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M.Sc IN SHIPPING MANAGEMENT

Desired Soft Skills in Modern Shipping Era. A Behavioural Competencies Assessment System in Tanker Operations Towards a Safer and Efficient Work Environment

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Masters' Thesis

Which has been submitted to the Department of Maritime Studies as part of the prerequisites for the acquisition of the Masters' degree in Shipping Management.

Piraeus, December 2020

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The current Masters' dissertation has been unanimously approved by the Tripartite Examination Committee, which has been designated by Special General Assembly of the Department of Maritime Studies of the University of Piraeus, according to the Operating Regulations of the Masters' Programme in Shipping Management.

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The approval of the Masters' dissertation from the Department of Maritime Studies of the University of Piraeus does not imply acceptance of the writer's opinion. »

Acknowledgments

The following study **is part of a collective contribution**, effort and proof of team working culture. The following dissertation serves as an enquiry into the degree of adoption, penetration and permeation of soft skills into modern ship management practices, especially those related to the Tanker Management Self-Assessment (TMSA) programme. The full work is completed by Bertidis Orestis, Thymara Maria-Argyro and Tsilioris Dionysios, relevant partial dissertations.

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This dissertation is the third that I am implementing in my academic life and the experience in regards of research work is the most satisfying one. It helped me combing the knowledge I gained as a Mechanical-Management Engineer in Technical University of Crete with the modules of University of Piraeus, while in parallel led me to discover aspects of human behaviour that I had never explored so far. In order to sum up this research journey, I will attempt to re-phrase a famous philosopher's quote: "***It is not the behaviour of men that determines their being, but, on the contrary, their social being that determines their behaviour.***"

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Abbreviations

AIDS	Acquired Immune Deficiency Syndrome
ALARP	As Low As Reasonably Practicable
BBS	Behavior-based safety
BIMCO	Baltic and International Maritime Council
BMP	Best Management Practices
BRM	Bridge Resource Management
BTM	Bridge Team Management
CBT	Computer Based Training
CDI	Chemical Distribution Institute
CEEMP	Company Energy Efficiency Management Plan
CEO	Chief Executive Officer
COSWP	Code for Safe Working Practices
CSR	Continuous Synopsis Record
DOC	Document of Compliance
DPA	Designated Person Ashore
DTSA	Defend Trade Secrets Act
DWT	Deadweight tonnage
ECDIS	Electronic Chart Display and Information System
EnPIs	Environmental Performance Indicators
EPA	Environmental Protection Agency
ERM	Engine Resource Management
ESCA	European Secretariat for Cluster Analysis
EU	European Union
FAL	Facilitation Committee
FFE	Fire-Fighting Equipment
GSC	Generic Skills Compentencies
GT	Gross Tonnage
H&M	Hull and Machinery
HIV	Human Immunodeficiency Virus
HO/HA	Holds/hatches
HR	Human Resources
HRA	High Risk Area
HSQE	Health,Safety, Quality and Environmental
HSQEMS	HSQE Management System
HSSE	Health, Safety, Security and Environment
HSSQEE	Health,Safety, Security, Quality, Energy and Environmental
HVPQ	Harmonised Vessel Particulars Questionnaire
IACS	International Association of Class Societies
IAMU	International Association of Maritime Universities
ICAO	International Civil Aviation Organization
ICS	Institute of Chartered Shipbrokers
IG	Inert Gas
ILO	International Labour Organisation
IMCO	International Maritime Consultative Organisation
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
IMSBC	International Maritime Solid Bulk Cargoes

