed by Martin, (1995) research in Sweden and Japanese experiments are detailed in chapter IV. It follows that more cohesion and integration of people on board ships is required to create a harmonious working atmosphere because crew sizes are curtailed. This cohesion and integration provides a cushion against the after effects of stressful near miss situations, stress generated by new technology, reduced manning scales and reduced port stays, so that it prepares the seafarers to deal with variable tough unpredictable marine conditions effectively. According to Tan, (1999). ships on an average spend eighty percent of the time at sea. However, in actual operating conditions, tankers, bulkers and container ships spend much lesser time in port on case to case basis.

1.10 Unique Features of Seafaring

No other industry requires workers to remain in the confines of the working environment, as is the case with the seafaring profession, excepting the oil industry ashore and the army in war like situations. This unique nature of the profession can be dealt with by realistic solutions, which are not easy to find, unless, thorough examination and investigation is undertaken, or the measures adopted by the oil industry are modified and applied to the seafaring profession.

The charm of foreign lands has vanished from the seafaring profession with the onset of the information and space age, which lends global connectivity and mobility never, imagined in the past. With new challenges of the present and future, new strategies are to be evolved. Schager, (1996) stated that to attract quality people to the profession, so as to deal with new challenges of the present and future, new strategies need to be evolved in attracting the best professionals. However, the factual position generally confirms to the 1.6 the position described by Sohmen.

1.11 Fatigue and Stress Issue

As of now, symptomatic diagnosis, followed by quick fix solutions like recording hours of work and rest hours, and regulating work to deal with fatigue and stress issues in marine conditions (Chapter VIII of STCW 95 Convention and ILO conventions), belie the forthright approach needed to deal with these issues. It follows that fatigue, stress and human factors are to be investigated and researched, to equip the serving seafarers and new entrants to meet the challenges confirmed by the proceedings of the Maritime Safety Committee of IMO in its various meetings on the subject matter.

To elaborate on these issues, for example, voyages made in the latitude 30 degrees north/south during the winter season become increasingly tougher in the higher latitudes. This is dealt with by increasing the freeboard under the load-lines rules

applicable for the zones. This measure enhances the safety of ships if some measures are focused in the context of manning enhancement in the seasonal /zone changing marine condition, then may produce a more realistic solution for safer ships. Such practice is presently not known to be followed. In the context seeking solutions to fatigue and stress issues, the stopgap measures above mentioned can be considered, until, results from investigation and research work are clearly understood and complied. Fatigue and stress factors due to reduced manning and new technologies are well described in the case of Hoo Robin and Arklow Marsh in river Trent, the MAIB (press release no. 248) decided that Master`s judgement had been “Probably been adversely affected by accumulating effects of fatigue”

1.12 Outlook of Society towards Marine Transport

The attitudes of the human society at large are well reflected by Grey, (March, 2000) in his view that high seas practice is worth far more worth than paper. It makes for interesting reading of the instantaneous matter of affairs, conducted by thrustful people of commercial business with microscopic outlook, having no regard for the forces of nature, and who find that everything is manageable on time regardless of inherent dangers in the marine conditions. This attitude of society has not changed from the Titanic disaster till date; it makes for a case to raise the public awareness about the stakes involved in the maritime transportation, so as to evolve more realistic attitudes and outlook. Hostile commercial environment described by Sohmen, (1990). Mainly contributes to lowering the status of the profession in the eyes of the public.

1.13 Seaworthiness and the Seafarer

The seafarer responds to the forces of the sea and adapts to dynamically changing circumstances and situations and takes steps to keep the ship seaworthy. A ship remains seaworthy till the seafarer is able to foresee the action of natural forces, the

activities of mankind and takes effective and adequate measures in sufficient time to ensure the ship`s safety.

The seafarer must remain properly equipped and motivated to perform this role at all times. The prescribed behavior by specifying a procedure can only be used as a guideline, but not a substitute for taking initiative for efficient performance. Excessive regulation, rules and prescription can be counter productive in the long run. Care and caution in this respect will not be out of place; each circumstance and situation is unique, in itself. Creating a procedure for each circumstance and situation is not a feasible option; however, this issue needs to be examined in right earnest. The man/machine interface has received attention; and a large mass of data is available from an engineering and technical angle, but research in navigation in marine conditions remains an area deserving more focused attention this aspect is analyzed and synthesized in Chapter III.

In an attempt to understand safe and its linkages and relationships to efficient, a look in Collins Cobuild, English dictionary provides the meaning, it is described in twenty one different ways and in all contexts it relates to human beings and their perceptions on comparative terms as no absolute definition of safe is derived. A description in Collins as a sample goes like this… "If someone or something is safe from something, they cannot be harmed or damaged by it". It is the humans who make the difference between safe and unsafe. The competence and its application makes efficiency a reality, in efficiency the play of lesser input and greater output produces competitive levels of efficiency in performance.

The meaning of efficient is described in the above dictionary as "If something or someone is efficient, they are able to do tasks successfully without wasting time or energy. Efficient working means a performer is decisive and accurate in his judgement. The quality of being able to do a task successfully with minimum input and maximum output."

The application of knowledge, understanding, skills and proficiency to complete a task efficiently is a direct function of competence. The competence of a team helps

to meet the challenge of efficient ship operation of a ship. The competence requirements of all levels for watch keeping functions are specified in detail in the STCW Convention.

The variable standards of competence and the application are attempted to be addressed by ensuring uniformity of minimum standards of training. The application of regulation I/8 of STCW Convention and requirement of demonstration of competence through simulators is a step towards achieving and maintaining uniform minimum quality standards of training.

This requirement is yet to be addressed adequately under the STCW Convention, mainly because of large financial implications and the training of trainers. The human relations in team formation and teamwork facilitate application of competence to achieve safe and efficient ship operation. The following illustration describes the relationship described above:

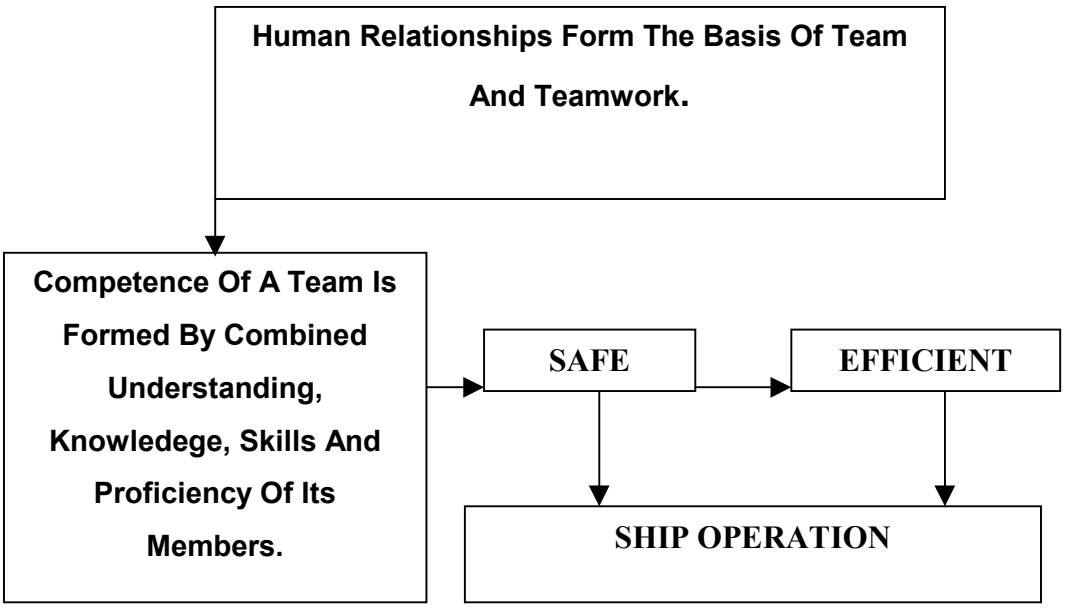


Figure 1.2 Describing Human Relationship and Safe and Efficient Ship operation

The last ten years trends of U.K. P&I CLUB claims analyzed by Bond, (October,1999). point in the direction of claims arising out of commercial pressure as follows:

> Three out of every five major claims are directly related to human concludes the report. Why people go on making mistakes a question which club data cannot adequately answer. However, the evidence is that even properly trained personnel can become careless even reckless when responding to commercial pressures or suffering from fatigue; discomfort, boredom or stress. Specific risk areas appear to be:

1. Language problems in mixed nationality ships, and between ship and shore side personnel, particularly when engaged in critical activities such as berthing and bunkering
2. Confusion due to poor communication between pilot and master
3. Fatigue from smaller crews and shorter turn around times in port
4. Minor miscalculations leading to ship instability and consequent cargo loss
5. Pride inducing crew to carry out tasks which should be executed with assistance
6. Calculated risks by masters and officers responding to commercial pressures

A compromise on safety and efficiency has direct relationship with performance of the ship to remain a viable commercial unit. The variability in competence and its application through teamwork is a cause of serious concern.

The maritime transportation is generally viewed as an economic activity and attempts at achieving economic efficiency are seen in the form of competition. It is the universal principle that the market is always right; this principle governs markets. The cost cutting measures are directed towards the manpower, because

the other inputs cannot be subjected to such measures as they are well controlled. The pressure of cost cutting measures largely impact on human beings a competitive advantage is derived out of this. However, it has a direct correlation with safety and efficiency. Safe and efficient ship operations are closely linked to humans and their relationships with each other. The maintenance and sustenance of quality systems if accepted as industry standards, leads to the reasonable conclusion that it will help reduce such attempts for competitive advantage to a reasonable level.

The hostile commercial environment in response to unlimited forces of competence takes its toll. It produces less committed, competent seafarers and reduces safety and efficiency of ships for the immediate gain of economic efficiency. The ascendancy of this approach almost rules over all other relational premises.
The inter-relatedness of safe and efficient with human relationships is a core element in the successful operation of a ship.

1.14 Lack of Uniformity in Training

Minimum training standards are specified in the STCW Convention. It is fairly well known that training standards prevailing in different countries are not uniform as confirmed by Donaldson, (1994). This variance in training is being addressed through quality systems implementation, but the approaches of administrations of different countries are not in unison. It will take some time to achieve this requirement. This is confirmed in Lloyd`s List, (May 2, 2000).

An article in Lloyd`s List, (April 12, 2000) reported the heterogeneous nature of training, and this, along with heterogeneous crews, make a difficult combination demanding special management skills ashore and on board. Performance standards for seafarers are not specified in the maritime industry. As for the case of national flagships with homogeneous crew and officers, voyages are performed with national pride and prestige. In comparison this is missing in the context of heterogeneous multinational, multilingual and multicultural, crews and officers e.g. Scandinavian Star accident.

Frequently changing registries of flag of convenience ships, classification societies and changing multilingual/multicultural crews create unsafe conditions, not only for their own ships, but also for the other shipping operating in the near vicinity and the environment e.g. Erica incident. Training solutions can be worked out for many needs but not for all the issues, some of which can only be dealt with by a combination of management measures in line with training. The following quotation is relevant to above:

> In conclusion, I would like to reiterate that reducing accidents due to human error is a principal challenge before all of us. Risk is inherent part of the maritime industry and can never be completely eliminated. However, the application of sound quality management principles and placing emphasis on people, both operators and managers of ships, enhancing their training and ensuring that they are properly qualified, is the most effective way to enhance safety and reduce risk. We have taken great efforts to develop the STCW and ISM code. They were designed to improve the competence of our seafarers and safety operations, and thus reduce the risk in maritime operations. Let us implement them conscientiously and with professionalism to achieve this aim. It is time to raise the image of seafarers.
>
> Kong, (2000).

The level of professionalism is poised to rise and seafarers have to evolve and rise to the challenge.

1.15 Quality

Peters, (1987). stated regarding failure of quality programs as under:

…Most quality programs fail for one of the two reasons, they have system without passion or passion without system.

Kurz, (2000) stated quality is the watchword of our modern industry; total commitment from all is the only way out for meeting the objectives of total quality management. Attracting, inducting, and training, organizing and retaining the best work force for efficient and safe operation of ships can meet this objective. Any shortfall in this respect will only show itself in under achievement of the aforesaid objective, to produce inherent risk to life, property and environment in an active, as well as, passive manner. “We must stop the havoc created by the substandard ships” opined Kurz, (2000). How remains a matter open to be addressed in future.

According to Tenner, et. al. (1992). quality is a competitive advantage in the manufacturing sector. It is a proven fact that the culture of quality has built in safety parameters as in the case of the aviation industry quality of service has features of reliability and integrity according to Weiner et. al. (1988). The variables in the maritime transportation business are not easily reconcilable, due to culture of openness and freedom, over tonnage and unhealthy competition. This makes the quality operator in shipping to be circumspect because remaining in business becomes an overriding issue. Shou Ma, (1999). depicts the options of doing anything in the maritime transport is a business where fitting quality into this scenario remains an unanswered question:

You can get in easily, You can get out quickly

You can earn money easily,You can lose it quickly

You can participate slightly, You can be involved heavily

You can look at it as a game, You can treat it as a mission

You can operate ships by direct control from a port

You can operate ships by remote control from an inland place

You can do it alone, You can do it with many others

You can have ships without being a shipping company

You can be a shipping company without having ships

You can operate in the most traditional way

You can operate in a state- of –the- art manner

MARITIME TRANSPORT IS INDEED AMAZING AND STIMULATING!

Source: Ma,(2000)

The recognition of quality in service - sector can feature safety integrity and reliability. The safety management system of the International Safety Management Code (ISM), if implemented properly, can move the maritime industry in this direction. Inherent weakness of the ISM code such as lack of a common international language for procedures, redundancy and lack of legal/liability immunity for operating under ISM code, if rectified can move the maritime industry in the right direction. The quality and safety culture are synonymous, this perspective alone has to become business and a competitive advantage. Encouraging a quality culture can bring about avoidance of substandard tonnage, this approach is in its formative stages According to Julian, (2000) USA may cut port fees for owners of quality ships after January 2001. This quality initiative has been outlined; the details of the scheme are yet to be agreed. The pertinent details are attached at Appendix E. The formal safety assessment process is being developed for application in the shipping industry so as to avoid prescriptive nature of safety regulations is applied more realistically and reasonably to deal with the safety needs of a specific operation/activity. Quality of service acts as a counter balancing force in the mission to drive out substandard tonnage.

The plethora of regulations governing the shipping industry is a discouragement to the evolution of a quality culture. The reduction and realistic unification of rules and regulations to address safety and pollution issues may be a move in the right direction. These are what IMO has striven for with a degree of success and now its role has changed to include a supervisory function in matters of safety.

Chapter II International and National Approaches to Human Element Problems

Every custom was once an eccentricity; Every, idea was once an absurdity.

Holbrok Jackson

2.1 Introduction

The advent of threats to unilaterally legislate in the aftermath of the EXXON VALDEZ incident and now in the case of the ERICA, this tendency poses a danger to the uniform international approach, so far adopted by the International Maritime Organization.

International approaches to the human element were a phenomenon marked in the middle seventies by the STCW Convention which was subsequently revised in the middle nineties, with accelerated pace of implementation. The Revised Version of this convention is competency based and its implementation and compliance is more emphasized by the introduction of the ISM Code and quality systems in training activities. Development of uniform standards of training is seen as a first step towards the progress for quality service free of accidents, loss of life and threats to the environment.

Shipping being an international activity has a large number of variables and to attain uniformity in training is a difficult objective. It requires a great degree of foresight, flexibility, vision and wisdom. Multi-Nationalization of the maritime industry is its great strength in the business context; but it poses a threat to the cause of safety in

the tough marine conditions when it is viewed in the context of multilingual and multicultural crews and officers.

Hawkins, (1999). determined that more than sixty percent of the world tonnage is registered under non-maritime flags; the ownership of it largely belongs to developed countries. The national approaches to the maritime trade have resulted in the flight of their national tonnages to non-maritime flags e.g. maintaining twice the manning scale on payroll and rise in salary due to high living standards of developed countries.

Flagging of vessels under FOC has numerous business advantages in the increasingly hostile commercial environment these are listed as under:

1. Lower manning costs: manning requirements since registration under open registry means unrestricted choice of crew in the international markets not being subjected to onerous wage scales and more relaxed manning scales.
2. Lower operating costs generate lighter maintenance programs and less stringent enforcement of safety standards imposed by the register
3. Less regulatory control and avoidance of bureaucracy
4. Avoidance of tax
5. Anonymity
6. Easy accessibility/exit to/from the register

Source: Bergantino & Marlow (1998).

Upon examining the web-sites on Internet Flags of convenience, it would appear have become a tradeable commodity cutting across the national frontiers in the

chase of remaining in business. It interferes with identification and confirming the actual nationality of shipowners.

2.2 National Approaches

The national political forces largely control the national approaches. The Political compulsions of nations may not allow rationality to prevail in national approaches to human elements. The on going process of liberalization and Globalization of world trade raises some hope towards an aim of rationality in arriving at a reasonable approach to attract and restore the tonnages to the flags to which they actually belong. The advantages of flagging the tonnages to non-maritime nations by the shipowners work against adopting a forthright approach to deal with the human element.

National approaches to the human element are generally colored by the activities of unions, political apparatus, and cultural, linguistic and regional issues. This does not provide a workable climate to conduct the shipping business on the principle of sound business practices, this is reflected in the report titled Costs: (February 1999) in The Drewry Monthly, about having different rules for British shipowners and foreign shipowners. The competing forces and conflicting interests retard the operation of maritime business and also its interference with the criminal and liability aspect of human element; this somewhat prevents deeper investigation of issues.

2.3 STCW Revision

The major initiative of international significance is the STCW Convention from the International Maritime Organization. It aims at achieving uniform standards of training, certification and watchkeeping in terms of quality and competence. This convention has been ratified by most of the maritime nations; therefore it has global acceptance. Its main strength lies in the continuous update process, which makes this instrument, up to date and relevant, but its weakness lies in global disparity in training standards and lack of implementation.

It continually strives for safer ships and cleaner oceans in a proactive manner. This was evidenced when STCW 78 was revised by STCW 95. By overcoming the ratification process delays, tacit acceptance provided for objections to be raised by the parties to the Convention, before the specified date. In the absence of any such objection of prescribed number of states and percentage of world tonnage, the revision entered into force. This action is without a parallel in the maritime field to date.

The implementation of this Convention seems to have run into rough weather as reported in Lloyd`s List, titled Crewing (2000). It has posed an unprecedented challenge to some of the major manpower supplying countries (e.g. Philippines, Indonesia) the national administrations being unable to solve their national problems, after having ratified the convention as confirmed in the article titled Leader, (May, 2,2000) in Lloyd`s List. This issue, of many nations having given full effect to the Convention, compared with others, who are training seafarers at a standard which is not uniform, is creating its own paradoxes. As the date for final implementation fast approaches, options such as denunciation may have to be exercised, which will be against the aim of uniformity in global standards of training, certification and watchkeeping; this will fragment the maritime world as was never known before. This issue currently seems to be taking Titanic proportions. The willingness of most of the maritime nations to comply with the STCW Convention in its revised form is a healthy sign in the march towards safer ships and cleaner oceans but the inability to come to terms calls for a more realistic outlook. A right step in this direction can bring the maritime world towards greater global co-operation as never known before.

After revision in 1995, STCW now consists of resolutions; regulations and codes paving the way for changeover from knowledge based to competence based training; consistency and clarity between regulations and chapters of the codes making it a formidable document.

The main content is the mandatory code A, complemented by the recommendatory code B. These elements make this instrument an effective and universally

acceptable tool for realizing uniform minimum standards of training on a global basis. The human aspect pertaining to elements, factors and relations is dealt with in the sections covering deck/engine departments, alternative certification, watchkeeping, simulator training, structured training, continuous maintenance of professional standards and quality standards including the training of maritime teachers/instructors and assessors. Part A of the code shows what is to be done and Part B of the code shows how it is to be done for achieving uniformity.

2.4 International Safety Management Code

It is contained in the form of chapter IX of SOLAS74, entered into force on 1-7-98 excepting mobile offshore drilling units and cargo vessels for which it will enter into force from 1-7-2002.This code attempts to cover the following:

1.Making safety a proactive and a dynamic matter

2.Making management of ships an accountable and transparent matter

3.Establishing linkage between ship safety and efficiency an operational matter

The responsibility for operation and management of the ships has become a matter of serious concern, with the advent of the information age and instantaneous communications, the decision making process shifting its focus from the Master`s discretion to Management's decisions taken ashore as observed by Anderson & Mehta, (2000). The responsibility for safe and efficient operation remains with the master but the authority and power to take decisions has shifted away from the ship. It has at times increasingly become more difficult for the master to take decisions even on matters concerning safety. In the light of this changed scenario, the ISM code attempts to make persons ashore responsible for decision making, identifiable and accountable.

The attempts at achieving transparency are successful to a large extent and fears about the ISM code appear to be converting into confidence as safety is becoming

synonymous with efficiency. The full impact of the code will be assessable after complete implementation by 2002. Bievre, (2000) Lloyd`s List, reports, fears of pilots and their resolve of declining to sign ISM checklist during the process of pilotage although pilots firmly declare their commitment to safety. The ISM code is being implemented with best of intentions but the pilots seem to have some reservations this could be a process to deal with new emerging challenges.

The responsibility for implementation and compliance of ISM is with administrations and port state inspections will bring out the short falls if any. The ISM code to a great extent addresses the human element and other issues but success in resolving these issues largely depends on the people on board and ashore responsible for the operation of the ships. The position prior to introduction of the ISM code concerning safety was connected with obtaining statutory safety certificates thereafter safety that was relegated to a ritual of lesser importance.

The credibility of ISM code was under test as a result of the ERICA incident during the course of writing this dissertation. The safety management system existed for this ship in theory but in practice attitudes of people and authorities remained unchanged. The obsession of ship owners remained focussed towards cost cutting. Master of the Erica was loaded with responsibility of safety of a sub-standard ship. The accountability, transparency only ended up in blaming culture and not accepting responsibility and pointing at each other rather than accepting the responsibility, also failing to view the matter from safety perspective. Each agency from classification society, Flag State, port state, coast guard, owners vested with authority and powers stoutly defended their position and some of them held Master responsible. Once again the question arises in the direction of man made problems. The Erica incident is an eye opener, exposing the limitations of safety management system in practice. The obsession of cost cutting in hostile commercial environment is detrimental to safety. The Master of Erica roundly criticized the obsession of cost cutting and crew reductions in The Sea (May/June, 2000) attached at Appendix D.

The seaworthiness of the above mentioned ship was compromised as a consequence of series of compromises made by different role players exposing the

seafarers to avoidable risk and turmoil. The question remains as to the correctness of the approach towards safety, efficiency and human relationships. Safety was compromised and efficiency remained questionable. Humans who were responsible for the state of affairs directed their efforts to defend themselves against accepting responsibility. Public outrage and opinion is being satisfied through threats of unilateral legislation till the public memory recedes into background.

The vulgarized splendor of blame culture was glaringly on display in the aftermath of the ERICA incident response from blame culture were of a very wide range and interesting beginning with threat of unilateral legislation, boarding of ships before entry into EEZ, banishing single hull tankers, preponement of phasing out of single hull tankers and so on.

The core issue of human elements in the form of under manning, poor and substandard survey regime and neglect of maintenance these issue did not find enough mention in the out bursts of blame culture represented by the political system.

The effectiveness of the ISM code on operational side of shipping industry is varied, but appears to be working after two years of its introduction, it has divided the shipping industry in three segments as viewed by Sagen, (July 29,2000) in Lloyd`s List. The suggested division is into following three:

i) The top 20% of the companies demonstrate operational benefits

ii) The average 60% of the companies managed to attain their certificates and finished the process

iii) The bottom 20%, the rule benders didn't want it, and do not care about code or its consequences.

The ISM code has proved sufficient to commence the necessary change of safety culture for those prudent shipping companies, which were too willing to invest the necessary commitment, resources and knowledge for the task.

The later part of maritime industry comprising of 60% and 20% range between managing to finish the process and bending the rule category. In 2.9 table no. 2.3 showing perceived effectiveness to promote maritime safety, although it would appear to have no direct relationship with the above stated view of maritime industry except the maritime safety. But the percentage of perceived effectiveness in promoting maritime safety by key sectors corresponds to 22.87%, 58.25% and 18.87% pertaining to high, moderate and nil effectiveness respectively. This pattern and its reflection on implementation of ISM code indicates that benefits of ISM code have not percolated to majority of maritime operations, however a slow beginning has been made to cultivate safety culture.

The compliance culture is yet to take shape in maritime industry as blame culture continues to rule the day.

The question begs an answer; is the mankind adequately responding to challenge created by its own making?

2.5 Safe Manning

The Manning issues are receiving concerted attention in the last ten years although most of the accidents have been attributed to human error or failure. In the aftermath of EXON VALDEZ, a solution of double hulls was implemented which did not contribute to safety of navigation in any way, which is a distinct function of manning.

Resolution A. 890(21). of IMO covers principles of safe manning noting that safe manning is a function of the number of qualified and experienced seafarers necessary for the safety of the ship, crew, passengers, cargo, property and environment:

> It recognizes the importance of the pertinent importance of instruments from other international bodies contributing to maritime safety and protection of the marine environment. Awareness is acknowledged that the ability of seafarers

to maintain observance of these requirements is dependant upon their continued efficiency through conditions relating to training, health, hygiene, hours of rest and work, and occupational safety. It believes that acceptance of broad framework for determination of manning of ships would materially enhance maritime safety and protection of marine environment.

Minimum safe manning levels are to be established by the governments based on the framework in the form of guidelines provided by the resolution. Maritime safety is a global issue as the unsafe acts of one ship jeopardizes the safety of the other ships and the marine environment, and a uniform approach to the manning issues would address the problem to maintain the safety standards. Each administration interpreting and applying these guidelines suited to their requirements does not make room for uniformity and retards the aim of achieving quality.

Minimizing of manpower by use of technologies transposed from the aviation industry, automobile and material handling industry is in vogue and pursued with great zeal. The shipping industry has benefited from this to a large extent. The concept of unmanned ships, one man bridge operation, unmanned engine rooms is popular and appealing to simple thinking minds and force full people. The main point in this context is the seafarer that, he had to endure the forces of nature, now has to contend with extinction of his profession, and the reduction of his acquired skills, which will in course of time become dormant and decay out. The transition period of transposition of technologies is a critical period deserving thorough examination for solutions.

Reduction in crew sizes has generated new problems, which have qualitative and quantitative impact. The crew sizes of six to eight under normal conditions in short shipping operations is considered safe but under exceptional circumstances raise risks to safety on board ships. Numerous incidents are reported when fatigued watch officers failed to carry out the nominal duty of lookout and position fixing. Stress and fatigue are the issues receiving the attention of the maritime community.

Unfortunately sufficient databases do not exist to provide sufficient information on stress and fatigue-related incidents and accidents. The investigations conducted into accidents and incidents so far were related to technological aspect ignoring the human aspects. An attempt in the form of Resolution A 884(21). of IMO amending the code for investigation of marine casualty and incidents in this direction is made but its effectiveness is linked to the operation of National Laws, which raises a doubt in achieving the laudable aim of improving the quality and completeness of casualty investigations and reporting the connections with human factors.

The ultimate aim of increasing the awareness of all involved in the marine industry of the role human factors play in marine casualties and incidents can help in evolving a proactive approach by the maritime community, which in turn may lead to saving lives, ships, cargo and the protection of marine environment, improvement in the working conditions of marine personnel and efficient safe ship operations.
The crucial linkage of operation of National Laws would decide deeper investigation of human factors. The positive outcome of implementation of this amendment to the code will be of immense interest.

2.6 Classification Societies

The classification societies play a crucial role in the operation of ships commencing from concept stage to demolition stage. Classification societies of repute have formed an international association it strives to combine the approaches and positions taken by its member classification societies. The non-member societies and member societies do not provide for uniform approach to ship design, survey, maintenance of class and condition of the ships. It lacks standardization in the matters of seaworthiness concerning hull and machinery of the ships. A climate of competition among classification societies becomes a factor forming negative element working against the safety of the ships. This climate indirectly enters through non-maritime flag states competing to have more tonnages registered under their flags. The classification societies activity for profit making creates a basic conflict of interest reported by Osler, (July, 27,2000).

Traditional role of classification societies as non-profitable institutions is changing because of their supervisory function during construction and certification of quality systems. The conduct of statutory surveys on delegated authority on behalf of non-maritime flag states has some what changed the role of classification societies. It has to follow the line of accepting responsibility and liability to the direct consequences of the actions, but the classification societies are resisting accepting this responsibility, Classification Society in Leader L accident stoutly defended itself it was glaringly evident in the report by Osler, (July, 25, 2000). The owners, under writers, and P&I clubs closely interact with classification societies for certification of seaworthiness to assess the risk and liability of the ships and largely depend on the reliability of certifying authorities.

The role of classification societies can be viewed when connected with flag of convenience states by the report, Costs, (February,1999) in The Drewry Monthly it points at the linkages between unhealthy competition of FOC states for having more tonnages registered under their flag. The classification societies enter into contractual arrangements with the some FOC registries to provide technical services at the same time resist taking responsibility for their actions when confronted with liability issues. The FOC record on safety matters is reportedly on negative side e.g. reporting Port State, (April 27, 2000). St. Vincent tops Trinidad and Tobago Safety Violations List for second year. In this context classification societies have an involvement which works against adopting a forthright approach for the safe ship operation and dealing with human factors. The connection of seaworthiness and safety with human factors and safe and efficient ship operation is crucial.

The role of classification societies came under public view during the Erica disaster case in December 99. The Erica in her life span had been operated by eight owners and registered with four different classification societies and she was involved in two grounding and two cases of boiler damage. The Erica was detained a number of times at different ports by authorities for reasons other than seaworthiness, when Erica was not able to meet the seaworthiness maintenance requirements of one

classification society the classification society was changed and the new society was apparently willing to be more flexible on the issue of seaworthiness. The class hopping even within the International Association of Classification societies compromises the safety of the ships and the classification societies resist owning up these responsibilities.

2.7 International Maritime Organization

The International Maritime Organization since, its inception in 1948 has transformed from an inter governmental consultative organization engaged in the process of reduction of national legislation not in tune with the process and aim to introduce harmonization and international recognition of safety rules and regulations to an prescriptive or directive organization. This most recent trend of IMO shows movement towards an active role of supervision. The revised STCW 78 Convention calls for IMO to set up a so called `white list` of states fulfilling the minimum training requirements of STCW Convention and is a first step towards a more proactive role for IMO.

The IMO members during the 17 th Assembly had drawn the attention of the world to the fact that many flag sates are not able to maintain and secure proper control of conditions on their ships under their flag.

The IMO established the Flag State Implementation Committee, which has the role to monitor efforts of flag states implementation of IMO and ILO Conventions, this can be seen as enhancement of proactive role of IMO. IMO Conventions particularly pertaining to safety have almost global acceptance. The following Table illustrates this fact:

Convention	Number of Parities	% of World Tonnage
Solas 74 as amended	140	98.34
Load Line1966	144	98.34
Marpol 73/78	110	94.23
STCW 78	134	97.93
Anti Collision Regs.1972	134	96.77
Tonnage convention 1969	124	98.05

Source: IMO Website as on 31May 2000

Table 2.1 Ratification of IMO Conventions

The emphasis on implementation, introductions of ISM code and quality systems in training are the steps initiated by IMO in the right direction. At the same time issues of manning and occupational health, safety and uniformity of rules for design and construction of ships remain to be addressed adequately under the good direction of IMO.

2.8 The International Labor Organization

This organization was set up in 1919 under the treaty of Versailles with an aim to improve satisfactory working conditions and pay. ILO was the first specialized agency at the time of creation of UNO in 1946. The membership of ILO has since grown from 42 states to 174 till 1998. ILO maritime instruments cover a wide range of issues, such as minimum age, recruitment and placement, medical examination, article of agreement, repatriation, holiday with pay, social security, hours of work and rest periods, crew accommodation, seafarers welfare, seafarers identity documents, occupational safety and health and continuity of competency.

ILO has altogether 180 conventions although well directed towards the welfare of seafarers lack wider acceptance; the acceptance of ILO Conventions in comparison with IMO resolutions is almost fifty percent. In the recent times IMO and ILO are jointly making efforts to address human elements issues.

2.9 Foreign Flag Registration

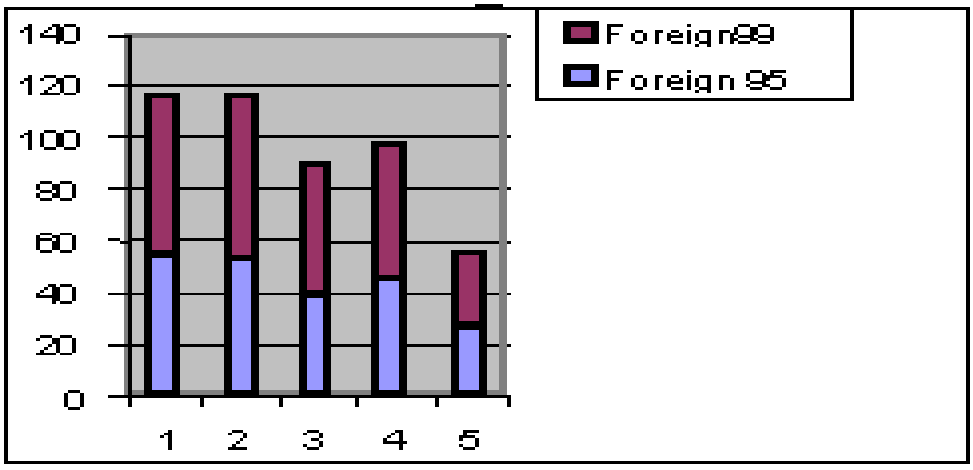
The last two decades have seen remarkable shift in registration patterns of the world fleet. Driven by economic interests, shipowners in increasing numbers have been taking their ships out of national flags and registering them under foreign flags and registering them under foreign flags, a report by Joshi, (July, 13 2000) Lloyd`s list, Stating that Gorthon lines threatening out flagging as employee scheme fails to cut crew costs, it is an evidence establishing this fact. This activity is known as flagging out. It shows decline of national fleets and rise of foreign flag or flag of convenience. A foreign flagship is one that is not registered in the country of domicile of the owner; instead, it is registered under a foreign flag.

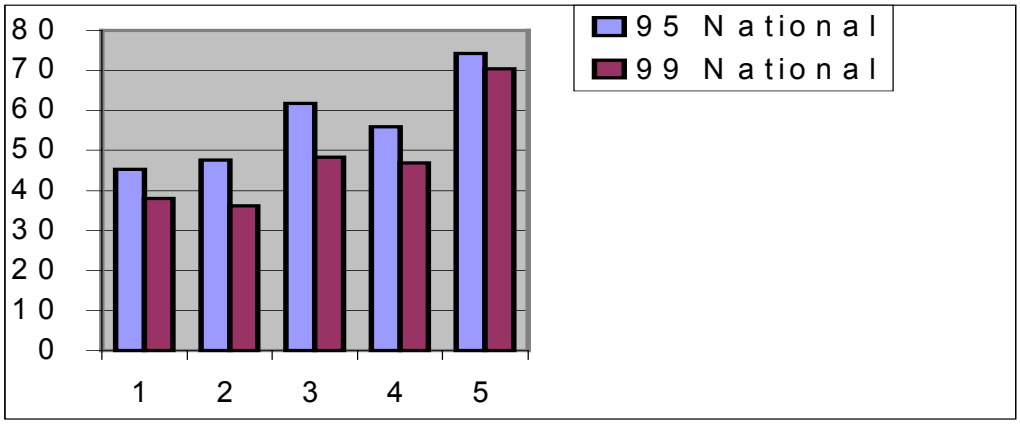
The foreign flag of convenience now make up almost 61% of world fleet compared to little over 51% in 1995 as determined by Hawkins, (1999) is shown in the following table:

Ship type	National Flag		Foreign Flag	
	1995	**1999**	**1995**	**1999**
1.Tankers	45.3	38.0	54.7	62.0
2.Bulk Carriers	47.6	36.1	52.4	63.9
3.Containerships	61.8	48.3	38.2	51.7
4.General cargo ships	55.9	46.8	44.1	53.2
5.Pass. /Pass. Cargo ships	74.2	70.4	25.8	29.6
Total	**48.7**	**39.4**	**51.3**	**60.6**

Source: Taken from APEC, 1999.

Table 2.2 DWT% SHARE OF WORLD FLEET BY SHIP TYPE





Legend: 1 to 5 corresponds to Ship Types Source: APEC Diagram by Author

Figure 2.2 A&B above Showing Increase in Foreign and Reduction in National tonnages in DWT% from 95 to 99

OECD report of 1996 confirmed operators of substandard ships are able to achieve competitive advantage over reputable operators who comply with international safety standards this position remains unchanged according to Hawkins, (1999). He concluded, for as long as operators of substandard ships are allowed to continue trading, they will do so at the expense of more conscientious operators. With unseaworthy vessels, they also pose a constant threat to life, property, and the environment. The existence of substandard or unseaworthy shipping is a joint responsibility of maritime world and attempt to grapple with are seen in the form of port state inspections under memorandum of understanding.