INTERCARGO	International Association of Dry Cargo Shipowners
INTERTANKO	International Association of Independent Tanker Owners
IOPC	International Oil Pollution Compensation Funds
IQ	Intelligence Quoteint
ISGOTT	International Safety Guide for Oil Tankers and Terminals
ISM	International Management Code
ISO	International Organization for Standardization
ISPS	International Ship and Port Facility Security
ISWAN	International Seafarers Welfare and Assistance Network
ITF	International Transport Federation
ITOPF	International Tanker Owners Pollution Federation
KPIs	Key Performance Indicators
LI	Leading Indicator
LLL	Lifelong Learning
LOA	Length Overall
LR1	Large Range 2
LR2	Large Range 2
LSA	Life Saving Appliances
MARPOL	International Convention for the Prevention of Pollution from Ships
MBA	Master of Business Administration
MEPC	Marine Environment Protection Committee
MHB	Materials hazardous only in bulk
MLC	Maritime Labour Convention
MOC	Management Of Change
MoU	Memorandum of Understanding
MR1	Medium Range 1
MR2	Medium Range 2
MRM	Management Review Meeting
MSC	Maritime Safety Committee
MT	Metric ton
NC	Non-Conformity
NGO	Non-Governmental Organization
NM	Near Miss
NOX	Nitrogen Oxides
NTNU	Norwegian University of Science and Technology
OCIMF	Oil Companies International Marine Forum
OECD	Organization for Economic Co-operation and Development
OHSAS	Occupational Health and Safety
OOW	Officer of the Watch
OPA90	Oil Pollution Act 1990
OVID	Offshore Vessel Inspection Database
P&I	Protection and Indemnity
PI	Performance Index
PMS	Planned Maintenance Systems
PPE	Personal Protection Equipment
PSC	Port State Control
PSF	Performance Shaping Factor
QCM	Qualified, Certified and Medically fit
QMS	Quality Management Systems
RA	Risk Assessment

RMIT	Royal Melbourne Institute of Technology
RO	Recognized Organization
SCT	Safety Critical Task
SCTA	Safety Critical Task Analysis
SEEMP	Ship Energy Efficiency Management Plan
SIGTTO	Society of International Gas Tanker and Terminal Operators
SIRE	Ship Inspection Report Program
SMC	Document of Compliance
SMCP	Standard Marine Communication Phrases
SMS	Safety Management System
SOLAS	Safety of Life at Sea
SOX	Sarbanes-Oxley
SPI	Shipping Performance Index
SPM	Single Point Mooring
SPM	Single Point Mooring
STCW	Standards of Training, Certification and Watchkeeping
SWA	Stop Work Authority
SWL	Safe Working Load
TCC	Technical Co-operation Committee
TML	Transportable Moisture Limit
TMSA	Tanker Management and Self-Assessment
TOVALOP	Tanker Owners Voluntary Agreement concerning Liability for Oil Pollution
TQ	Total Quality
TSS	Traffic Separation System
TSS	Traffic Separation System
UK	United Kingdom
UNCTAD	United Nations Conference on Trade and Development
USCG	US Coast Guard
VERP	Vessel Emergency Response Plan
VGP	Vessel General Permit
VIQ	Vessel Inspection Questionnaire
VLCC	Very Large Crude
VLOC	Very Large Ore Carriers
VOC	Volatile Organic Compounds
VPQ	Vessel Particular Questionnaire

Abstract

This dissertation serves as a partial enquiry into the importance of soft skills in terms of promoting a safer and more efficient work environment with regard to Tankers operations, both on board and onshore. This work investigates the importance of the human element in shipping and reviews the penetration of behavioural management practices – pertaining to the adoption of soft skill-oriented processes – in the safety and quality management systems of ship management companies, and suggests a path toward regulatory compliance and best practices.

This work aims presenting the regulatory framework within which Tanker management companies are required to operate. In identifying the pieces of legislation that underpin modern ship management, we first elect to focus on key international conventions including, *inter alia*, the four pillars of ship management, i.e. SOLAS, MARPOL, STCW and MLC. Furthermore, it focuses on those regulatory bodies directly involved in tanker ship management.

Scope and definition of tanker shipping operations and the human element role embodied to them is discussed as well as with the definition of what soft skills entail. Our analysis aims at establishing how to successfully manage interpersonal relationships and getting one's message across. Therefore, it is argued that on-the-job interplay in a modern workplace environment is the driving factor behind business outcomes. In that regard, we also argue that a workforce instilled with solid knowledge of soft skills leads to tangible results that are echoed in an organisation's productivity, revenues and overall profitability. Building upon the state of practice concerning the adaptation of soft skills in other industries, we then cast light upon soft skills in shipping operations. We examine the human capital in shipping and the nature of soft skills required for onboard and onshore operations. Tying with the aforementioned regulatory framework we also present how soft skills manifest in legislation relevant to shipping operations.

Finally an approach of a Behavioral Competency Assessment and Verification System for Vessel Operators is presented. This approach relies heavily on the work material and issues discussed in the previous chapters and is influenced by the Behavioral Competency Assessment System, of OCIMF and Intertanko 2018 relevant publication.