FOC are largely ship owner controlled as their craving for registration fee remains the controlling factor which is reflected in fierce competition among FOC states to

register more tonnage, a report by McLaughlin, (January, 12, 2000). Lloyd`s list, titled “Marshall Island tax lure could registries battle” confirms this. Following table depicts the perceived effectiveness of key sector in maritime world:

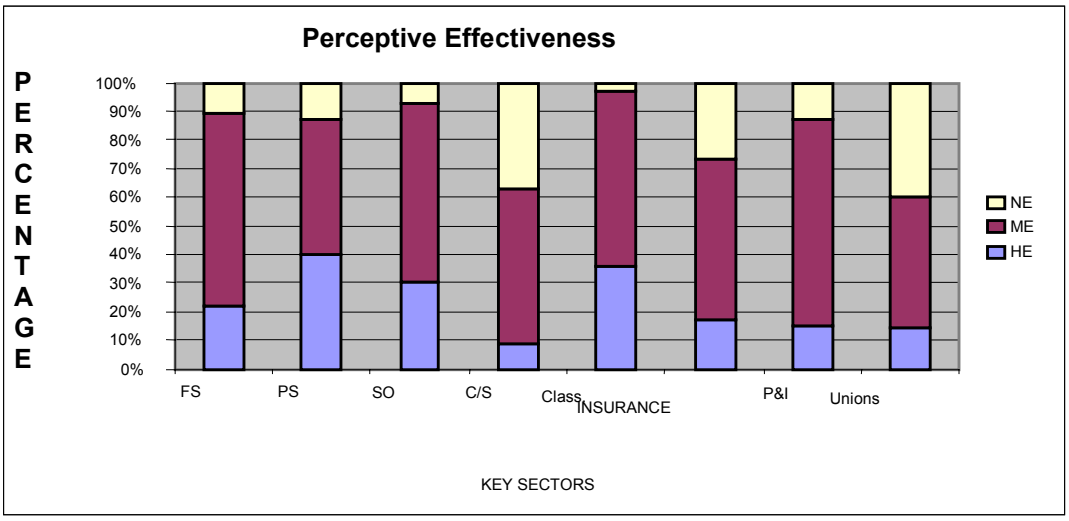
Key Sector	H.E%	M.E.%	N.E.%
Flag state	22	67	11
Port state	40	47	13
Shipowner	30	63	7
Charterer/shipper	9	54	37
Classification Soc.	36	61	3
Insurance	17	56	27
P&I	15	72	13
Unions	14	46	40

Source: APEC (1999)

Legend: H.E. high effectiveness, M.E.moderate effectiveness, N.E. nil

Table 2.3 Perceived Effectiveness of Key Sectors in promoting Maritime Safety

Legend: H.E. high effectiveness, M.E.moderate effectiveness, N.E. nil



Source: APEC Diagram by Author

Figure 2.3 Showing Perceptive Effectiveness of Key Sectors in Promoting Maritime Safety

It is clear that port state and classification societies are perceived to be the key players in promotion of maritime safety. The flag states and shipowners although theoretically responsible and liable appear to be lagging behind in perceptual terms. Among support sector APEC study identified port and terminal operators followed by professional maritime associations, maritime media and environmental groups moderately to highly effective in promoting maritime safety for example bankers, financiers, salvage operators and crewing/manning agents were considered least effective in promoting maritime safety in perceptive terms. Commitment to promotion of maritime safety in tune with their commitment to the maritime world would appear to be a step in right direction.

2.10 Port State Control

This is exercised by port states on ships calling at their ports to ensure that they comply with international safety requirements. It successfully employs a `name and shame` strategy, whereby lists of ships found to be deficient or put under detention are made available on online databases to the general public. Although this mechanism is effective to a degree in discouraging substandard shipping, the degree of duplication on inspections and overlapping of inspections is illustrated in Appendix G to highlight the problems faced by compliant quality operator.

2.11 Conclusion

In conclusion shortcomings of various approaches to deal with human element problems were discussed, analyzed, synthesized and highlighted. The liability aspect fixed on shipowner perhaps interferes with transparency and openness needed to deal with the human element. Society which benefits from maritime transport has to bear the liability aspect; this will improve transparency and openness level. Uniformity of legislation is to be maintained. Any heterogeneity in this respect will be detrimental to the larger interest of maritime safety. Attempts at restoration of tonnages to the actual owner flag state and uniform code for

classification societies will to a large extent can move maritime industry towards a safer and more efficient ship operation. However, the trends of acceleration in flagging out are noteworthy.

Chapter III Survey of Casualties

Every one in business makes mistakes; if you did not take risks you never did get anything done. The sin would be if you made the same mistake more than once

Michael Eisner, (1995)

3.1 Introduction

Human failure repeats to cause casualties. This sin in the maritime industry was acknowledged over thirty years ago. The investigations undertaken into the casualties revealed many lessons to be learnt, but the loss of lives lost at sea remained unchanged. The lessons learnt from casualties remained unchanged. The lessons learnt from mistakes brought messages for the designers, planners, and managers but lacked the most important messages about human aspects.
It is interesting to note how human factors contributed to the following casualties:

Ship`s Name	Visibility	Nature of occurrence	YOC	Causes
Andrea Dorea/Stockholm	RV	Collision	1956	Late Action
Chitose Maru /Marie Skou	RV	Collision	1967	Lookout
Steel Designer /Atlantic Trader	RV	Collision	1968	Lookout
C.K.Apollo/Sanshin Victory	RV	Collision	1978	Lookout
Yellow Stone/IBN Batouta	RV	Collision	1978	High Speed, failure to use engine
Agean Captain/Atlantic Empress	RV	Collision	1979	High Speed, failure to use VHF
Hellenic Carrier/Lash Atlantico	RV	Collision	1981	High Speed
Venpet/Venoil	RV	Collision	1977	Inadequate Training in Equipment use

John M/Majola II	RV	Collision	1988	Lookout Failure to comply ROR, Late Action to close quarters situation
Brott/Nassau	LV	Collision	1961	Lookout, Late Action, Improper use of radar
George s.Embricos/Ercole	LV	Collision	1970	Error of Degree
Genimar/Larry L	LV	Collision	1972	Excessive Speed/Close Quarter Situation/TSS
E.R. Wallonia/Ned Lloyd Seine	LV	Collision	1980	Lookout/H.S.
Torrey Canyon	NV	Stranding	1967	Human Relations, Long Tour of Duty, Tide
Joseph Banks	NV	Stranding	1973	Lookout Poor Human Relation.
Jahnsi Ki Rani	LV/RV	Grounding	1986	Lookout, Wrong speed estimation, c/e/o distraction to WatchKeeper
Case 5		Grounding	1998	Lookout./Fatigue
Case 6		Hazardous in.		ROR Interpretation TSS
Case2	C/V	Collision	1998	Multi Vessel Situation ROR interpretation

Source: Collision and their Causes.Cahill R.A. /Australian Department of Transport / Maib Safety Digest.

Legend: C/V clear visibility, L/V limited visibility, N/V nil visibility, R/V restricted visibility, YOC year of casualty, VHF very high frequency, H.S. high speed, ROR rule of the road, TSS traffic separation scheme.

Table No. 3.1 Showing human factor`s contribution to casualties

3.2 Causes of Accidents

The privilege of anonymity in recent times has brought a degree of openness in human failure aspect in incidents, accidents and near miss cases. The ability of humans to cover themselves against repercussions of failures is remarkably evident when one examines the scenario prior to informal reporting systems coming into existence. This proves a point that formal investigations and civil suits are not able to identify human factors so that issues can be identified and understood from the safety perspective. The completeness and quality of these reports remain mixed up and mired in the depths of legalities and liability in which human aspect gets drowned.

The liability and legal issues in the context of national laws have somewhat of a suppressing effect in combination with criminal laws in operation. No human being likes to have an accident or any undesirable event yet it is the human error, which is the cause of most of the accidents. Examination of rules and regulations in the maritime industry reveals that technical matters find a place of great importance whereas the operating aspect and the interactions/interface of human factors is largely left to be ignored. This limitation to deal with interactions and interface appears to be the generic base leading to accidents.

The survey of various investigation reports indicates following are the main causes of accidents involving human factors/elements:

3.2.1 Limitations of collision regulations

3.2.2 Limitations of equipment

3.2.3 Fatigue and manning

3.2.1 Limitations of collision regulations

The interpretation and understanding of collision regulations has caused many accidents. Matters are so simplified while framing the rules to cover all parameters that an element of vagueness creeps in and wide areas or gaps are left for interpretations, which at times make these rules unwanted and undesirable. No unified interpretation of rules and regulation of collision rules are developed to assist the navigators in this most relevant aspect of marine transportation. The courts decide and interpret the collision regulation when they decide the liability or criminal issues. The legality of the whole issue prevents a realistic and practical approach to deal with the ground reality and courts take a long time to come to grips with the situations faced every day at sea.

While examining these rules it is found that a mariner must know not only the limitations of his own craft but also of the limitations of other craft navigating in the vicinity. Technology having changed and is changing at a much faster pace the

watchkeepers find it hard enough to keep pace with changes taking place at their own place of work, as well as knowing the intentions of other craft. The requirement of the rules for a stand on vessel is to keep more than a normal vigil to remain safe even when the other vessel is required to comply with rules. This means that a stand on vessel must wait for the situation to become such that a close quarters situation must develop for him/her to justify his/her action and the danger should become immediate. Close quarter situation is also not defined; it is left to the interpretation of the individual navigator.

A watchkeeper must have a thorough knowledge of the limitation of all crafts navigating in the vicinity where he/she must master the knowledge of all that he surveys. This superhuman effort in the times to come when the existing techniques which assist in determining the course and speed of the targets will be inadequate. In fact the intention of target vessels can at best be guessed from the current course and speed but to know the intentions a continuous watch is to be kept. Finding out intentions on predictive basis is loaded with an element of instinct only.

A watchkeeper has no means available to interrogate and determine the intention of other vessel as VHF is found to be inadequate to help in this respect. It is necessary for him to know and verify whether the other craft is actually carrying out his stated intention within the shortest possible time.

With respect to the demands placed on a watchkeeper for correct judgement and avoidance of collision, the close quarters situation remains an issue which deserves to be given more clear definition which varies from ship to ship and place to place. This can be estimated for different ships in different areas of operation rather than allow this to be a matter of interpretation and doubt. This step in the light of reduced manning where a master is also a watchkeeper will be a positive contribution to assist in the navigation of the ship.

Determination of other ship‘s limitations and intentions remains a bone of contention. Interpretation of the collision regulations and resultant actions of ships in a situation cannot be entrusted to the best of equipment. Collision regulations are

almost thirty years old and the maritime trade has more than doubled in this period. At the same time technology has changed at fast pace and now the pace of change is increasing at an accelerated rate e.g. ECDIS, AIS, VTS. The rules for high seas and congested waters are the same although the ground realities are at variance in terms of time available and safe area available for taking safe action. The traffic separation schemes, although require vessels to navigate in a particular direction with collision regulations taking precedence. This in fact appears to be a contradiction, and it deserves a closer examination. The only immediate solution seems to be that rules are difficult to observe in situations arising in congested waters where the risk of collision and safety of navigation has higher risk. An active control mechanism of controlling and regulating traffic in high-density traffic and congested area in combination with separate sets of rules for congested and open seas/oceans in the near future is the likely possibility.

The traffic control towers at the terminal points in line with global positioning and existing GMDSS could also be considered as a solution worth considering. Navigation in the open seas and oceans has two positive dimensions of time and area for manoeuvring. At the same time traffic density is also much lesser than the congested areas.

In narrow and congested areas time, area, depths of water, and navigational dangers put constraints on mariners to take effective action in good and ample time. Ample and good time appear to be workable in open seas and oceans with low traffic density but constraints in congested and restricted waters do not permit sufficient facility of ample and good time in high traffic density areas.

Mariners are expected to wait till the give way vessel is not complying with rules, or not able to comply with the rules due to constraints of the area of navigation or her own limitations. The stand on vessel if competently navigated will be able to assess the constraints posed by the area of navigation or tidal conditions/sea condition. The limitation of the craft and her intentions are an area where some doubts arise. This critical aspect is left to the practice of ordinary seamen in the regulations to prevent collision. Knowledge of the other vessel‘s intentions with the existing

information of course and speed information would appear to be a shortcoming because when and which way the course or speed of the other vessel will change can be known only on a reactive basis and not on proactive basis.

The ordinary practice of seamen must also be a remedy for all encountered situations in the conduct of navigation at sea. Ordinary practice must also deal with each and every extra ordinary situation. This is also a paradox in that the ordinary practice of seaman is not described nor defined in clear terms; it is known to produce good results and anything unacceptable or undesirable is not part of the ordinary practice of seamen. One is aware of the resultants but the context of the ordinary practice of seamen remains a matter of interpretation in the courts of law deciding on criminality and liability issues.

The tolerance level of human societies is fast receding and accidents are seen as criminal acts. In this context of tolerance level of human society, Moore, (2000) stated:

> "We have helped create this great standard of living by reliably supplying low-cost energy, as part of the chain of energy supply, tankers have helped make that happen. We are doing a great job. We have set a the bar so high that occasional `blips` as it, were-are met with very low tolerance that is the reality"

In this scenario the degree of interpretation of rules has to be more on specific terms and realistic to ground realities, rather than the courtroom battles of wits as seems to be the case now argued by Cahill, (1997). The legality aspect could be a barrier to deal realistically with the increasing complexity of navigation. This can be controlled through developing separate rules of conduct of navigation rather than just the collision rules dealing with navigation in the congested high-density areas of the sea and oceans alike.

Identification of areas with increased navigation difficulties is possible and practical situations encountered are also foreseeable to a large extent. The predictability elements can be increased with positive outlook to depart from the past and embrace the future with the technological advance of high-speed ships and larger sizes of ships.

3.2.2 Limitations of equipment

Lack of standardisation of regulations for ship design and construction among classification societies and non-unified approach to maritime transportation has its own ramifications. At the same time equipment installed on board have their own unique features varying from manufacturer to manufacturer. Limitations of equipment reveal themselves in terms of failures, incidents and accidents. The users views are rarely taken into account. What is needed by the user is replaced by what is desired or thought to be good by the non-user, commercial considerations generally prevail this is glaringly evidenced in the case of ARPA, ATA and EPA installation and carriage rules. The rules are linked to GRT of the ships rather then the navigational dangers and traffic a ship is required to negotiate. The afford ability and purchasing power rules rather than the demands of navigational situations and area of operation. The attempts for reducing work load and improving navigational watch safety are made without defining the work load of OOW this is evidenced in the resolutions of some of the organisations adopted for introduction of new navigational systems.

Tests and trials of equipment are undertaken in normal or favourable conditions and statistical tools are used to arrive at the probabilities of error for the type approvals, while reliability studies are rarely undertaken. The mariner is left to his own devices to deal with worse case scenarios in the practice of navigation hoping for the best results from the ordinary practice of seamen. Equipment installed on board has its limitations. The limitations are largely described in statistical terms to cloud the real status of dependability. Testing and trials of equipment are carried out in favourable conditions and reliability of equipment is largely not determined concluded during

the MET (N) class discussion by Muirhead, (2000) WMU Malmö. Testing facilities and opportunity for testing equipment in extreme conditions are not easily available.

Testing facilities are needed for trials in worse case scenarios for reliability determination and actual usage conditions so, as to fully appreciate the limitation of equipment. In the drive for capturing a market business share, manufacturers generally project the positive aspects of the equipment. In this respect the type approving authorities have a role to play to fill in the gaps left by the manufacturers. Total assessment and limitations of each equipment must become part of the training process prior to installation of the equipment on board the ships. ECDIS and AIS technology are expected to be introduced on global scale but role of trainers is not clearly identified prior to induction of new technology. For developing intervention capability of ship`s officers during operations training is a must prior induction of this new technology. The forces of competition are appearing to be in a haste to deploy such technologies without proper training.

Off the shelf equipment as part of package deals in shipbuilding contracts needs to be seriously examined for adopting a professional approach in the matter described by H. Wentzeil, (February, 24, 2000). Presentation to MET (N). Class in Bremen at STN Atlas. Sohmen (January 19, 1990). Aptly described shipping and innovation as under:

> "It has to be said again that shipping industry is not renowned for its innovative spirit, be it on the hardware side or in what we put into it in terms of personnel or techniques unlike other industries we progress slowly and react only to outside stimuli, often react only often quite reluctantly. The rapid improvements in marine propulsion efficiency during the past decade are a good case in point. The technology was there for a long time but only higher fuel prices made us implement the potential savings. Not every one will agrees with me but I maintain that our industry by and large retains an aura of

unsophistication, despite introduction of more automation in ships, the better hull forms the higher grade paints the new navigation and communication technology and most of the progress is made outside the industry and then adopted, instead of being self generated, a lot is cosmetic rather than fundamental,"

Position has largely remained the same in the light of response from regulators as discussed at 1.8 about ECDIS, possibly because of its transposition from other industries.

3.2.3 Fatigue and manning

These two issues are linked together because minimum safe manning becomes maximum manning at the application stage and each administration follows a regime of its own exemptions and dispensation. No uniformity of approach is seen in this respect in the maritime world.

Fatigue has become one of the major causes of accidents. An ITWF study in 1999 on this matter has revealed that out of 2500 seafarers of 60 nationalities serving on 63 flags, thirty percent of them reported working days of 12 hours or more, 36 percent said they did not get a minimum 10 hours rest and 18% said, they regularly could get only six hours. Nearly half felt safety was endangered by the excessive hours and sixty percent thought that the situation was getting worse.

Many of the worst affected are the officers. One first officer of a passenger ship commented:

> On a previous ship I worked 12-15 hours a day and never had six hours continuous sleep. I worked an 87 hours week for three months. I regularly made errors in passage planning and execution and did not dare to sit down on watch Source: ITWF, (1999).

This reveals a scenario of man made problems because the traditional watchkeeping routine has not kept pace with reduced manning scales along with larger, faster ships and increased traffic density in congested traffic areas. US Coastguard is examining the subject matter of watch keeping review according to a Mars report.

In a competitive, unsympathetic and uncompromising world, where tolerance of society is low towards accidents, watch keepers are pushed to the bones; it is well said that to err is human, who wants to be inhuman. The situation onboard ships appears to be heading for disaster with compounding of all prevailing uncontrolled errors.

The watchkeeping regimes are to be reviewed and restructured not only by better equipment but also by manning solutions, US Coast Guards are currently considering new watch keeping cycles in view of research data available from aviation industry regarding body cycles/rhythms. Optimum utilisation of all resources is the key requirement.

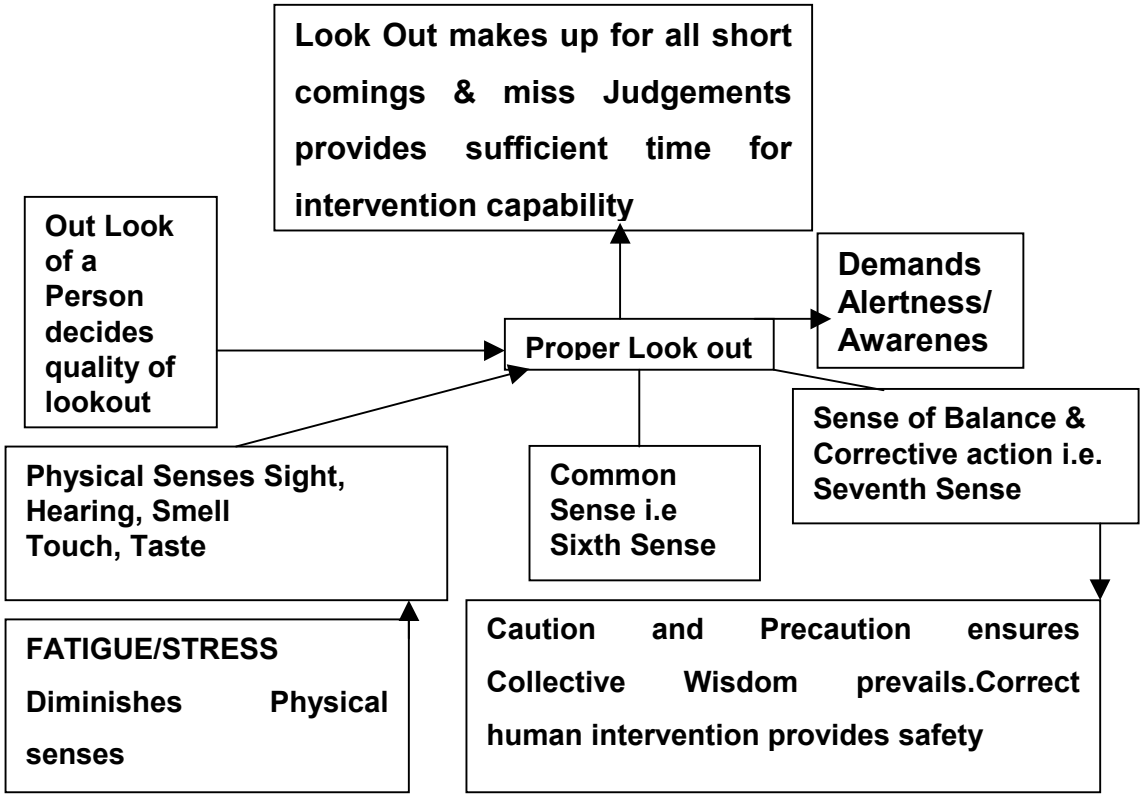
Based on these realities manpower is reduced which ultimately reflects as a extra burden on the watchkeeper which compromises the ability to make a correct judgement and to arrive at correct action of wisdom. The regime of collective action of wisdom and double checks is increasingly becoming part of the past because the management level on board is also performing the watch function on a regular basis. The most common causes of collisions, strandings and groundings are look out and safe speed.

3.2.3.1 Lookout

This is a direct function of the human senses. Human beings possess five physical senses (sight, smell, hearing, touch and taste). The sixth sense is the common sense followed by the seventh sense of balance. All the senses are required to keep a proper lookout; no technology is able to find a substitute to this. The outlook

of a person dictates the quality of lookout. It requires complete application of at least four senses. The case studies examined in this chapter discuss this aspect.

In order to match the internal and external reality of the ship and marine environment a seventh sense of mind operates to decide on relevant action for arriving at the correct decisions and options of own ship and its impact on other ships in the vicinity. This transforms itself into caution and precaution for ensuring that collective wisdom prevails. This sense may not be readily available in all persons; it also varies depending on the level of fatigue. The sense of collective wisdom to decide best course of action works to deal with most intricate navigational situations sometimes on an instinctive basis as the predictive data is not available, this is illustrated by a schematic diagram as in Figure 3.1below. Even the new technologies under development are not able to eliminate instinctive element in navigation at sea.



Source: Constructed by Author

Figure No. 3.1 Showing Look Out and its Linkages

Equipment created to assist in keeping lookout has its own limitations; this equipment is only an aid to the navigators but not a substitute for evolving collective wisdom of appropriately dealing with a situation. A one-man bridge watch in Fair Play (October 29, 1998). Provides details of sleeping watchkeeper. The function of lookout stands compromised in reduced manning scales. Steps are needed from the ship managements and training has no role to play in this context.

This important function of human beings is also affected by relationships in the work situation. A case study of m.v. Joseph Banks (O.N. 332269) court of marine inquiry report no.154 published by the Australian Department of Transport in this aspect as summarized by Muirhead, (1990). At Appendix A. is examined to highlight the human relations, interpersonal relations and teamwork.

Case Study- stranding of "Joseph Banks"

Background to the casualty

M.V. Joseph Banks, an Australian flag cargo vessel under the command of Mr. Trevor Huntely Roberts, was on voyage to Sydney from Hobart when the vessel ran aground, while the Chief Officer Mr. G.A. Gregory was on watch in moderate sea and clear visibility. A marine court of enquiry found the Chief Officer responsible for the grounding of M.V. Joseph Banks.

The human relationship between Master and Chief Officer in this case makes an interesting scenario, which is unique. It demonstrates the interplay and interaction of human factors in the role-play during and after the discharge of respective duties and responsibilities. The lessons learnt are useful for officers who will find such interpersonal situations while serving on board merchant ships. The incident did not result in any serious consequences in terms of loss of life or threat to environment but the human relations were the cause of accident.

Such incidents can occur on any merchant ship and anywhere in the world leading to serious consequences in terms of loss of lives, property and threats to environment. The relevance of human relations is illustrated to highlight the impact on the safe and efficient ship operations. Appendix A attached herewith gives details of the above accident.

Discussion

The above illustration is discussed from a human relation angle. The age, experience and competence profile of master and chief officer is relevant to the role play of these two persons, the assigned role play for discharge of respective duties to fulfil the respective responsibility is important. The Chief Officer held a competency certificate for a number of years, almost equal to the age of the Master. The Master carried a burden of assumptions about the chief officer, which in all probability developed into a communication barrier; this is analysed from the benefit of hindsight. The safe navigation of a vessel demands a collaborative approach to apply collective wisdom for the benefit of all. The reasons of not working as a regular master by Mr. Gregory are not clearly stated in the narrative at Appendix A, therefore an assumption in this respect is made as a lack of leadership quality or inaptitude and incompetence. The lack of aptitude is a natural endowment whereas application and updating of competence was linked to personal order of priorities. (updating of competency certificates has now become a mandatory requirement)

It would also be important to note that the watch regime on board was not in conformity with the common practice; this regime stood altered and who altered it is not clear from the facts available. The total hands off approach of the master resulted in absence of supervision and double checks in the conduct of the navigation. This can be viewed as the underplaying of role by master and the overplaying of the role by chief officer reflected in the form complacency and over confidence which is confirmed by his defiance of the Master`s law full orders specifically written in the Night Order book. This compromised the safety of navigation.

The safe navigation of vessel demands a collaborative approach to apply collective wisdom for the benefit of all. Assumptions of the Master about the Chief Officer and lack of confidence as stated during the course of inquiry would appear to be a hindsight view, indeed if these assumptions were not an afterthought then it betrays a transparent and open minded approach. This attribute is central to positive leadership, in this respect the Master was not able to practise the aforesaid attribute. The Master in this incident could not muster sufficient courage to adequately respond to the reality of the role-play. The communication gap existed between the two role players because the Master carried a load of assumptions about the Chief Officer. However, the Chief Officer`s views about the Master are not clear in the report of the inquiry.

The only facts available about the chief officer are his candid admission of the facts and acceptance of responsibility; this can be further analysed as a sign of maturity and perhaps indifference due to the approaching end of his career. The social aspect cannot be ignored, as the prolonged service of over thirty years results in over confidence due to social support and the homeostasis effect which sets in generally over a period of about one year`s continuous service as noticed on board the ships. This happens to be the situation in the case of the Chief Officer who was serving on board for two years, however it is not clear that this service was in one stretch.

Navigational watchkeeping demands physical and mental fitness for the performance of physical functions of psychomotor skills like taking bearings and keeping lookout. The element of physical fitness is more relevant in the case of semi-automated ships and mental fitness is required in larger measure on fully automated ships. In this case the vessel was not fully automated therefore the element of physical fitness is crucial from a human angle.

The collaborative approach requires participation and involvement of all persons; the participation of the Chief Officer in navigational decision making seems to be absent. Respect, regard for age and experience in human relations are practised to assess likes and dislikes for cultivating healthy interpersonal relations. The content

of mutuality to the common benefit of all has to be derived jointly so as to derive an order of priorities by understanding and agreement. A difference of opinion is a healthy sign; in a given situation it is an indicator of active interest, awareness, responsiveness and alertness. Care and caution has to be exercised for preventing the difference of opinion to develop into conflict.

Resolution and negotiation of difference of opinion into synergising of ideas for deriving a healthy compromise for the mutual benefit of all, this healthy compromise has its own advantages in terms of harmony among role players. The collaborative approach is relevant in the scenario of situations, conditions and circumstances for which rules, regulations do not exist. Positive leadership takes initiative and responsibility to evolve and apply fair play for the common good of all.

The degree of maturity and foresight differed in this case, both Master and Chief Officer could not come to terms with each other. Teamwork, important to interpersonal relations, ego-strength, and adjusting ability stands typically highlighted in this illustrative case. Master and chief officer possibly lacked these most important matters of human relations.

Consider also the Chief Officer`s approaching end of his career and unfulfilled needs (self-actualisation) with the Master`s almost immediate elevation to the position of command on passing the certificate of competence, a striking contrast. This was apparently too sharp to reconcile in tune with the Chief Officer`s position of “nothing to lose and nothing to gain attitude” an indifferent attitude, some times noticed among the professionals nearing the end of their careers. On the other hand almost immediate elevation to command after passing competency certificate examination of master is normally not an accepted practice in most reputable shipping companies. Prior to elevation to take command a stint as an understudy with a senior master is generally undertaken and a period of about one to two years is generally preferred by the shipping companies. It is true that the certificate issuing authorities maintain that a person passing a competency certificate can immediately discharge the responsibility of the rank. This caution and circumspection as generally practised by the ship owners was not exercised in dealing with human relations.

Conclusion

The livewire to livewire interaction as defined by Hawkins, (1987) between master and chief officer was not healthy and it resulted in a compromise in the safety of navigation of M.V. " Joseph Banks"

3.2.3.2 Safe speed

This matter has caused many accidents, when awareness and alertness of mariners in the hindsight of the real situation is generally found to be wanting because of the inability
To judge the situation correctly. Lack of awareness and alertness is a direct function of human beings. The understanding of safe speed in a given situation or circumstance is variable on an individual basis; no quantitative parameters are defined, only qualitative parameters are known that are also in generic terms.

For each area of high traffic density and congested places safe speed can be determined depending on the size of the ships operating for different weather conditions/visibility with the help of simulation techniques now in vogue.

Safe speed and look out function in navigation are linked together as both complement each other. A correct assessment of traffic conditions and navigation dangers helps in deciding and estimating correct safe speed; this fact if ignored leads to a maritime casualty. A case study is discussed here to emphasise the importance of safe speed and look out.

Case Study- stranding of Jhansi Ki Rani

Background to the casualty

M.V.Jhansi Ki Rani an Indian flag vessel, under the command of Mr. Shahid Hasan, was on voyage to Higashie, Harima Japan, from New Castle, Australia when it ran aground at Fredrick Reef during the watch of Chief Officer.

The marine court of enquiry found an accumulation of various factors, which caused the accident. The consequences of the accident were not serious in terms of loss of life or threat to the environment, however subsequently the vessel was declared constructive total loss.

The speed estimation was a judgmental error but the interaction and interface between Chief Officer and Chief Engineer immediately before the occurrence of this accident is highlighted for illustrating human factors at play from relational aspect. It shows how human relations can be significant to safe and efficient to ship operation. Appendix B gives details of the accident.

Discussion

The human relationships connected with safety and efficiency of shipboard operations viewpoint are observed at point 3 and 4. The interaction between master, chief officer, chief engineer and lookout and interface between radar and navigational area are important.

The interactions and interface at the crucial time between 1700 to 1735 is of immediate relevance to the accident. Interface with radar provided critical information at 1715 in the form of a target on the starboard bow at about 9 miles, that is about 45 minutes before the expected time of picking up Fredrick light tower on radar.

At this juncture the presence of the chief engineer and loss of the picked up target at 9 miles on the starboard bow for a period of five minutes followed by relocation on radar at seven miles distance can well be attributed to changing weather conditions. This can be treated with a degree of doubt because such drastic changes of weather conditions may seem out of place.

At the same time the possibility of the chief engineer distracting the watch cannot be ruled out. The chief engineer was on the bridge for approximately ten minutes. The master on entering the bridge saw the chief engineer and chief officer talking; hence the possibility of distraction to the watch is further strengthened although not confirmed due to denial by the chief officer and chief engineer.

The intent of the chief engineer to come to the bridge in order to ascertain if the emergency fire pump was being tested by checking the exhaust located in the fore part of the ship is also debatable because M.V. Jhansi Ki Rani was a gearless bulk carrier, an unobstructed view from the chief engineer`s cabin provides a clear view of the exhaust of the emergency fire pump.

The visit of the chief engineer officer on the bridge at this crucial juncture most certainly was a distraction to the watch keeper, regardless of whether the chief engineer engaged in a discussion or conversation. However, the role of the chief officer in ignoring his own responsibility of watch vis a vis his relationship with the chief engineer officer such that it became detrimental to ship`s safety, is relevant.

The arrival of the Master at 1725 and departure of the chief engineer officer at the same time indicates that a sense of seriousness and sanctity of watch was restored to a greater degree. The role of the chief engineer officer in interaction with chief officer and interface with radar and navigational area on closer examination would point towards a degree of laxity by keeping the vessel on automatic steering when making a landfall.

The changing colour of water itself shows, an approach of landfall and a hint of approaching danger, this aspect is compromised due to the lookout function being performed assisted by electronic navigational aids.

The chief officer perhaps compromised on his watch keeping function and also the most important function of lookout by sight and radar. If this function was properly performed it would have certainly made up for all the error of estimation of speed and position. Indeed the Master`s over dependence on speed estimation without accurate position is questionable.

Conclusion

The interference of interactions into interface compromised the safety of navigation at a crucial time. The undivided attention of the watch keeper would have ensured alertness and awareness to arrive at an exercise of the required caution and precautions. This would have in most likelihood prevented this accident from

happening. The efficient and safe operation of the vessel was compromised because of the unauthorised interaction to the compromise of interface.

3.3 summary

Most of the accidents and incidents are caused due to human failure. The attention failure, human relational failure in terms of lookout and speed estimation can be reduced by eliminating speculation and instinctual aspects. Predictive data on speed and available area vis-à-vis required area in congested waters would help watch keepers. Formulation of different collision regulations for congested and open waters and reinforcement of active mechanism in areas of high traffic density can contribute to safe and efficient operation of ships. Determination of reliability of equipment combined with higher level of training prior introduction of new equipment will be a step in raising professional standards of seafarers.

Chapter IV Cultural, National and Language Factors Related to Human Shortcomings

Although we speak of a culture and a social environment, we must keep in mind that these are not single, fixed entities. An individual`s social environment already complex at the moment of birth, changes constantly. Infants are born into many social groups, -- a family, perhaps, a tribe social class, a racial or ethnic unit religious group, and/or a community. Each of these social entities has some shared ideas, beliefs, assumptions, values, expectations and appropriate pattern of behaviour. These shared expectations form the culture of the group.

Grace C. Craig (1989).

4.1 Introduction

Impressions of a culture can be observed in its art, music, paintings, language, life style, beliefs, values, taboos and ethos. Different cultures have looked at the same truth of spirituality differently although the truth of universality is common e.g. universal ethics, grace, values and dignity. Diversity of outlooks of different cultures makes this world a beautiful place. It provides vigour, vitality and all the elements of human beings. Versatility of ideas derived out of diversity provides a power to adjust with reality and the ultimate truth of universality.

4.2 Changing Cultures and Values

The prevailing values of each society, culture, religion, region are in tune with beliefs and taboos; these are in a state of mix and are being changed and churned around like never known in the past. This state of churning is due to global connectivity and the information age and it has converted our globe into a village in

terms of fast instantaneous communication and transportation, Conlon, (April 2000). Concluded:

"The world is changing. The old structures of neighbourhood, employment family, and church no longer have power to connect society that once they had. The trend towards globalisation, post-Fordist "flexible capitalism", individualism and consumerism seem to be unstoppable Information technology is deeply implicated in these changes and education is inevitably caught up in them ".

The impact of this on individuals causes an imbalance as the personal, moral, social, religious, cultural values and beliefs have to adjust to change. So the integration of a personality is somewhat disturbed. Thus the adjusting ability of individuals is challenged/ severely tested in some of the extreme stressful conditions and it affects the mental health of seafarers in marine conditions.
The importance of culture is well described in the Donaldson report, (1994). Titled Safer Ships and Cleaner Seas. This important report on safety in the shipping industry stated:

> … It is certainly true that standards of training vary between countries and that these are fundamental problems of mixed crews, not just because of language differences but also cultural differences.
>
> Donaldson, (1994).

The earth has more than two hundred countries, many languages and countless cultures. In all this each human being is unique and nature does not replicate itself in the form of human beings. Humans are a reflection of nature, striving to master and control, manipulate or direct it, to use it for the aim of better quality of life. Societies are formed to pool in their resources to reduce human suffering as (IMO Model Course 1.21). The maritime world is part of these ground realities and so far the greatest vehicle of change is now expected to be complimented by the onset of

the information age and global connectivity Morgan et. al. (January, 2000). argued about this change as under:

> " We have seen that technology has a huge effect on both self image that each of us possesses, and how we interact with the world around us. We are indeed products of our environment and that environment is shaped and controlled by technology"

4.3 Perceptions

Truth itself varies and largely depends on the outlooks, aspirations and acceptability in a society. Realities keep changing and human vision has to keep pace with them. Human vision to deal with ground universal realities mismatches because anticipation of emerging realities is based on past and present experiences and the lessons learnt, if at all learnt, from the existing and emerging truth. This fact is evident in the form of various IMO resolutions embodying vision commonly shared but not enforceable particularly in the context of human matters.

IMO is a body comprising 158-member nations of the globe; the common bonds between members are shared visions, aims, goals and objectives for the common good of human beings and humanity at large. Sharing of ideas, views, information and universally accepted facts, truths and realities strengthens the binding forces.

It is the sense of insecurity of one society to loosen its position over the others causes a tug of war among societies. Each society with its own contradictions endeavours for its progress depending upon its collective aspirations, will and wisdom, Finally boiling down to the fact that each human being wants his betterment. According to Radhakrishnan, (1933). purpose of human life is:

> “ Is an aspiration to grow into likeness of divine…The Purpose of human life, This is moksha or liberation into the light of super conscious”

Its progress from insufficiency and ignorance to fullness and wisdom and ignorance to fullness and wisdom analysed By Barnes, (1987). Therefore, generally human beings want to override their needs when the basic subsistence needs are met. The wanting animal, as popularly described as the human being, is generally not able to assess the needs and apparently remains to be constantly directed towards its wants. The fears of new [ICT] technology converting individuals into passive receivers is a matter of concern as individuals whether, it may shape us into passive consumers rather than active producers a view held by Fein, (1987).

According to Soddy, (1961). The definition of a good society allows the optimal development of its members while at the same time ensures its own development and also an amount of tolerance towards other societies. Laws governing the social conduct of affairs are for development of society/individuals and a degree of tolerance is practised towards other societies. Collis, (1999). described culture in biological sense, in the totality of an environment that enables an organism to develop socially it encompasses the values, beliefs, ethics, mores, attitudes and practices of individuals, families, groups and social organisations with in their physical environments

Societal and cultural changes and transformations occur continuously due to various causes like challenges and competition from other societies, natural/technological occurrences, and political events/developments in other societies and cultures also their own aspirations and priorities depending on values most dear to each individual by tradition and many other factors. The moral, social, cultural, regional, and religious values constantly evolve but now same are varying in the current times at a pace never imagined before due to the influence and impact of media and global connectivity. Editorial, (April 2000). Of British Journal of Educational Technology defined these changes as follows:

> "May you not live in interesting times" is a Chinese proverb that resonates during a period of accelerating technological change. Information and communications Technology [ICT] increasingly makes an impact upon fabric of society and upon our daily lives, both in terms of the values, attitudes and

conventions it engenders and how it underpins commercial, economic and industrial structures and practices."

4.3.1 Value of Human Life and Safety Regulations

In insurance terms value of life varies from reasonable sum of five hundred US dollars to an average of around one million US dollars when comparing the under developed countries to developed countries. This has a bearing on societies tolerance level in terms of perceived threats and safety demands. The safety regulations are directed at addressing the safety demands but variance is related to living standards and value perception of life in a society and tolerance level. Safety regulations may exist in principle but in application the threat to safety of life and tolerance perception can mismatch and vary between the safety regulation enforcement and actual requirement, the custom and practice.

The custom and practice generally prevail causing a cosmetic approach to safety regulations and its application. The income and wealth inequalities are an out come of not a very pleasant past if seen in terms of slavery, apartheid, colonialism and now the spheres of influence causing economic slavery or financial slavery. The non uniformity in application and compliance of safety regulations and training is not likely to disappear, because maritime transport activity is historically run on custom and tradition or practice, therefore codes of practice bring better compliance in a culturally acceptable way rather than the stringent compliance or enforcement. Maritime transport is a free and open business with a degree of regulatory control, whereas Aviation industry is totally under regulatory regime with a degree of freedom.