Key Words: Human Element, Soft Skills, Behavioural Management, Safety and Quality Management Systems

Περίληψη

Αυτή η διπλωματική εργασία χρησιμεύει ως μερική έρευνα για τη σημασία των soft skills όσον αφορά την προώθηση ενός ασφαλέστερου και αποτελεσματικότερου εργασιακού περιβάλλοντος των εταιριών διαχείρισης δεξαμενοπλοίων, τόσο επί των διαχειριστικών λειτουργιών (operations) επί πλοίου όσο και στην στεριά. Η εργασία διερευνά τη σημασία του ανθρώπινου στοιχείου (Human Element) στη ναυτιλία και εξετάζει τη διείσδυση πρακτικών διαχείρισης συμπεριφοράς (behavioral management) - σχετικά με την υιοθέτηση διαδικασιών με γνώμονα τις δεξιότητες - στα συστήματα διαχείρισης της ασφάλειας και της ποιότητας των εταιρειών διαχείρισης πλοίων και προτείνει διαδρομές προς τη συμμόρφωση με τους κανονισμούς αλλά και βέλτιστες πρακτικές για το μέλλον.

Επιλέγουμε να οριοθετήσουμε αρχικά τη συζήτηση για τα soft skills αναφερόμενοι στους τέσσερις πυλώνες της ναυτιλιακής νομοθεσίας, ήτοι τις συμβάσεις SOLAS, MARPOL, STCW και MLC. Αναζητούμε που και πως γίνεται αναφορά σε πρακτικές όπου εντοπίζεται η ανάγκη ανθρώπινης αλληλεπίδρασης, εφαρμογής διαπροσωπικών δεξιοτήτων και απαιτείται η ανάπτυξη δομών εκπαίδευσης των ανθρώπων σε θέματα που ξεπερνούν την αυστηρή τεχνοκρατική κατάρτιση και άπτονται των ανθρώπινων σχέσεων και διαπροσωπικών αλληλεπιδράσεων

Επιλέγουμε να θεμελιώσουμε την εργασία μας και να ορίσουμε τη σημαντικότητα των soft skills στο χώρο της ναυτιλίας αφού πρώτα έχουμε αναγνωρίσει την κεφαλαιώδη σημασία του ανθρώπου – των ναυτικών και του προσωπικού στη ξηρά – για την ασφαλή περάτωση των λειτουργικών δραστηριοτήτων τόσο εν πλω όσο και στη ξηρά. Με την έννοια ασφάλεια υιοθετούμε την αγγλική ερμηνεία του όρου η οποία είναι διττή περιλαμβάνοντας τόσο στοιχεία του safety όσο και του quality.

Τέλος, παρουσιάζεται μια προσέγγιση ενός συστήματος αξιολόγησης και επαλήθευσης ικανοτήτων συμπεριφοράς για τους διαχειριστές δεξαμενοπλοίων.. Αυτή η προσέγγιση βασίζεται σε μεγάλο βαθμό στο υλικό εργασίας και σε θέματα που συζητήθηκαν στα προηγούμενα κεφάλαια και επηρεάζεται από το Σύστημα Αξιολόγησης Συμπεριφοράς Ικανότητας, (Behavioral Competency Assessment and Verification System) της σχετικής έκδοσης του OCIMF και του Intertanko 2018.

Λέξεις κλειδιά: Human Element, Soft Skills, Behavioural Management, Safety and Quality Management Systems

CHAPTER 1: INTRODUCTION

The Maritime history, to a large extend, is a history of human character against all odds. Since the creation of the first dugouts 6 000 years BC, all the way through the age of discovery, the difference between the successful and the unsuccessful voyage has laid in the ability of the crews to make decisions, stay resilient and maintain confidence amidst the fury of nature. Today, shipping affects the lives of billions of people, with 90% of the world's international trade travelling by sea.

The main goal of this paper is to provide a description of the desired soft skills required on board and on shore for safe and efficient Tanker Operations. In this work not only we provide an extencive list based on main tanker operations and typical tanker company organizational chart but we present a more holistic approach by providing a behavioural competencies assessment system.

This research aims to assess the desired Soft skills importance in Terms of promoting a safer and more productive operation and business environment, review and enhance the penetration of behavioural management practices focusing on the adoption of soft skill-oriented processes - in the safety and quality management systems of ship management companies.

At the second chapter we examine the importance of human element in the safety and efficiency of shipping operations. We present the typical operations tanker's operations and we discuss the importance of human element within them. Afterwards we discuss the Regulatory Scheme in tanker shipping operations and the international bodies and finally we assess the need towards behavioural management in shipping industry new era.

At the Third Chapter we discuss the rough definition of soft skills, their importance in modern workplace and other worldwide industry's practice. Examining the very nature of required on board and on sore soft skills we correlate human aspects and shipping operations so as to extract the desired soft skills for every job position of a typical tanker management company

Finally we present an approach of a Behavioural Competency Assessment and Verification System, based on OCIMF and Intertanko 2018 relevant publication.

CHAPTER 2: THE IMPORTANCE OF THE HUMAN ELEMENT IN THE SAFETY AND EFFICIENCY OF SHIPPING OPERATIONS.

The International Maritime Organization (IMO) suggests that the human element is a complex-multidimensional issue that affects maritime safety and marine environmental protection. It [the human element] involves the entire spectrum of human activities performed by ships' crews, shore based management, regulatory bodies, recognised organisations, shipyards, legislators, and other relevant parties, all of whom need to cooperate to address human element issues effectively.

The human element plays a most significant role in the safe prosecution of a voyage, as it also unfortunately does in errors that can result in collisions or groundings, minor or catastrophic to name a couple of types of accidents. Ships' crews today are, more often than not, of a mix of nationalities, languages and cultures, and, again, oftentimes of a different nationality to shore based employees. The need for clear understanding and fluent channels of communication has never been more important.

2.1. Scope and definition of shipping operations

With so many different types of ships, the requirements to operate them safely and effectively are undoubtedly demanding. Some argue that first and foremost a competent Master and crew are needed. They are the people who will work on board, cater for the ship, meet charter party requirements, raise the standard of the ship's maintenance, and are instrumental in reducing the cost of running the ship. All of the above must be achieved without jeopardising the standard of safety and security on board. Ship managers need to support the crew, and, in many cases, this cannot be achieved without them understanding the operation of the ship type for which they are responsible.

In addition, ship operators must be able to speak in two languages when items of concern are raised, the languages of money and things. The management and especially the senior management of the company talk in the language of money. The Master and crew talk in the language of things. It is the responsibility of the operations department to be able to convert the languages being used from one to the other so that the items under discussion are fully

understood by the other party. This applies not only to the ship manager but also to the Designated Person Ashore (DPA). It must not be overlooked as in the past, as well as nowadays, this failure to understand where the other party is coming from has resulted in miscommunication, delays for ships and vessels senselessly exposed to the perils of the sea.
In greater detail, it has been argued that ship management companies fall into two main categories. One type is the shipowning company that manages its own ships and offers the same service to the other shipowners. The other is a company that has no ships of its own and solely provides ship management services to shipowners.

Either way, the ship management function is the same and has the following seven components:

- Crewing
- Storing
- Technical
- Insurance
- Operations
- Commercial
- Training

With the above in mind, it can also be argued that an essential task of shipping operations is to ensure that the ship carries out the tasks to which it has been committed by the commercial staff, i.e. the chartering department, who arranged its employment. Employment can involve carrying in-house cargoes, operating in the spot market or may even involve operating on a liner service, although that will rarely be the case for oceangoing bulkers and tankers.

The operations department will know from the technical department that the ship is ready to carry out revenue-earning work and the commercial staff will have explained what the commitment is. It is then up to the operations staff to carry out all the many tasks needed to fulfil this commitment. For example, an essential job is to ensure that the ship is sent to the right place at the right time and then told where to go next.

Decisions have to be made as to how much bunker fuel will be the ideal quantity and where this should be taken on board. Similarly, it needs to be ensured that the agents at all ports of call are advised and act upon the instruction received and within the scope of their authority. Crew changes have to be organised at the appropriate intervals and careful planning can avoid expensive air travel for crew members leaving or joining the ship.

Bunkering is another key area of shipping operations. Bunkering, i.e. arranging fuel for ships is not a task to be undertaken lightly because lack of skill and attention could have adverse effects ranging from mere loss of profit to severe damage to the machinery and even to major disaster. There are three aspects of bunkering; quantity, quality and cost and they are all interdependent. It can also be argued that there is a fourth consideration, time.