The uniform training and quality goals may remain good objectives to strive for; attaining and achieving the goals will be another dimension to debate about. In this context a report titled Leader, (July 12, 2000). Eloquently states about:

> The conference on port -state controls as just another avenue where illusions of uniformity of standards term is to be perpetuated. Well meaning people suggest that if we have uniform rules for shipping, and they are uniformly inspected to the same sort of standards through out the world, substandard ships will go away. But the apple in the pie notion of the world fails to recognise that there are vast area and numerous nations where the opinion of high quality shipping remains light years away for their inhabitants. In a country where there is a real grinding poverty the only shipping they can afford is seventh hand; Vessels on their last legs that richer nations would have scrapped long ago.

This is the real world where we can only strive for better human relationships, safer and efficient ships in most realistic and practical manner, achievements of goals can be measured in relative terms and not in absolute terms.

4.4 Impact of Changing Patterns

The relevance of the above is seen in the maritime world in terms of global shortage and surplus of officers and crew respectively. The higher classes of human society with access to resources of information are seemingly less inclined to take seafaring as a profession, mainly due to a rise in living standards. Whereas the crew is apparently not able to find sufficient means or resources to earn a living due to reduced employment opportunities, therefore continuing to live under subsistence levels.

The qualitative changes in technology in the maritime world have negative impact on the crew in the form of reduced opportunity of employment at the same time demand for officers with higher level of calibre is increasing. This is reflected in terms of a projected global shortage of 16,000 officers and surplus 224,000 crews according to ISF/BIMCO UPDATE 2000; the exploitation of crews has consequently

increased and this contributes to the human shortcomings. This qualitative change in manpower is well documented in ISF/BIMCO manpower update 2000 it predicts severe shortages of officers and surplus of crew in the current decade. The world-wide supply of seafarers in 2000 is estimated to be 404,000 officers and 823,000 ratings. The Far East is increasing its share of manpower supply at the expense of OECD. The traditional largest supply of crew from the Far East remains unchanged. Table 4.1 shows the predicted shortage/surplus of crew and officers respectively:

	OFFICER	CREW
SUPPLY	404000	823000
DEMAND	420000	599000
SURPLUS		**224000**
SHORTAGE	**16000**	

Source: Bimco 2000

Table No. 4.1 Showing Global Shortage of officers and crew

4.5 Marine manpower Demand and Supply Sources

The major manpower supply nations in the maritime field are the Philippines, Indonesia, Turkey, India, Russia, Greece and China.

The ship owning is mainly limited to thirty-five countries as shown in the Table attached at Appendix C. The flagging under national and flag of convenience has a large variance, Belgium, Sweden, Switzerland, Spain, Netherlands, Japan, USA, Saudi Arabia having larger part of their tonnage under flag of convenience.

A typical example of a developed country's manning cost of total ship operation is around 40% as determined by Martin, (1995). for Swedish ships.

Couper, (1999). Argued that the entry of the banking sector in the mid seventies, due to the inability of the ship owners to self finance their ships, caused all out

efforts to be made for optimisation of profits as the competition levels rose. These efforts were generally directed towards finding and engaging the cheapest manpower from anywhere in the world. This fact is confirmed by the report that 80% of merchant ships have more than one nationality serving onboard as mentioned in MARCOMS, (1997a).

4.6 Crew Reductions

The technical upgrading of machinery and equipment resulted in reduced crew sizes is effectively illustrated by the example of Broström ships shown below:

24 men	15 men	Difference
1 master	1 master	
3 officers	3 officers	
1 chief engineers	1 chief engineers	
3 engineers	2 engineers	-1
8 deck ratings	3 general purpose ratings (deck)	-5
3 engine ratings	3 general purpose ratings (engine)	
1 radio operator		-1
1 chief steward	1 cook-steward	
1 cook		-1
2 messmen	1 messmen	-1

Source: Martin, (1995)

Table No. 4.2 Crew Changes on Broström ships

The Japanese experience of crew size reduction is depicted as under:

1. First stage was started in 1980 by introducing a dual-purpose crew (DPC) system. They were able to cut the total number of seafarers on board from 23 to 18.The experiment proved to be successful and thus ships with 18 men was institutionalised by law.
2. Second stage commenced after the stage one was successfully implemented. The ships used in this stage were fitted with automated devices. The aim was to eliminate one officer for which either the second mate or third engineer officer was trained to combine watch duties. Finally the total number was reduced to 16 men. The system, was once again institutionalised by law in 1986.
3.Third Stage began soon after. The ships used in this stage had the bridge, the engine control room and the radio room all on the same deck with even newer automatic devices permitting centralised watches. 14 persons cut as a result one watch officer and one DPC. This was institutionalised by law in 1988.
4. Fourth Stage was a bit different, because it was selective as regards the type of ships and route. Container ships, bulk and car carriers were chosen. The engine control equipment and steering equipment were installed on the ships bridge wings with a new watch-officer system the chief mate, engineer officer and chief radio officer were utilised for watch on bridge and in the engine control room. In parallel, the DPC was minimised. Currently this stage is being introduced which allows ships to sail with 11 men on board. All with high degree of polyvalence. The crew includes one captain, one chief engineer, four watch officers, four dual-purpose crew and one rating.

Source: The Japanese Ship owners Association, 1996

Table No. 4.3 Japanese Experiences with Crew Reductions

23-crew normal ships crew			Modernised ships with Japanese crew		
All 23 crew foreign	5 Japanese 18 foreign	9 Japanese 14 foreign	11 Japanese crew	14 Japanese crew	16 Japanese crew
0.6mn	1.61mn	2.31mn	2.43mn	2.95mn	3.35mn

Source: The Japanese Ship owners Association, 1996

Table No. 4.4 Costs associated with Crew Reductions on Japanese Ships in million US$ per Annum

The savings are substantial in terms of engaging foreign crew in comparison with the Japanese crew therefore mixed crew or all foreign crew ships increased in numbers. The crew sizes also vary from 6/8 to about 20/30 on a typical tanker of 15000 DWT and a 4000 TEUS container ship.

4.7 Main Languages Spoken in the Maritime World

From the table at Appendix C it is evident that in the maritime world about 35 countries are mainly involved in transportation work and are involved in manning.
On examining the linguistic dimensions English, German, French, Chinese, Philippines, Indonesian, Greek, And Indian languages are commonly used on board merchant ships operating on the globe and various forms of English language and other languages are used for marine transportation work. The heterogeneity of languages used in work and training contribute to variable standards of performance and puts safety at risk.

4.8 Wage Disparity

The variance in terms of remuneration to officers for the same type of work performed is around seven times and almost twenty-two point five times for a seaman's cost for the same work performed. This disparity among crew and officers is almost irreconcilable this is depicted in at Appendix C.
The ILO minimum wage recommendation in 1958 at a minimum rate of £25 Sterling per month for an able seaman. Since, then it has been periodically updated till 1996 to $ 435 per month. No other rating or rank is included in ILO recommendations. South Asian countries have consistently rejected the ILO recommendation because the national wage scales are much lower at the same time ITWF is not satisfied because ILO recommendations are much below their bench mark wage. But in some countries ILO recommendations are accepted and implemented by certain companies. Attempts at negotiating a minimum total value of monthly earnings based on minimum ILO recommended minimum wage, between ISF and ITWF were abandon this year. The basic minimum wage bench marking and its

acceptability remain an area to be dealt with to provide professional dignity and reducing human exploitation.

4.9 Neglected Human Welfare

Hawkins, (1999). Concluded in his study "Significantly enough the question of seafarers welfare, particularly in the hands of unscrupulous ships officers and operators, merited very little mention. Overall, protection of the environment was cited more frequently than improvement of seafarers`s living conditions on board ships. This in itself is symptomatic of yet another fundamental, and ultimately sadder, problem in the maritime industry." Barnes, (1987). Couper, et. al. (1999) and Neilson, (2000) are in general agreement with the conclusions of Hawkins in the neglect of seafarers living, working condition and occupational health regardless of diversity of nationality of researchers.

INTERTANKO, warned about detention of masters may hit oil supplies (July,13, 2000) in Lloyd`s List, The report points towards unlawful detention of tanker Masters, trend of detaining and prosecuting seafarers continues, this is also reported in Maritime Officer (June, 2000) with a caption "Prosecute Survivors: Its is a mark of civilization". The uncivilized treatment given to the Master of The Erica by the authorities after the incident is widely reported, only points to the negative profile and the attitude of the society towards seafarers.

Couper, has given detailed accounts of the facelessness of the unscrupulous ship owner attempting to deprive the rights of seafarers in the case study of Adriatic Tankers in voyages of abuse. The situation in this respect remains unchanged.

The international unions and federations in tandem with national unions and federations work together towards maintaining human dignity and higher remuneration. These endeavours have largely focused towards financial remuneration and other welfare benefits. However, the focus of trade union activities has generally not been in the direction of emotional, personal wellbeing and mental health issues.

The mental health aspect is as important as physical health because these are linked with the emotional state of a person. The events, situation, circumstances, conditions and other people/ persons on board ships in marine working conditions are the factors influencing and interacting with the mental, physical, and emotional responses of an individual.

The differences of cultures, religion, languages and societies in principle will produce adaptation towards the goals of universal integration of people on the long term basis, but in short term and immediate terms when sufficient time is not available for adjustment, the situations and circumstances cause impossible challenges leading to disasters and catastrophes. (Scandinavian Star Incident)

The disparities illustrated in the tables and graphs mentioned above show a wide range of variance in remuneration among officers and among crew for the same work performed. The dividing line between officers and crew is the shortage scenario for officers and surplus scenario for crew in the context of job security. The consequent contrast of security and insecurity in the same place of work between officers and crew cannot be conducive to harmonious human relations on board ships. Hence it is analysed that environment on board such ships can be surcharged with under current of suspicion and misgivings. This is not a healthy sign at all, particularly because a ship is exposed to forces of nature it combines with emotional and social deprivation contrastingly different from normal life ashore. The remedy is in more awareness of respective roles and responsibilities of each group. Understanding by the officers of aspirations of the ratings and gradual development of mutual respect, trust and acknowledging the interdependence. Hawkins, (1994). Stated:

> In Taylor`s work at the end of the 19th century money was considered of paramount importance in creating motivation at work. Today it is known that once incomes rise appreciably above subsistence levels dissatisfaction with relative incomes is far more powerful sentiment than dissatisfaction with

> absolute income. In other words, not that any income is not enough but some other comparable person is getting more

The tough challenging and unpredictable marine environment is coupled with problems of forming human interpersonal relationships, with emotional and sexual deprivation. These circumstances of employment not only demand good physical state but also good mental state.

Considering the coping and adaptation requirements in seafaring profession, Barnes, (1987) Described effective adaptation and personality integration as follows:

> The first criterion of good adjustment is freedom from inner conflict. A well-adjusted person presents a solid, unbroken front to the world and is free from competing trends from within. Integration means the resolution of conflicting personality trends. In an integrated person the super ego is in harmony with basic drives. Further integration shows itself in an ability to concentrate on ones energies on a single goal or, at least on a small group of harmonious and compatible goals. Hence, the energy of different drives in an integrated person is expanded on the outside world for effective adaptation

Ships operate in a highly dynamic environment, frequently people on board follow a set routine of shift work disrupted by arrival at, working in, and sailing from ports. This is an existence, which involves living in a place of work for prolonged periods, creating a unique form of working life, which almost certainly increases the risk of human error.

To withstand these physical, sociological and psychological stresses, the seafarers need to possess high ego strength to have adequate personality integration and

adjustment. The studies in this context are conducted in the Indian maritime industry pertain to crew and the officers by Barnes, (1987). The mental make up of the officers is of greater importance than crew as the responsibility for the safe and efficient ship operations is placed with officers.

According to Copmeratore & Kingsly, (1999) crew endurance levels are affected by the interaction of the following factors:

- Mental State
- Body Clock
- Sleep Environment
- Physical Conditions

The duration of tour of duty ranges on an average from three months to nine months and in the context of Swedish ships is around six months. The working conditions on merchant ships can involve extreme temperatures, more than eight hours average work, prolonged separation from family and fatigue. The above four factors are described as under:

- Mental State Includes impact of stress, anxiety and emotions. A healthy mental state not only means physical fitness but also the impact of environment and adjusting and adapting ability depending on the response of an individual or group of individuals working together to a situation/situations, occurrences, or events. Mental health is connected to adjustment, personality integration and ego-strength according to Barnes, (1987).

- Body Clock: Includes morning or night person, daylight exposure, and biological synchronization. The internal clock and circadian rhythm regulates the daily cycle of activity and inactivity of an individual. It causes sleepiness at certain time spans in the early morning and afternoon.

- Sleep Environment: includes light control, noise reduction, smell, temperature, living accommodations, recreational facilities and medical facilities.

- Physical Conditioning: includes exercise, sleep and nutrition and workloads.

The conclusions drawn by Comperatore et. al. (1999) are that safety depends upon endurance. The endurance levels vary from person to person depending on physical and mental health, also the number of work and rest hours and total duration of service. In my view the mental stresses accumulate over a period of time, rest hours alone do not provide the remedy.

4.10 Factors Relevant to Safe/Efficient Ship Operations

The performance of safe and efficient ship operations is connected to human relationships on board ships. The constant shorter port stays, faster ships combined with above mentioned disparities produce a scenario in which shipboard human relationships in social context are minimized. In the context of multilingual, multicultural transient officers and crews the human relations stand further decimated.

The motivational theories in use in other industries can hardly be applied for achieving higher level of performance for efficient and safer ships due to large turn over and wide disparities of remuneration received for same work performed.

The International committee on seafarers welfare has physical and mental wellbeing of seafarers as one of the primary concerns and it believes that physical fitness directly affects that condition. Increasing automation on board ship, not to mention the inactivity of off duty hours will take its toll on the fitness of any crew. This toll includes physical and mental fatigue, which increases risk of sickness and injury on the job. Zakaria, (1994) stated, regarding automation and its relevance to mental and physical condition of seafarers, as under:

The vessels are being improved in many respects and working ways and means on board are also changing. The technical progress in shipping, the mechanization of cargo loading and computerization, as well as constant growing ship operation costs, initiated a trend to limit number of crew on modern ships. Some thirty years ago, an ocean going large cargo ship had a crew of 38-43 men on board which now a days, has reduced to about 18 to 32 men on board, or even less. More automation on board means smaller crews and often lead to more working hours while on board which in turn are compensated for by longer leave periods ashore.

The rhythm of the traffic gets more hectic and so does the work. The responsibilities of the crew members also increase in such conditions, when a small mistake by anyone on board can lead to a great catastrophy, if the "odds are against". The ownership of the world merchant fleet has also changed dramatically during the last 3 to 5 years this in turn has led to shift in the composition of the seafarers. Today more and more seamen come from developing countries with different cultures, different religions and speaking different languages on board the same ship this certainly is a new challenge to the world of seafaring. To perform a job properly seafarer has to be in good physical and mental condition independent of which rank he belongs to and what place he holds. This puts shipowners and the whole society itself under heavy obligation to look after and care for their seafarers

Nishibi, (1974) concluded that mental stress and boredom are occasioned more often by large automated vessels due to lack of physical work and of active involvement. Work and mental health relationships are important according to

Maslow, (1959). Goal seeking and need satisfying are characteristics of an individual`s normal behaviour. Work becomes part of a performer and his personality. Apart from financial security, satisfactory work to achieve goals provides self-actualisation, ego satisfaction, stabilises and integrates. This provides a sense of significance and achievement. Yankelovich, (1978) confirms the relevance of the aforesaid, as stated below:

> It is clear that work can define peoples goals and values, it can create a sense of stability and enhance feelings of potency and effectiveness.

In this respect the current changeover from skill based performance to monitoring function apparently interferes with work satisfaction. Freud defined a normal adult as someone who is able to love and to work. Stages of adult development are linked to a person`s involvement in a job or career. The seafarer is able to work and does not get to to be with near and dear ones at the same time, the love of performance of his skills also stands diminished in the changing work situation.

4.11 Summary

To sum up the nature of profession or career in the context of work satisfaction and social deprivation on board and ashore are the serious factors to contend with. The diminishing social contact on board due to reduced crew sizes and multinationalisation have to be thoroughly investigated. The need for harmonious and trusting work environment perhaps remains unfulfilled for cultivating harmonious human relationships to over come the stress created by automation and near miss situations. Diversities and disparities are to be reconciled for ideal scenarios but it is impossible to achieve uniformity in the matters of culture, language, region and religion. Action can be taken with respect to lingual, cultural and religious tolerance/understanding.

A regime of minimum wage scale on global basis will help to restore professional dignity although the disparity of wages cannot be eliminated. The minimum uniform training standards will become meaningful when linked with minimum wage scales across the globe. The maximum duration of service on board if restricted to a

reasonable period on global basis will add to crew stability and reduce the surplus status of crew supply. Limiting of number of lingual crew to a maximum of two can restore the drift away from safe and efficient ship operation in multilingual crews.

CHAPTER V Human Factors Training: Future Directions

> The child has its tongue and mother has hers. The mother keeps the child on her lap and pronounces the words so that the child may learn to speak through its own tongue. The mother can speak through her own tongue and save all the bother! The Guru too is like that. He can only repeat, inspire, instruct, persuade, plead; the activity, the disciple must himself initiate. He must jump over the stile himself. No one can hoist him over it.
>
> Sai Baba (1984)

5.1 Introduction

The safe and efficient ship operation in terms of human relationships mean that it is the human relations, which ultimately reflect the consistencies and inconsistencies of various organizations and authorities involved in the maritime world. The role of factors like multi-nationalization, culture and forces at play were described in Chapter II and IV to assess the total impact.

5.2 Trends and patterns

On the job training traditionally was the most effective way of training in the maritime world, however with accelerated pace of change occurring, on-the-job

training alone cannot keep pace. It needs to be augmented with modern training. Laubstein, (1997) has aptly described the affect of globalization on maritime world:

> To date, the field of maritime education and training has hardly been affected by the trend towards International standards and competition elsewhere in post secondary education. This is somewhat paradoxical, as maritime transportation has probably contributed to and been more affected by "globalization" then any other sector of the world economy. Of course one could argue that the globalization of maritime transportation, with its attendant `flagging out` and multinational crewing has not only worked against the development of global standards of maritime competence, education and training but actually contributed to general lowering of such standards. Whatever the case, the only real trend in MET over the last 30 years or so has been a significant reduction in established capacity in the western world and an expansion of MET in the developing countries.
>
> Laubstein, (1997)

The Seafarers International Research Centre in Cardiff study confirms this, concluding that one ship in four is manned by incompetent crew.

The general standard of competence can be raised through appropriately qualified and experienced instructors and assessors. Apart from the competency qualifications and experience instructors will additionally require more academic qualifications in areas such as pedagogic and modern information technology.

Application of distance learning techniques, although historically suffering from a large percentage of dropouts/ wastage in academic applications is more suited in training application as opined by Noble,(1999). Distance learning through the Internet is being introduced on a global scale and WTO is currently at work trying to remove any and all barriers to international trade in educational commodities.

Complementing maritime training through Maritime training institutes to shipboard structured training through the application of modern techniques of Internet distance learning in the near future can help in raising competence and professional standards of seafarers. The requirements of the revised training convention and training demands of new technology not only consumes more time and financial resources but also in some way contributes to the shortage of officers. The new distance learning technology can be of help to make good this need.