As mentioned previously, crewing is of course another activity central to shipping operations with the human element lying at its very centre. The number of a ship's officers and rating will vary depending on the size of the ship, but other factors can also influence the number of seafarers onboard the ship. Administering a ship's crew demands a well-disciplined organisation. Apart from the recruitment of the crew members, the task of ensuring they get the correct wages at the correct time is vital. Even minor issues or mistakes committed by the crewing department can become sources of irritation and consequent poor morale. The department should therefore be well founded so that data about basic pay, overtime, bonuses and so on feeds into the system smoothly.

In fact, even with fist-class departments in the ship manager's office, and despite all the technological advances made over the last century, a ship's eventual success or failure will depend on its officers and crew. This is a very actual concern since as we write these lines, more than 300,000 commercial ship workers, the lifeblood of global commerce, are now stranded on vessels because virus control measures and travel restrictions have prevented crew rotations. With about 80 per cent of trade carried by ships, the world's two million merchant seafarers are vital to deliveries of everything from oil, gas, and iron ore, to grain, fresh fruit, TVs, and automobiles.

Apart from maintaining basic efficiency, a crew department can make a positive contribution to the company's profitability. Most contracts with crew members are for specific periods of time with appropriate leeway to allow time for a voyage to complete. Careful coordination with the timing of voyages can ensure that crew changes take place at the shortest travelling distance away. Precise timing can save accommodation costs for crew members arriving too early, or worse still, holding the ship up for a crew arriving too late. Even shopping around for the best deal from an airline or travel agent can make a worthwhile contribution to the crew department's budget.

Precise record keeping of seafarers' certificates and their validity periods is another essential particularity as this is an aspect often targeted by port state control inspectors. A ship can be detained for the simple reason that one of the crew's competency or medical certificates has expired. To avoid such events, a crew department will need to ensure that the appropriate action to renew certificates is taken in good time.

As well as certificates required under the STCW, crew members on ships visiting certain countries will need to obtain visas in advance of arrival if they wish to be permitted to go ashore during port stays. Similarly, some ports are situated in areas where diseases such as yellow fever are prevalent. Crew should be vaccinated against these diseases before visiting such ports and may be required to prove that they have been vaccinated by authorities at subsequent ports of call.

Being the focus of this report, the shipping industry depends on competent, well-trained seafarers to ensure the safety of life at sea, maritime security, the efficiency of navigation and protection and preservation of the marine environment. It has been established that the human factor is the main culprit in maritime disasters; qualified, certified and medically fit (QCM) personnel in line with the standards set by the international conventions mitigate the potential to cause catastrophic damages that could bankrupt the company and even merit criminal liability for its senior management.

Continuing with what is included under the scope of shipping operations, stores (supplies) fall into two classes: those items concerned with the crew and those concerned with the operation of the ship. Some of the latter will be the responsibility of the technical department.

For the crew, the obvious items are food and drink, which some still call victualling, but now are more usually termed provisioning. This can be a demanding task, as each nationality has its own food preferences, often determined by religious or cultural needs. In many cases, the ship's commend is given a budget within which it has a high degree of control over buying supplies. Nevertheless, close supervision is essential. Other stores for the crew include such things as bed linen, cleaning materials and cooking utensils. For the ship itself, stores further divide into two categories: deck and engine room. Deck stores include materials needed for cargo operations such as ropes for lashing, and timber for dunnage. Specialist items such as tank cleaning and refrigeration materials, and also paints and other materials for routine maintenance, fall under the deck stores heading. Engine-room stores include lubricants, but spare parts are usually the responsibility of the technical department.

Mention has already been made to the technical department which is often subdivided into two sections. One will be under the management of the marine superintendent, usually a former master mariner. The other will be managed by the engineering superintendent, generally a former chief engineer. The former are responsible for the fabric of the ship and for keeping the classification surveys up to date, while the latter are concerned with the ship's machinery, including the cargo-handling equipment and sometimes also electronic devices.

Close cooperation between the technical people and the other departments is essential for the success of shipping operations. For example, routine drydocking is another major activity which must be harmonised with commercial commitments. While many specialist tasks can be passed to the appropriate departments, the operations staff have to co-ordinate it all.

Ship operators require good communication skills to be effective at their job. They need to be able to understand what is being said by the people onboard the ship. They talk in the language of things and translate it into a language that will be readily understood by the senior management of the company. That can be said to be the language of money. If ship managers present a message from another party in the wrong language, then it will be misunderstood, and its effectiveness or impact will be lost. So being able to visualise the language to be used to ensure a successful conclusion is of paramount importance.