Present disparity in the training process is a major stumbling block in achieving global uniform standards of training. The engagement of a large number of different nationalities on board merchant ships is the second most serious challenge. The third challenge is rapid technological changes in maritime transportation. The future challenge will be a sharp reduction in crew sizes on larger number of merchant ships as the trends are already seen on some merchant ships. Presently the crew sizes have somewhat stabilized between 11 to 20 persons per ship.

The present revised convention is silent on the training of trainers; training on simulators is largely non-mandatory and not standardized. Polyvalence, presently non-prevalent in developing world, has to become more common for achieving the objective of interchange ability from seafaring profession to shore professions in future.

The Human relational aspect in the revised convention is to be augmented to deal with multinationlisation and multiculturalism. The human element aspect needs to be dealt with so as to address the reporting requirements of ISM code to report near misses from human factors angle. This reporting requirement is needed for arriving at a uniform proactive approach to deal with human elements problems on global basis.

5.3 Performance

The STCW 95 Convention, apart from training, also hints at how the work shall be done. In this respect team work, commitment, working climate motivation and attitudes find mention. Human management skills for trainers are essential as the role played in this respect helps to shape the future career development of trainees and trainers. Professional performance standards are not derived, however a functional approach is specified for various ranks and ratings involved in watch keeping. The maximum number of functions, which can be practically performed in different conditions and circumstances at a time, are not derived. Chapter VIII of the STCW 95 Convention specifies hours of work and rest. It falls short of defining a maximum period a watch keeper can serve on board. The general service period for on board service varies on average from three to nine months, however, due to shortage of manpower such periods may be at times extended. The maximum duration onboard relates to fatigue which in turn has a connection with safe and efficient ship operations.

Schager, (1996) stated that it should not be a major problem for shipowners to comply with standards of education and skills of officers, engineers and crew. This is more a question of selection, training and experience. To comply with demands for human software can, however create problems because this is connected with tradition, style and organization, not only with individuals. It cannot be easily ordered and it may change without being evident to the shipowner. Building the right attitudes, motivation, commitment, good working climate and teamwork takes time since these things are interrelated.

The most important aspect in maritime training remains to be addressed inspite of numerous ship inspections conducted by flag states, Port states, classification societies, charters, cargo interests and P&I. Short comings pertaining to structural integrity and seaworthiness remain undetected and unreported hence reveal only in terms of serious accidents. The inspection and survey function appears to be in need of training support to focus on the matter of structural integrity and seaworthiness reporting.

5.4 Reliability

The safety combined with efficiency in work situations is a great motivator for the persons involved in performance of work, it provides fulfillment to individuals and is a step towards achieving quality culture. As noted in Chapter I quality culture in maritime world is in formative stages. The reliability of seafarers has to be determined, so far it is noted that studies are being undertaken in this direction the results of same are awaited. The reliability levels of seafarers are to be such that if any systems short falls in automation are corrected by human intervention. The reliability factor is central to implement quality systems.

Human reliability suffers from human errors therefore human error reduction error effort in training is made through various processes. The main process includes simulation training and continuous training. Simulation training is used for confidence building, raising reliability.

5.5 Fatigue and Health Management

The sharp reduction in crew sizes and changing over from skill performance based ship operation to mainly monitoring performance due to a large degree of automation alters the nature of work. The mental health and physical health of seafarers would need more attention. Occupational health issues are surfacing and gaining importance due to advances in medical sciences. Medical profession and courts for claims and liabilities now accept posttraumatic stress. US coast guard is conducting projects in real world situation to arrive at solutions towards endurance management of crew; the results of same are expected by next fall. Marine Safety Committee in its meeting 72/15 proposed draft measures to deal with fatigue. The attention of entire maritime industry including training institutes and shipboard staff was drawn and a range of objectives and frame-work to deal with fatigue was circulated in February 2000 in draft form. The initiative is in its formative stage and its effectiveness in isolation with manning strength raises some relevant questions.

5.6 Training For Trainers

The minimum uniform standards of training as envisioned by IMO are only a first step. In order to raise professional standards in the maritime world a beginning is to be made with the focus on trainers, instructors, teachers and educators and their continuous development of professional competence standards. The STCW 95 convention has provisions for demonstration of competence but the qualification, training and experience of trainers is not specified. Marcoms project (2000) of WMU has identified varying standards of training are linked to the varying standards of English language used for instruction along with materials used for the conduct of courses in maritime training institutes. Long term and short term solutions are proposed for trainers and instructors in this report.

5.7 Cultural Management

This training may be imparted to all levels on board the ship and all departments. Broad understanding of main cultures exists on a global basis and specific attention is to be on maritime nations supplying manpower for operating ships. In particular, role-play in the work situation is important and understanding is to be such that it contributes to increased tolerance levels. Globalization processes are the order of the future and almost all nations of the globe are opening up to welcome a more liberalized world. American example of managing the multicultures is sighted although it has taken about 150 years to achieve this success. The convergence of cultures inspite of the American success story has not occurred. On the contrary, some deeper delineation is noticed in this respect as confirmed by Lewis, (1998) and Hofsteede, G. (1991).

The removal of trade barriers and increasing interdependence has reduced the areas of confrontation/insurgency to a few pockets of the globe. The spirit of ever-onward march of free market mechanisms is pervading on a global basis. The inter-culture training in multinational organizations helps to create organizational culture. Languages and religions normally emanate from cultures therefore knowledge of a working language in the work situation is not sufficient for cohesion of persons

working on board. Multicultural or intercultural training from support level to management level can be aimed at building teams and creating lasting bonds of understandings. This training will enhance the prospects of interchangeability into other professions.

The present revised convention does not cover this aspect although the multilingual aspect is covered at operating level and personnel management is specified for management level. The inter cultural or multi cultural training commencing from support level to management level is needed for creating and sustaining harmonious human relationships for safe and efficient ship operation.

Sufficient training facilities are used by multinational corporations and a move in this direction can be made with the help of information technology. On board training in this respect and translational facilities on line basis can help to deal with multilingual and multicultural disparities to some extent.

5.8 Communication Skills

Quality of communication and its impact on effective crew performance is of relevance in training process. Communication skills result in successful cooperation and stress reduction finally raising the standards of professionalism. Communication skills have acquired more relevance because of multi nationalization of shipboard staff. The efficient and safe ship operations can be performed through good communication. Good communication skills not only mean knowledge, skills of English speaking but developing a personality to acquire communicative skills in multilingual working environment with in the ship and outside the ship.

The language training in addition to English language training is needed in the scenario of increasing multilingual and multicultural crew mix as Schroeder (1999) puts it, It must therefore be kept in mind that the performance of crews are surely interrelated.

5.9 Simulator Training

The non-mandatory training specified in part B of STCW code needs to expanded further and standardized to include human relations and elements as part of new curriculum. The recommendatory nature of this training can be considered for making it mandatory. Competency based assessment if included at the end of simulator training will lend more credibility to this process.

5.10 Interpersonal Relations

Complexities of human relationships are to be viewed from relational angle rather than the psychoanalytical theory, the systems theory in conceptualizing and tackling problems in relationships. Becavar, et. al. (1998) held that psychoanalytical theory tends to view the individual as an autonomous, independent hero whereas systems theory sees an individual in the context of his or her environment and interpersonal interactions. It is difficult to see the self as autonomous and independent and also desiring relationships that require considerable interdependence. From a systems standpoint, how another person behaves is always relevant to the context of his interactions. Therefore, in relationships the context it affects both and is determined by the people interacting. The start point as recommended by Becavar, seems to be somewhat more relevant to the multi lingual and multi cultural situation prevailing in Maritime World.

5.11 Continuous Structured Training

Provisions for this are contained in the STCW convention, its implementation through application of IT will provide continuity and the benefit in terms of time and cost saving to seafarers will make it attractive.

5.12 Plans For Future

The conflict management, emotional management, fatigue management and human skills understanding and application will be the need of the future. Human skills and techniques find application in the context of reporting near miss occurrences under ISM code for developing proactive approach to deal with human factors. The techniques to be utilized in future training would include combination of distance learning through internet and shore based training, continuous competency development through structured training at all levels while on board.

Petersen, (1999) summed up the challenges to be faced by the seafarers in the evolving Maritime World.

> Since,…its earliest beginnings, the maritime industry has found itself occupied with the question of how to ensure that the ships sailing the oceans not only stay afloat but continually are able to carry out their objectives. The work requirements are multifaceted, with modern technology and economics creating the paradoxical situation of requiring highly skilled seafarers who are experts in their particular field. At the same time, decreasing the number of seafarers on board, hence forcing each crew member to adept at any number of many complex tasks.

The era of specialization had set in early and mid eighties in terms of specialized courses imparted for oil, gas and chemical tankers. This development provides a degree of professionalism, but changing technologies would require greater effort. The full implementation of STCW 95 is to be completed by 1-2-2002 in terms of almost universal acceptance; the blue print for future training directions is to be worked out.

The following areas are earmarked:

- Training for trainers, instructors, teachers, lecturers, assessors
- Training for new entrants
- Continuous upgrading and reorientation of serving seafarers

Rodger, (1999) mentioned regarding training successfully for the future, for the initiation to be effective. It is to be assessed as to what is required of the seafarers in the next 10 to 20 years. While gazing into future is fraught with many unknowns Rodger, described the scenario as mentioned below:

> …Industry has reached a stage where There are more officers then ratings, as jobs become more technically complex and need traditional hands on sailor like skills has almost disappeared and the western European, Japanese or American seaman has almost disappeared from world's oceans.
>
> For attracting sufficient good officers, it is to be accepted that serving span at sea on an average will not exceed around 10-12 years, thereafter, ideally interchangeability into shore based jobs would involve compatible structure to reduce the divide between shore and shipboard operations.

The induction of seafarers from developed world suffers from comparison with the wage scales of developing world; therefore future training programs will have to design taking this fact into account.

5.13 Conclusion

The training proposed in this chapter is in global context to deal with the challenges encountered on global scale. However the training solutions have to take micro level factors into account. The variability due to the factors at national level may be accommodated this may make these proposals appear to be generic. The specific training requirements therefore have to be tailor made taking the general training directions proposed herein.

Chapter VI Conclusions and Recommendations

The role of human beings in maritime safety seems both obvious and mysterious, obscured sometimes by the technology designed to aid him and groups in which he works. While most maritime accidents can be traced to "human error" somewhere, it is generally agreed that the actual causes run deeper than that. Though dedicated as always to completing a safe voyage, seafarers are now subjected to fairly new stresses as the ship, once an insular world becomes part of a complex system of man, machine and management. In the maritime world these three elements are for the first time being examined by individuals and regulatory bodies alike for their compounded contributions to safety and casualty.

Surveyor, ABS (1996)

6. Conclusions

In the first chapter various factors relating to human elements were highlighted; it was understood a trusting working environment, openness and transparency in management could raise commitment levels from ship owners and seafarers. The barriers to transparency and commitment are mindless competition, and perhaps the unreasonable legal and liability regimes which encourage non-acceptance of responsibility i.e."non blame culture". Encouraging trends and patterns in terms of safety management system and efforts to attain uniformity in training standards are noteworthy but still away from making quality a competitive advantage and

discouraging substandard shipping. The operation of substandard ships and incompetent crews produced out of variable training standards remains a threat to the operation of quality shipping. Steps are being contemplated in the developed world on a national level to make quality shipping an operational advantage. The effect of such measures can be gauged only after 2001.

The second chapter examined non-uniform approaches of classification societies, and national and international authorities particularly towards human resources in the maritime world. The Flag of Convenience States in concert with classification societies provide an environment where substandard shipping can thrive. It poses a danger to safe and efficient ship operation and it is detrimental to development of healthy human relationships on board the merchant ships.

A survey of casualties from a human relations dimension, remains a most neglected area, but provides a most important input for safe and efficient ship operation. It is to draw the attention of all that the human relations angle must be investigated in all casualty reports of the past to determine what human factors were ignored in the past so that lessons can be learnt for future investigations. The shortcomings of ignoring the human aspect were highlighted in the case study of M.V. Joseph Banks and M.V. Jhansi Ki Rani. It was possible to examine the human aspect of all the accidents and incidents of the past, but the time and space available for such an effort was not sufficient to the author. However illustration was made to draw attention to this aspect.

Investigation in chapter IV was made into social, psychological and psychosocial aspects in the context of emerging realities of multilingual crews serving on board merchant ships. The disparity and diversity of issues creates a complex operational scenario. These issues were highlighted for resolution and strategies to be adopted to grapple with the challenges of the present and future. The inability to implement resolutions adopted by IMO and limited ratification of ILO resolutions remains a cause of major concern. Efforts to implement resolutions for safe and efficient ship operations in comparison with past efforts were found to be laudable but inadequate in the light of emerging challenges.

In chapter V attempts to arrive at future directions in the training of seafarers began with the conversion of the revised STCW Convention‘s shortfalls into strengths. The

next step is to look at future changes in technology and availability of high calibre manpower. The emphasis is mainly on continuous training taking advantage of information technology to overcome time and distance barriers due to the nature of the seafaring profession. The focus of training can include interchangeability and merging of seafaring competence with shore based industries such as education, media, manufacturing, and management to name a few. The new entrants as well as serving seafarers at sea are to be included in the ambit of continuous training with a beginning to be made with serving maritime educators, trainers and lecturers.

6.1.1 Encouraging Quality Culture

Only the events or catastrophes dictate our actions to satisfy the public outrage. The maritime world is still some distance away from the culture of customer or client defining quality criteria. Societies should be encouraged to define the acceptable or tolerable levels of risk in clear and definitive terms. Insurance and underwriters do have a role to play to encourage a public awareness and debate on safety and quality issues in maritime transport.

Application of quality criteria is seen in pockets of excellence but some tonnages operating in economically backward countries and under FOC flags operate sub-standard ships. This introduces an element of compromise to endanger lives, property and the environment. The control of FOC regimes will bring greater degree of transparency and commitment from ship owners and higher commitment levels from seafarers to make safer ships and cleaner sea an achievable reality. The FOC regimes have to take more responsibility in matters of safety and protection of environment. The change in approaches of FOC regimes requires global action in the form of decisive support from the most developed and powerful nations of the globe. The end of the FOC regime in the maritime world is not feasible mainly because of the love of competition being the greatest passion of modern society.

An encouraging action in this direction is seen in the form of one of the leading FOC nations offering six months free of charge registration for registration of ships. Incidentally the above-mentioned developed countries mainly patronise this FOC nation. This action can be viewed as a precursor to drive out the sub-standard FOC

countries from maritime world. The compliance with quality culture augurs well towards acceptance of responsibility i.e. “non-blame culture”. The non-acceptance of responsibility was recently on naked display in the aftermath of Erica and Leader L incidents.

6.1.2 Safety, Efficiency and Competition

Safety, efficiency and competition are closely linked to each other. Efficiency at the compromise of safety to gain competitive advantage produces dangers to life, property and the environment at sea. Competition has to account for certain basic norms, which ensure safety remains paramount and it is in no way compromised. The maritime world has to acknowledge this on a global basis. The unhealthy practices having negative impact on safety have to be discouraged by setting realistic, practical and acceptable standards so that safety prevails at all times. Heterogeneous content needs to be minimised for better cohesion of people on board and minimising cultural, lingual, religious disparities. The maritime professionals ashore and on board ships are morally obliged to clearly and distinctly establish, safe efficiency is a profitable business and ISM code is the way out for performance of safe efficiency it must be recognised as a business advantage in maritime world.

6.1.3 Human Relationships

Human relationships assume importance due to heterogeneous composition of shipboard staff, hence the training solutions are proposed in chapter V. However, to equip the seafarers for the transcending changes, which are expected sooner than later, programs on self-management commencing from acquiring emotional competency, are immediately required as part of health management. Health management is of importance to grapple with stress and fatigue problems. A proactive approach in this respect will reduce occupational health hazards and reduce possibilities of human error.

6.1.4 Final Overview

The relational aspect between humans, safety and efficiency is significant because of the relative importance safety and efficiency have become, relevant to the stakes involved. Safety pervades in relative terms; absolute/total safety is not a practical concept. Factors of safety are relative to tolerable risks according to perceptions and acceptability of a society. Performance of efficient shipboard operations safely means managing the risks in an optimal manner, reasonable up to an acceptable level. These minimum or optimal levels need a definition in the form of quality standards, so those lives, property and environment are adequately protected during the operation of maritime transportation. Sufficient regulatory apparatus exists which remains to be implemented. It would appear that most of the discussed points and issues highlighted in this dissertation are part of our day to day living existence in the maritime world, but our inability to effectively provide timely solutions remains in waiting. The mentioned words of wisdom describe this the best:

> We may cry out desperately for time to pause in her passages, but time is deaf to every plea, and rushes on over bleached bones and Jumbled residues of numerous civilizations are written the pathetic words: " Too Late"!
>
> Martin Luther King Jr.

6.1.5 Final Comments

A wakeup call is given to shipowners, charters, shipbuilders, classification societies, port operators, training and manning professionals, and administrations engaged in the maritime world to prepare the seafarers to face the new challenges that is the only way ships can operate safely and efficiently. Let us all accept responsibility for sending the ships to sea in safe and efficient manner and shortfalls if any be identified from a safety perspective rather than blaming one another. The larger part

of maritime transport is conducted safely and efficiently but on comparative terms the safety record of merchant shipping places the industry in the category of a high-risk industry only behind the fishing industry. The scope for improvement exists in ship operation and endeavours to achieve safer ships and efficient operations have to be vigorously and continually pursued in a proactive manner.

Human relations dimensions are vast and cut across all the barriers of time and space in the specific context of the maritime world. This topic of human relationships and safe and efficient ship operations has innumerable variables to encompass each and every aspect of the maritime industry. Many projects on this issue are attracting the attention of authorities and governments and the European Union has launched projects connected with safe and efficient ship operation.

The scope of this issue on a global scale is very broad and wide. The author of this dissertation has attempted to keep the size of this dissertation as brief, concise and to the point. To cover all parameters, which contribute to raising the professional standards of seafaring and the profile of the maritime world for operating safe and efficient ships was found difficult but many new directions were identified. Ultimately it was realized the size of the canvas was too big and the size of the brush was very small. Taking a holistic profile view of the seafarer and the maritime world, there needs to be a drastic improvement in the form of higher professional standards and better public awareness.

6.2 Recommendations

As a result of this research and investigation, the author strongly recommends following measures so as to make ship operations more safe and efficient.

1.Good human relationships are the key to safe and efficient ship operations. This can be attained through dedicated devoted and committed crew with minimum disparities in terms of culture,lingual,region,religion and wages. No effort should be spared to minimise disparities. The teams of dedicated, devoted and committed crews produce proficient performance.

2. Attracting and retaining higher calibre manpower to the seafaring profession and the maritime training and education field. Actively encouraging seafarers to promote maritime safety and to maintain good health.

3. Avoiding duplication in safety endeavours. Closer cooperation between Port State control MOUs.

4. Active identification of quality shipping. Making quality a competitive advantage on a global basis by defining practical global standards and actively encouraging compliant operators and active identification of sub-standard shipping and isolation of unseaworthy ships.

5. Closer cooperation between IMO, ILO and WHO for improving occupational health of seafarers particularly on Health Management training.

6. Developing and evolving a uniform code for classification societies on a global basis. Exclusiveness, subdivision and isolation among classification societies to be avoided.

7. Management of liabilities in ship operations to be reviewed for adopting a more realistic approach to discourage blame culture and encourage compliance culture.