2.2. Human Element in Shipping.

Today, thanks to advancements in artificial intelligence and automation we have witnessed a process of "deskilling" - automation of many of the tasks onboard led to reduction of demand for technical skills. A new era seems to emerge, as interpersonal skills, self-management skills and ability to cope with unstructured tasks are about to become the main factor that differentiates between the low performing and the high performing crews. Even at our age and the times heralded to come, ever-increasing levels of automation, onshore and onboard applications of artificial intelligence and Big Data analysis do not lessen the importance of educated personnel that boasts an acute sense of responsibility and empathy, and has the capacity for clear verbal communication, team working, decision making and complex problem solving.

In Tanker Operators., TMSA 3 (new edition) makes an effort to overhaul the measure performance process, not only with the streamline of KPIs but also with the introduction of non-financial measurements and the assessment of soft skills. Furthermore, TMSA3 introduces a different approach by focusing on the human element and behavioural safety suggesting that crew competence is the tool for crew retention and development. Humans are not simply an element like the weather. They are at the very centre of the shipping enterprise. They are the secret of its successes and the victims of its failures. It is human nature that drives what happens every day at work – from the routine tasks of a ship's rating, right through to the policy decisions of the IMO.

Moreover, the success of tanker operations depends on people carrying out their tasks reliably and safely. It is therefore essential to focus on human element and the required so called "soft skills" that stem from human element actions. Conducting operations safely and without incidents relies on human competency, which comprises both technical skills (hard skills) and non-technical skills (soft skills). **The industry's main focus until now has been on developing and accessing technical skills**, with the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW Convention) being the main international convention addressing the competencies of seafarers. Any officer who holds a certificate of competency issued by a proper authority that meets STCW Convention requirements is qualified

to serve in that rank. Since 2010, the STCW Convention also refers to soft skill competencies such as leadership and managerial skills, decision making, teamwork and communication.

Our research begins with David J. Deming statements at his relevant study. "*The skills and tasks that cannot be substituted away by automation are generally complemented by it, and social interaction has - at least so far - proven difficult to automate (Autor 2015). Our ability to read and react to others is based on tacit knowledge, and computers are still very poor substitutes for tasks where programmers don't know "the rules" (Autor 2015). Human interaction requires a capacity that psychologists call theory of mind - the ability to attribute mental states to others based on their behaviour, or more colloquially to "put oneself into another's shoes*" (Premack & Woodruff 1978; Baron-Cohen 2000; Camerer et al. 2005)." At the same study, the importance of soft skills regarding their growth in the Labour market is demonstrated at the below Figure 1.

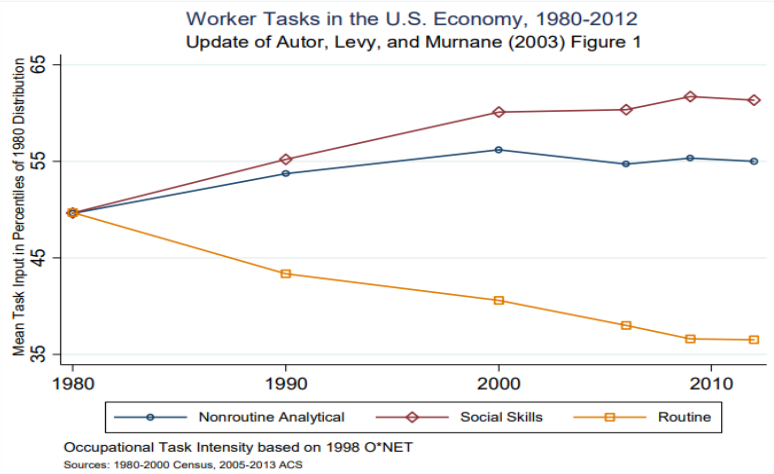


Figure 1: Worker tasks in the US Economy 1980-2012 (Levy & Murnane)

In fact, soft skills and personal attributes can be just as important as technical skills. Ten of the sixteen 'crucial proficiencies for education in the 21st century' identified by the World Economic Forum are non-technical.