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APPENDICES

Appendix A

Case Study--Grounding of "Joseph Banks"

Narrative

MV Joseph Banks is owned by the Tasmanian Transport Commission. The vessel was built in Hamburg in 1965 and has been owned by the Transport Commission for some years. It is a steel general cargo vessel. Its gross tonnage is 460.36 and its net tonnage is 293.58. Its length overall is 203ft.2inches. Its breadth moulded is 32ft.6inches. Its depth is 20 ft 4 inches and its maximum draft is 13 ft.6.75 inches. Its propulsive machinery consists of an 8-cylinder B.M.W. Alpha two-stroke diesel engine coupled to a variable pitch propeller and both the engine and the propeller are controlled directly from a console on the bridge. Its service speed is 10 knots at 400r.p.m.

The essential navigation instruments on the vessel are a Kelvin Hughes radar, a Decca radar and slave in the chart room. None of these radar displays could be stabilised by the gyrocompass, which was coupled to automatic steering unit. It has also a magnetic standard compass on the flying bridge and a magnetic steering compass in the wheelhouse with a pelorous on each wing of the bridge. Neither pelorous was illuminated.

There was also available an echo sounder of the echelo type.

At the relevant time the vessel was loaded with reels of newsprint which were being taken from Hobart to Sydney.

When the vessel left Hobart she had a crew of eleven. The master of the vessel was Trevor Huntely Roberts, who had been master since 25 June 1973. He held a

master-foreign- going certificate, which he had obtained early in 1973. The chief officer of the vessel was Garth Ashley Gregory, who had been chief officer of the vessel for a period of approximately two years. During the same time he had been master one occasion for one voyage only. He held a master's foreign -going certificate, which he obtained in 1941.

The vessel left Hobart on 23 October 1973 loaded, as already stated, with reels of newsprint for Sydney. Up to the time of the grounding of the vessel the voyage was uneventful.

After midnight on the 25 October 1973 the vessel was proceeding in a northerly direction along the new south Wales coast towards port Jackson. The chief officer, Mr. Gregory took over watch from Mr. Hodgman at midnight and he was responsible for the watch from midnight to 4.00am on the 26 October 1973. The master had previously set the course line of the vessel by marking it on the relevant chart as attached herewith. The course, which set, was such that the vessel would pass bass point at a distance of seven cables from the rock upon which the vessel eventually grounded.

The master had made an entry in the night order book that on no account was the vessel to go to the west of the course line he had set and that he was to be awakened if there was the slightest doubt or difficulty during the watch. That entry in the night order book was perused by Mr. Gregory when he came on duty at a minute or so after midnight and he signed it.

The weather was fine with visibility at sea level in excess of twenty miles. There was no visible moon and it was a dark night. The sky was cloudy to overcast and according to Mr. Gregory there was about something like 75% cloud cover just before the casualty. The wind was north by east, of very moderate strength. The last relevant official entry in any of the books relating to the weather was at midnight when Mr. Hodgman ceased his watch and noted in the log that the force was then two to three. At the time the casualty occurred the master, when he got on deck, described the wind as "light airs". It would appear therefore that the weather conditions did not contribute in any way to the casualty, except that the dark nature of the night affected the lookout and visibility.

During his watch from midnight until the casualty, the chief officer, Mr. Gregory took radar ranges at half hourly intervals, and he made marks on the chart indicating the

position of the vessel as calculated by him according to these ranges. Mr. Gregory did not take any bearings at all by radar or otherwise. He did not use any navigational aids available to him on the vessel other than radar ranges and he has conceded that on one occasion only did he take range from more than two objects to ascertain the position of his vessel. In this regard two quotations from the Mariner`s handbook third edition 1970 seem appropriate:

> A fix by only two bearings is liable to undetected errors in taking bearings or in applying compass errors or in laying off bearings on the chart. A third bearing of another suitably placed object should be taken whenever possible to confirm the fix by passing through the intersection of other position lines.
>
> Possible errors in the measurement of bearing and range must be taken into account when using radar for position fixing. In general, the ranges obtained from navigational radar sets are appreciably more accurate than the bearings
>
> It therefore follows that if radar information alone is available the best fixes will be derived from the use of three or more radar ranges as position arcs

It would appear that at 0200 the position so ascertained by Mr. Gregory was slightly east of the course set by the master and at 0230 it was slightly west of that course. Mr. Gregory took no steps to contact the master during his watch but at 0300 he altered course some 4 degrees further to the east.

It seems that in fact the vessel proceeded up the coast for some distance west of the course, which had been set by the master, and at the time when Mr. Gregory altered course the vessel must have been appreciably west of the course which the master had set. It is also clear that the positions, which Mr. Gregory marked on the chart, did not indicate the true position of his vessel and that he failed to take proper bearings by making use of the other navigational aids which were available to him on the vessel.

It is appropriate to record in favour of Mr. Gregory that he was extremely candid in evidence which he gave and that he has at all times accepted responsibility for what happened, both in discussions he had with master after the casualty and in evidence he gave at the preliminary inquiry. The only qualification he has made to

that acceptance of responsibility is that since casualty he has consistently criticised the course, which was set by the master as calling upon the vessel to pass too close to bass point. He raised no such objection on the night of the casualty and took no steps to contact the master if in fact he entertained any doubt.

There was a marked difference between the age of the master and the chief officer and the extent of their respective experiences.

The master was 33 years of age, having commenced his career at sea at the age of 16 years. He held a master foreign-going certificate since early 1973. The M.V.Joseph Banks was his first command. He had been master of that vessel since 25 June 1973.

The chief officer was 60 years of age. He held a master foreign-going certificate since 1941. He first went to sea in June 1930 and has had a varied experience in peace and war. Since about 1946 he has served with coastal shipping companies around the Australian coast. Despite his long experience he has had command of a vessel only on two occasions. About three years ago he served as master on a supply boat serving oilrigs in Bass Strait and doing a run from Barry's beach to Singapore. His other experience as master was in September 1972 on the MV Joseph Banks on a voyage from Launceston to King Island return.

It does appear that shortly after midnight on the night of the casualty the master went on deck when the vessel was passing Bereft Peninsula. The course was set to pass off this point at a distance of six cables. He said he did this because he did not entirely trust the chief officer's ability. He did not go on the bridge but satisfied he the vessel was making a safe passage as it passed the peninsula. His explanation for not going on the bridge was that the chief officer "had a resentment from a younger man teaching an `Old salt` how to navigate if I was to at all mention anything".

According to the master the chief officer had " a bit of a complex about harassment. He would say I was harassing him".

Having regard to the masters lack of confidence in the chief officer, the master`s conduct is not beyond criticism in that he did not exercise some supervision over the chief officer as the vessel approached bass point. The course set by the master

contemplated that the vessel would pass that point at a distance comparable with that at which beecroft peninsula was passed.

The master left in charge an experienced chief officer with explicit instructions as to the course he should follow and as to contacting the master in the event of the slightest doubt or difficulty. He was entitled to assume that the chief officer would obey these instructions. Short of taking over himself there was little more the master could have done.

As far as the master is concerned it has been contended that he set the course too close to bass point. It appears not unusual for vessels proceeding up the new south Wales coast towards Sydney to follow such a course.

The “Joseph Banks” ran aground at about 0310 hours on 26 October 1973 on rocks situated off bass point in an approximate position 34 degrees 36 minutes s 150 degrees 54.3 minutes e.

Appendix B

Case Study- Stranding of Jhansi Ki Rani

Narrative

On 26 April 1986 at 1735 hours local time the Indian flag bulk carrier Jhansi ki Rani of 42141 gross tonnes, on passage from Newcastle, Australia to Higashi, Harima Japan ran aground on Fredrick reef in position 21 degrees 01.5 minutes s 154 degrees 22 minutes e.

At the time of the investigation on 2 may 1986 there had been no injury to any person, the ship was still aground and a salvage team was onboard with a stand by. Preparations were underway to attempt to refloat the vessel.

A minor quantity of oil was sighted after grounding. This pollution was apparently the result of the forward oil fuel deep tank, which held 1 tonne of fuel oil, being holed on grounding.

All other fuel tanks were situated aft and were intact at the time of the investigation. The danger of further pollution was negligible.

Details of MV Jhansi Ki Rani

Official number:	1549
Port of registry:	Bombay
Nationality:	Indian
Owners:	the shipping corporation of India ltd.
Builders/date:	Lithgows, Glasgow 1974
Ship type:	bulk carrier

Main engine:	diesel 13600 bhp
Gross tonnage:	42141.49
Net tonnage:	31259.33
Length:	245.364m
Breadth:	32.258m
Depth:	18.745m
Summer draft:	13.828m

Certificates

Cargo ship safety equipment: issued by Korean government on 21 June 1984 valid until 20 June 1986

Cargo ship safety radiotelephony: issued by Japanese government on 9 February 1985 valid until 8 February 1986

This certificate was extended in mobile USA for 5 months

Loadline: issued by Lloyds, London, and 15 august 1985 valid until 22 June 1989 annual endorsement-Korea 7 July 1985

Safety construction certificate: issued by Indian government 3 September 1984 valid until 22 June 1989 annual endorsement-Korea 7 July 1985

Sequence of events leading up to the grounding

On April 1986 the Jhansi Ki Rani left NewCastle with 74228 tonnes of coal bound for Japan. The route for the voyage had been planned and plotted by the second officer, approved by the master and was to take the vessel 10 miles east of Frederick reef. The speed for a loaded passage was 11.5 knots, and the draft forward was 13.6m and aft 13.7m.

At 0040 hours local time on the 24 April 1986, the vessel was off cape Byron and set a course of 005 degrees, which was the course to take the vessel directly to the next alter course position to east of Frederick reef.

The following are extracts from the vessel`s deck log, bridge notebook and charts. Explanatory notes are in brackets

25.0040 Cape Byron brg. 273 degrees x 10 miles a/c to 007 degree T&G allowing 2 degree set to make course 005 degree

25.0830 27 degree 13 minutes s 153 degree 59.8 minutes e a/c to 003 degree T&G (ship was to the east of the course line)

25.0900 27 degree 06 minutes s 154 degree 00.5 minutes e (last position obtained by radar off cape Morton).

25.1200 meridian passage 26 degree 37.8 s 154 degree 08 minutes E av. Speed over 24 hours 10.58 knots. A/c 000 degrees t (V/L to the east of the course line).

25.1736 star fix 25 degree 39 minutes S 154 degree 10 minutes E av. Speed since 0900 10.11 knots.

25.2000 DR position 25 degree 14.8 minutes S 154 degree 10 minutes E

A/c 005 degree T&G (v/l should have been back onto original course).

26.0800 solar p/l 152-degree/332 degree passing through D. R. 23 degree 09 minutes S 154 degree 23 minutes E.

The last fix obtained prior to running aground at 1735 hours on 26 April 1986 was the stellar fix obtained at 1736 hours on 25 April 1986. The chief officer, second officer and third officer stated that they endeavoured to obtain an astronomical fix in the normal course of their duties, but due to the overcast skies were unable to do so. The third officer did obtain one solar position line at 0800 hours on 26 April 1986, but a further sight could not be obtained.

The ship was equipped with two 3 cm radars, one of which had been in constant use since 0900 hours on the morning of the day of grounding.

The vessel was operating in automatic pilot from gyrocompass. The master stated that he considered that there was no gyro error.

Other navigational aids consisted of Decca navigator and loran c navigator, but these aids cannot be utilised in this area. A radio direction finder was apparently used to try and obtain a position line, but the available stations were out of range. The vessel was fitted with an echo sounder, which was not working.

Dead reckoning positions were run up at 10.5 knots on a course of 005 degree true. The master and second officer considered that 10.5 knots was a reasonable speed to use when the following points were taken into consideration:

Previous days run was at 10.1 knots. Charts and sailing directions indicated a southerly current, at about 1 to 1.5 knots. Could be expected the wind was between NE and NW throughout the period”

Using that speed, the master did not expect to pick up the Fredrick reef light tower on radar before 1800 hours, when he considered that the light tower should have been 22 to 25 miles away. (Frederick reef has a light tower situated towards the north east of the reef. The light has a nominal range of 11 miles and is at an elevation of 33 m). During the southbound passage in good weather conditions, the light tower had been picked up on radar at 25 miles.

During the second officer`s watch, the wind was NE` ly force 4 with drizzle and frequent heavy showers. By the time the chief officer came on watch at 1600 hours the drizzle had become continuous rain showers reduced the visibility from 8-10 kms. between showers to 2-3 kms. (4-5 miles to 1-1.5 miles).

Observations: The master stated that he expected a southerly current of 1 to 1.5 kts. Based on previous speed, and information from the chart and sailing directions.

This adverse current did not eventuate. The distance from the star position at 1736 hours on to the grounding position at 1735 hours on 26 Th is 277 miles, which gives the average speed over that distance of 11.54 knots. The service speed vessel.

The note on the chart states:

Seaward of the 100 fm line the south sub tropical current setting west-south westward turns more southerly and becomes the east Australian coast current which south of lat. 22 degree sets predominantly southward between about

long. 156-degree e and the 100fm line with average rates of about ¾ and 1½ knots. Increasing from north and south. At times the current has exceeded 2½ knots. In the Australian pilot volume 3, it notes that east Australian current sets southerly with strongest flow following the 100-fm line, its width varies from 20 to 60 miles.

The west boundary lies close to the mainland, but there is no well-defined e edge. The predominant direction is s and its constancy is high especially in the area between 25-degree south and 30 degree south…. Between the e flank of the east Australian current and 160 degree east the flow of water shows considerable variability both from place to place and from month to month…. In April the SW- going sets occupy most of the area but N of about 23-degree south the flow is more NW as it crosses meridian of 160-degree E.

2) The echo sounder was not working and had not worked since October 1985. In this instance, however, the echo sounder would have been of little use as the soundings reduce rapidly onto the reef that no warning of the approaching reef could have been obtained from it.

The master stated that all efforts had been made to repair the echo sounder, but apparently major repairs were required and were planned for dry-docking in June 1986.

3) There is some conflicting evidence between the chief officer`s, chief engineer`s and captain`s statements.

The chief officer stated that the chief engineer was on the bridge for some time prior to the grounding but did not know when he came onto, or left, the bridge, or what he came there for. He did not engage in conversation with the chiefengineer, but may have talked to him in passing.

The chief engineer stated that he went to the bridge at 1715 hours but did not disturb the chief officer because he saw that he was busy. He left the bridge after 2-3 minutes.

The master on entering the bridge at 1725 hours saw the chief officer talking to the chief engineer.

4) From these statements, the following is considered to be the sequence of events immediately prior to the grounding:

1715 hours chief officer picked up target on radar on starboard bow at about 9 miles but lost it again almost immediately. Chief engineer comes to bridge.

1720 hours radar located target at 7 miles and chief officer went to look for the targets with binoculars.

1725 hours master enters bridge, chief engineer leaves bridge. The master described the time interval between his arrival on the bridge and the sighting of the broken water as “just a few moments”. Therefore the period may have occupied any time from five minutes to a “few moments”.

1730 hours chief officer and lookout first see line of white water ahead, wheel put hard to port. The times and distances given in the statements are

inconsistent with the average speed of 11.5 knots as recorded from ships last established position of 1736 hours on 25 April and the time of grounding, and can only be taken as an indication of the developing situation subsequent to 1700 hours. This assertion is based on the fact that the ship grounded with Frederick reef light bearing 020 degree x 5.7 miles and on the assumption that the reported radar targets of 1715 hours and 1720 hours were in fact echo returns of the light structure (as reported in radar log).Further the stated time between the master`s order to put the wheel over and time of grounding is not consistent with known manoeuvring characteristics of similar ship and certainly not with a change of course of only 13 degrees. It is therefore reasonable to assume that the time between putting the rudder hard to port and the grounding was shorter than the five minutes assumed by the master.

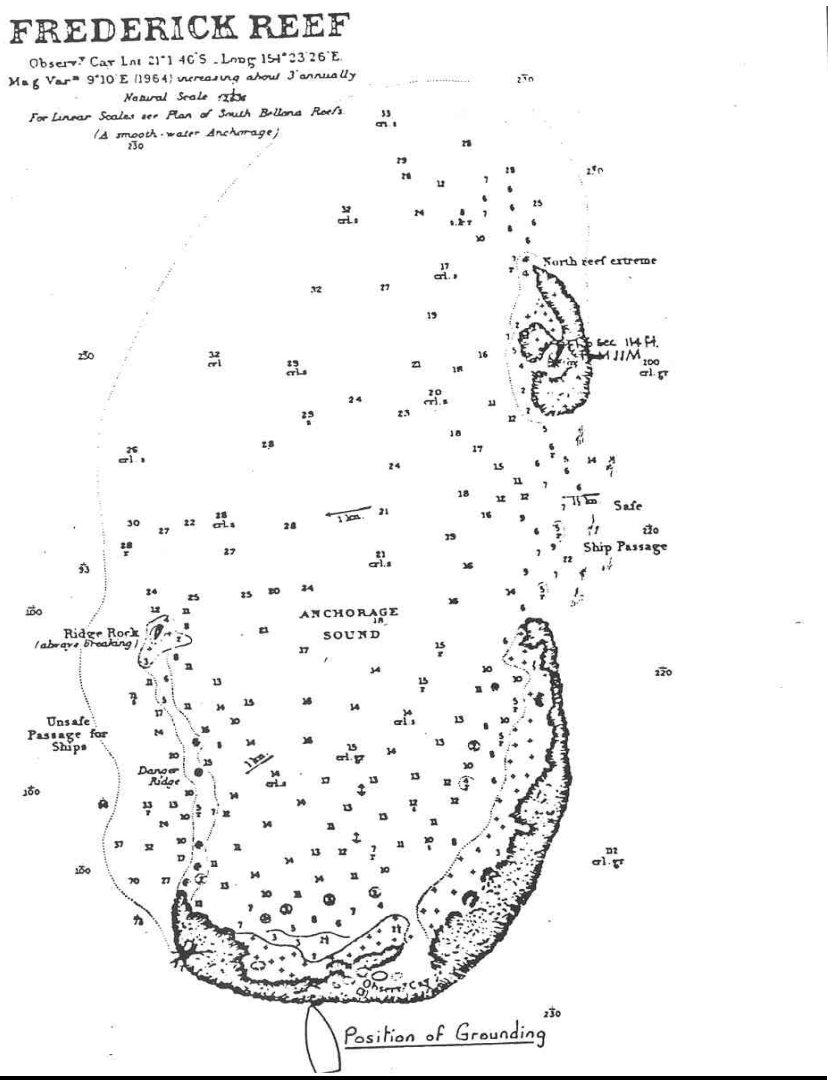

Figure: 3.2 (A) Charted position showing grounded M.V. Jhansi Ki Rani

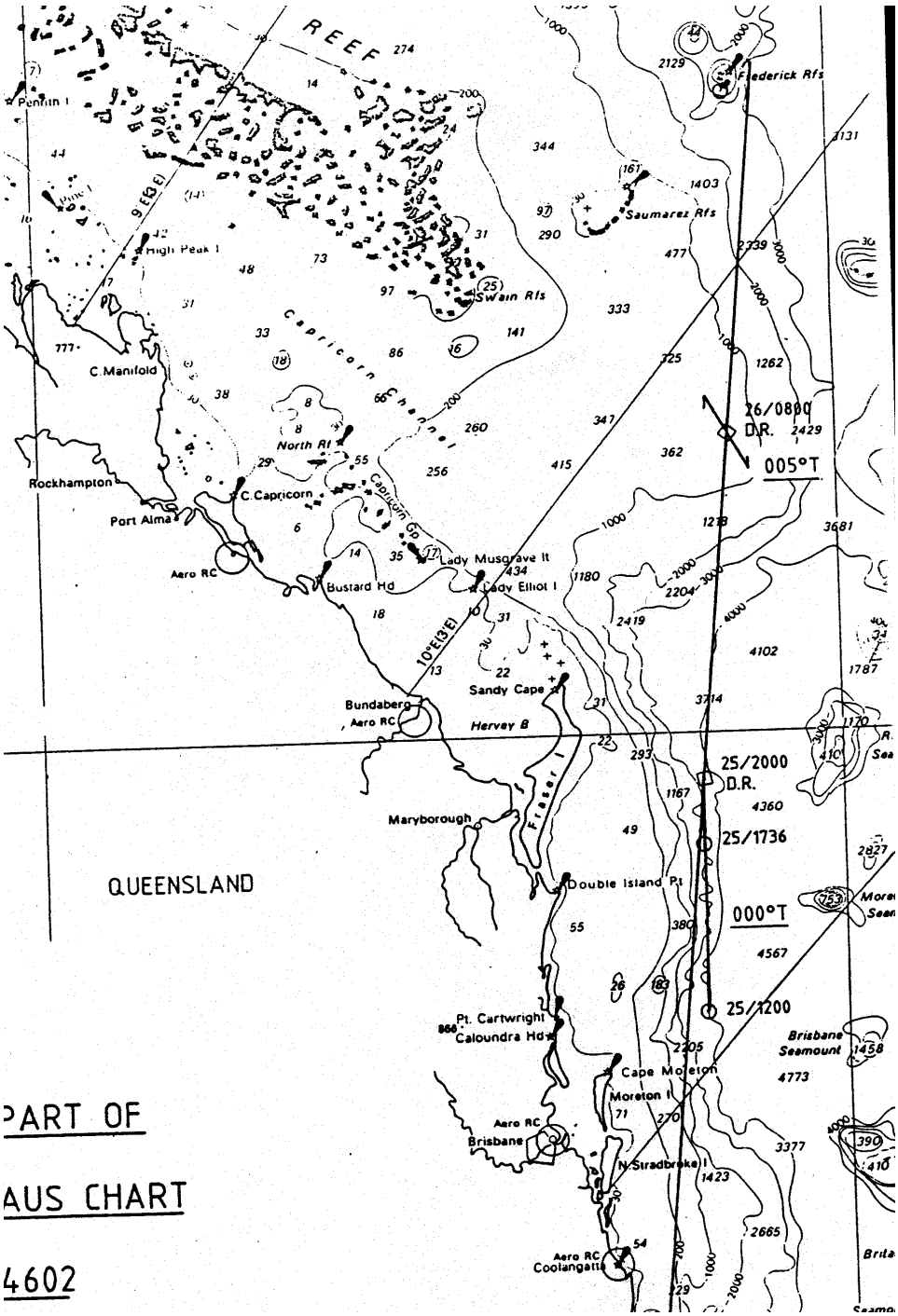

Figure 3.2(B) Showing the Track of M.V. Jhansi Ki Rani prior to Grounding

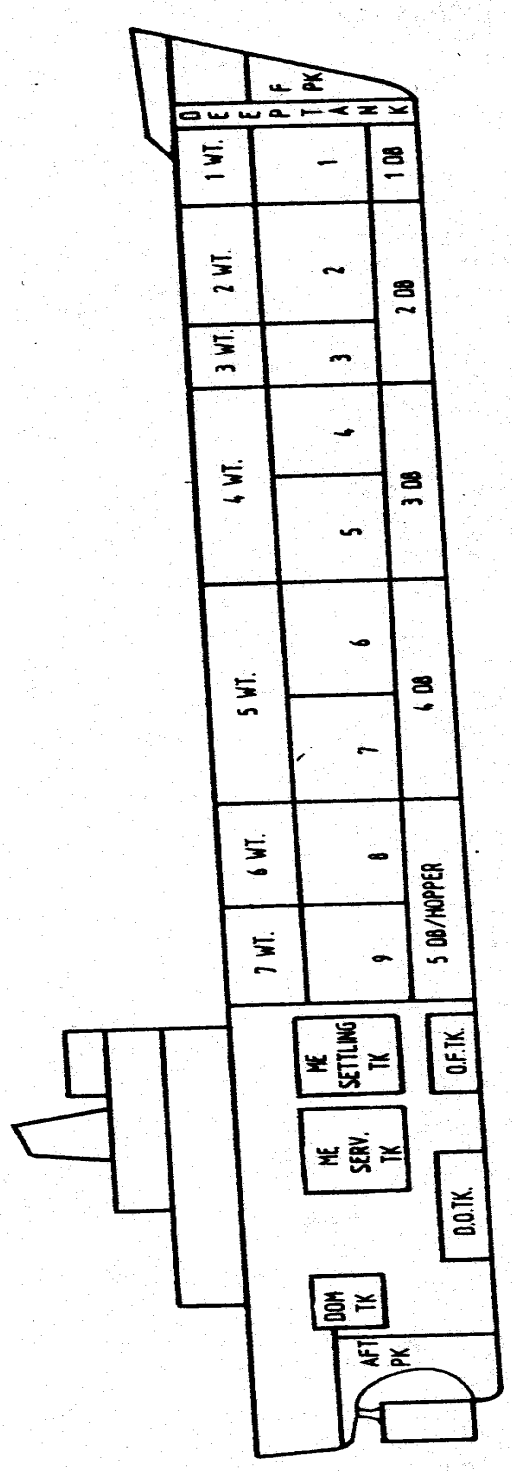

Figure 3.2 (C) Showing Profile of M.V.Jhansi Ki Rani

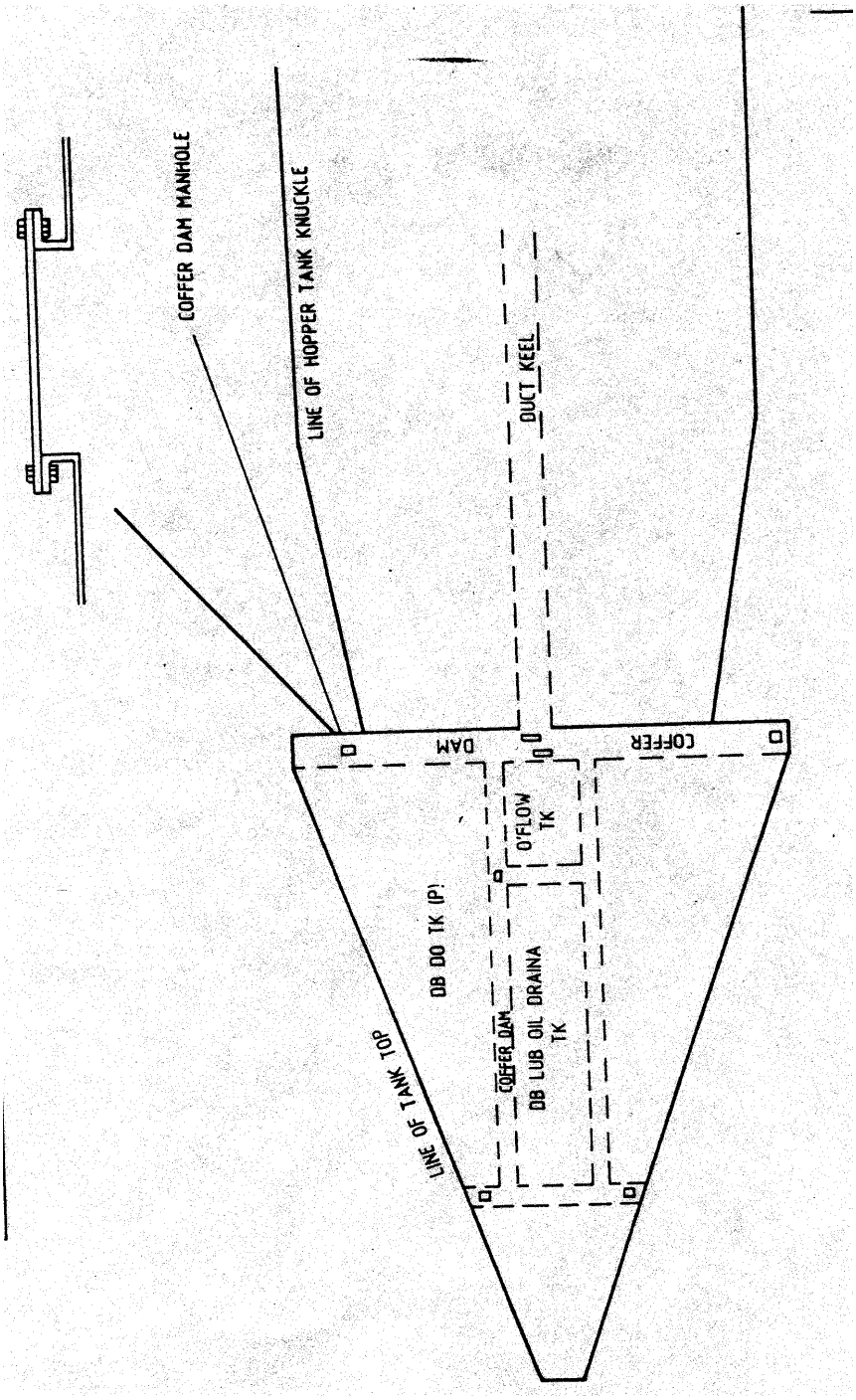

Figure 3.2(D) Showing Parts of M.V. Jhansi Ki Rani affected by Grounding

Appendix C

TABLE4.5 WAGE DIFFERENTIAL BY COUNTRY

Country	MASTER Tanker/Bulker	2nd Officer Tanker/Bulker	Bosun Tanker/Bulker	AB Tanker/Bulker
Australia	7000/5658	5165/4239	3816/3450	3521/3073
Myanmar	2900	1094	562	436
Canada	6797/6452	4839/4608	3917/3687	3399/4032
Chile	3840/3762	2394/2333	1228/1196	805/784
PR China	2200/2000	1560/1300	900/750	630/520
Croatia	4000/3520	1800/1650	1280/1000	1000/800
France	10115/9195	5390/4900	4340/3945	3780/3440
Hong Kong (Guild)	7440	3427		
India	3600/3300	2150/1970	1050/1000	1000/970
Indonesia	2979/2594	1403/1220	680/571	482/423
Japan	14100/13900	9300/9200	10300/10200	8900/8800
Latvia	3380	1775	1100	1000
Norway	9201/9201	6192/6192	5218/5218	
Pakistan	3651/3515	1912/1841	624/624	503/503
Philippines(TCC)	2975/2975	1488/1488	1114/1114	929/929
Poland	4000/3200	2100/1960	1265/1205	1068/1013
Portugal	4880/4244	2749/2390	2223/1933	1871/1627
Russia	2650/2520	1700/1620	1250/1200	1060/1020
Singapore	4454/4000	2281/2050	1026/930	962/875
Spain	5800/5600	2800/2700	1930/1868	1417/1394
South Africa	5200	3450	1750	1570
Sri Lanka	4400/4000	2600/2360	500/460	430/390
United Kingdom	6700/5800	3750/3400	2900/2550	2500/2150
Vietnam	2200	1200	800	500
ITF(World Wide)	6464/6464	3344/3344	2141/2141	1922/1922
South America		1900/1767	1000/1000	786/786

Source: Precious Associate Ltd.

Appendix D

Industry “obsessed” with cost-cutting, says captain

“EVERYTHING in the seafaring profession is dominated by money these days, says Capt. Mathur, Master of Erika. He, along with 25 crew rescued by helicopter before the ship sank.

Speaking to a French newspaper, he made no direct criticism of the ship owners of his ship but said that certain owners were obsessed with cutting cost to the point where crews were “below the threshold of safety and endurance”.

The Erica was his first command without a radio officer. “During the storm, I felt how much I was short of a man,” he said.

The piles of paperwork increased the load on masters. He had been unable to get more than six hours` sleep a day.

As much as 15000 tonnes of Erika`s cargo of heavy fuel oil may still be in the ship on seabed.

Salvage teams have submitted proposals to remove it.

Appendix E

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US may cut port fees for owners of quality ships. Julian Bray

Lower port dues could be among the incentives on offer to owners of good quality ships if they and their flag states co-operate and comply with US efforts to stamp out substandard shipping. Talks on fee reductions are still at an early stage, US Coast Guard`s Thomas Gilmour told Lloyd`s list, though there are hopes that major US ports will take part in the scheme.

The coast Guard`s aim is to reduce to a minimum the effort it expends undertaking port state control checks on well-maintained ships, to enable it to devote more of its resources to rooting out dangerous vessels. Other benefits to owners that take part in the scheme will be fewer inspections and less time taken in port.

Capt. Glimour said he was “very excited” about the Coast Guards quality shipping initiative which it hopes to have up and running in January 2001. No final details of the scheme have yet been agreed, but he outlined the likely conditions all vessels would need to comply with:

-The vessel would not have been detained in the past 36 months.

-The ships owner would have no vessel detained in the last 24 months.

-The vessel would not be flagged with a targeted `flag state`.

-The vessel would not be classed with a targeted classification society.

Other conditions demanded by the Coast Guard would be that the vessel`s flag sate had made its self-assessment to the International Maritime Organization, and that assessment had been made available to the US. “ We want to reward those flag sates that want to be open,” Capt. Gilmour said.

In other comments on recent detentions, he hinted that a number of vessels detained in the US had been stopped for forged International Safety Management code certificates. ”Some had certificates, but there were questions of how those had been obtained,” he said.

Appendix F

Mars 200025 Manning and Fatigue

Lean manning in the coastal trade means small vessels do not carry an engineer. An overtired shipmaster recently told me, as I piloted his ship, that engines and electronics were troublesome. The ship had no engineer, and he and the mate were expected to look after engines with no training. He thought that the mate was better than he was because “ the mate has a motorbike at home, which he sometimes works on”.

It is a common place on vessels with this system for the pilot to be left alone on the bridge while the master sorts out ballasting, oil and temperature checks etc. It does beg the question of how a proper lookout can be maintained and what would happen in an emergency when the master may be needed both on the bridge and in the engine room.

Appendix G

Yet more inspections

We debated the subject of PSC/PSI at the last Nautical Institute Council, on which I have the honor of serving as a seagoing member. Several serving shipmasters, including myself, voiced our concern at the increased frequency of inspections, and at the unnecessary disruption and duplication of effort that they caused. My own vessel has now three PSI, one external and one interim ISM/SMS audit in the space of three months.

As mentioned during the debate was the apparent determination of PSI and auditor to find fault with the vessel by any means, to the extent of reporting defects that come under the heading of minor house keeping lapses which will always be evident during a port stay when engine room staff are usually busy doing routine maintenance and repairs which cannot be done at sea.

After all, if port state inspectors consistently report `nil defects` they might be seen, in the eyes of their respective administrations, not to be doing their job.

One such example of recent defect was crankcase and scavenge trunking doors missing or removed. The chief engineer pointed out that he was carrying out routine maintenance, calibrations and inspections in the crankcase and scavenge spaces as determined by the vessel`s planned maintenance system, which is an ISM/SMS and class requirement. However, this was still recorded as defect.

Two other recently reported defects were inadequate ventilation to the generators and no secondary means of starting the emergency generator. This was built under the rules of, and classed by, a leading IACS-registered classification society. These defects should have been addressed to the vessel`s flag state and the classification society concerned and not to the vessel, as major structural changes and modifications of this nature are obviously way beyond vessel`s control.

The following tale will be a news to the majority of shipmasters and chief engineers. This is the scenario: on one day in Rotterdam last year, discharging a cape-size bulk carrier, we had a port inspection; full ISM external audit; bunkers; bulk lube delivery; slops and sludge barge; garbage collection also by barge; major deck, engine and catering stores again by barge as there is no vehicular access to the ship`s side stores crane because of the belts and gantries; class surveyor for

inspection of CSM items; load testing of lifeboat gentry and other crane gantries; crew changes including two senior officers; master with less than eight hours rest in the past 48 hours and by rest is meant napping fully clothed on the settee; all engine staff trying to catch up on scavenge trunk and boiler cleaning and other jobs which cannot be done with main engine running; second officer preparing charts and passage plan for departure; chief officer nearly working nearly round the clock on cargo, ballast and stores; class surveyor and terminal workshop called twice to crop and weld inserts where the grabs had penetrated the hopper sides or double bottoms, and having to resort to the extreme measure of stopping cargo twice to prevent bulldozer drivers slamming the blades down on the hopper sides and side shell frames to shake the cargo down- the list is endless.

Luckily the master is not being relieved here because this will involve, on top of the normal familiarization period, completing the SMS hand over checklist comprising of158 items.

To cap this sorry tale is the fact that we are berthed at one of the most inhospitable and inaccessible bulk carrier terminals in the world, with drab and dreary view of the North Sea, the big highlight of our port stay being a trip to the local duty-free shop for few hands who can find time and energy to go ashore, or who are brave and foolhardy enough to tramp through the piles of slushy iron ore or coal on the quay side.

Adrenaline levels rise after the agents, normally very amiable and cooperative tells the master that he has forty minutes between completion of discharge and pilot boarding, as the terminal needs the berth. The agent and terminal are told in no uncertain terms that nothing less than two hours is acceptable, and if they don`t like it, please invite our friendly port state inspector down and we will quickly run through some of the ISM, SMS, Solas and STCW requirements; and they still do not like it, find another captain and crew.

Armed with six or seven hour`s sleep between the first and second day of discharge, the master can now look forward to about two days of almost continuous attendance on the bridge while he threads monster down the Euro Channel, North Sea TSS, the South Falls choke point and Dover Straits. Usually he will do the first couple of watches alone, or at least up to Noord Hinder junction, as the other officers have all far exceeded their STCW hours although he needs them for the

tricky bits as this is a two-man job on a vessel of this size. St Catherine's Point disappearing over the starboard quarter is usually the first break he will get.

The only note worthy event in the whole two-day port stay has been watching the superb ship handling skills of the pilots and tugs both inbound, and the slick and efficient organization of the whole Mass traffic system.

The moderate gale rounding Ushant is like a breath of fresh air as we head out into North Atlantic, once again masters of our own fate and destiny.

Captain N Cooper FNI, recife@ samarine corp.co.za

Appendix H

Study Concludes that one out of four vessels is manned by incompetent crew

An academic study based on the opinions of pilots has concluded that one in four vessels is manned by an incompetent crew. The results of the study were revealed at a symposium at the Seafarers International Research Centre in Cardiff. The research, which was conducted by professor Tony Lane- a maritime sociologist, asked pilots to evaluate crews on over 3000 vessels of various types and score them out of 100. Approximately 80% of the research was carried out in six European ports, while the rest was conducted in ports around the world in order to check the authenticity. The average mean score for all the crews was 77. On this basis a score of 60 was described as poor which applied to 25% of the survey population and a score of 60 as abysmal of which 10% were below.

China and Black sea countries scored below 70 while Liberia, Malta, Panama and Eastern Europe in the mid high to 70`s. The reports argued that poor training was the decisive factor for the worst performing countries. It is perhaps not surprising that China, as an emerging maritime nation, scored below 70. China is understood to be churning out 5000 officers and 20000 ratings a year and some believe that China will replace Philippines as the world`s largest supplier of seafarers in the not too distant future.

Drewry Monthly –November 1999