What is more, in terms of shipping operations, shipping industry continues to face challenges in safely moving environmentally sensitive cargo around the world. As it is stated on the Human Element guide, since 1970 the industry has made great strides in reducing the number of incidents, presenting a remarkable safety and environmental record. Unfortunately, many incidents still occur despite rules and regulations. Analysis of the contributing factors in all shipping sectors shows that the major factor is the human element. Conducting operations safely and without incidents relies on human competency, which comprises both technical skills (hard skills) and non-technical skills (soft skills).

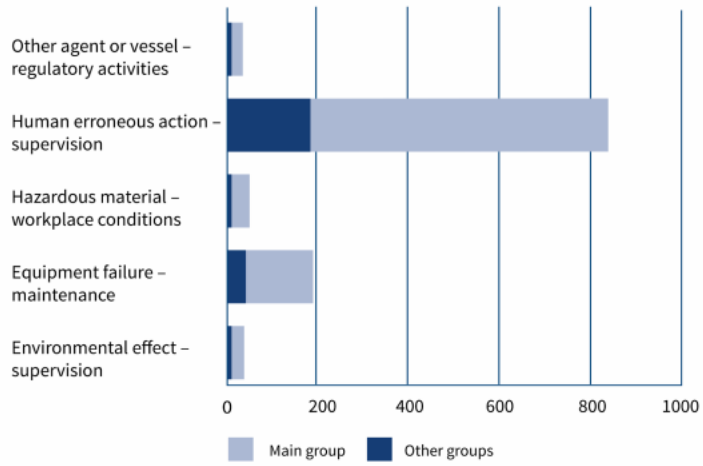


Figure 2: Groups of contributing factors 2011–2018 (Source: EMSA 2017)

Discussing about soft skills, we cannot avoid referring to the diffusion with the **human element.** The 'human element' is misnamed. It implies something that happens at the sidelines – a piece of the picture that is hopefully being dealt with by some specialist or other. Or else it implies that it's 'just one of those things' – a bit of a mystery about which we can do little more than shrug our shoulders and hope for the best. But humans are not simply an element like the weather. They are at the very centre of the shipping enterprise.

They are the secret of its successes and the victims of its failures. It is human nature that drives what happens every day at work – from the routine tasks of a ship's rating, right through to the policy decisions of the IMO. Fortunately, there is a lot that is known about human nature – and a

lot of practical things that can be done to ensure people play to their strengths – while avoiding the pitfalls. So, what do we mean by human nature? In regard to shipping operations, we focus on the following aspects of **human nature**:

1 People make sense of things
2 People take risks
3 People make decisions
4 People make mistakes
5 People get tired and stressed
6 People Learn and develop
7 People Work with each other
8 People communicate with each other

2.3. Successful Tanker operations; the role of the human factor on board and onshore.

Lloyds Register accepts that there is no accepted international definition of the human element, whereas the USCG defines it *as human and organisational influences on marine safety and maritime system performance*. Expanding the USCG's definition and in the context of shipping business, the human element can be taken to embrace anything that influences the interaction between a human and any other human, system, or machine onboard the ship and onboard.

Although the phrase *human element* may be new, the effects of people on maritime safety have been evident as long as mankind sailed the seas. The people, systems and machines have changed, through the increase in technology, developments in legislation and the drive to reduce operating costs. This has resulted in a reduction in manning scales and the employment of multinational, multicultural and multilingual crews.

It is widely accepted by both academia and practitioners that the human element issues need attention across the maritime industry, as they are becoming critical for the following reasons:

- The norms of past experience amongst the seafaring population are not immediately transferable to computer-based systems and other new technologies.

- Competition is shipping services has reduced manning levels so that back up may not be available in critical situations.

- Ships are operating to tighter schedules and to more critical tolerances.
- Ships are becoming more integrated into transport chains, so the consequences of failure are greater.

- There is growing international public pressure to protect the marine environment.

- The majority of the crews are employed from supplier countries which may have different cultures and languages, and differing attitudes towards lifestyle, training and education, compared with the operator.

- Shipyards and equipment manufacturers are concerned with optimising their production methods and do not always work together to develop integrated, operator-focused systems.

- Lack of attention to the human/system interface, in terms of design, layout and integration of systems, and training in their use, is the root cause of many accidents.
- Ships trials do not fully test all the ship systems.

- Competence requirements are not keeping pace with changes in regulation and technology.

- International regulation lags behind the operational needs of modern ship systems.

- There are ship types (container, passenger, gas etc.) that are getting larger, such that the consequences of a single failure are more significant.

Furthermore, it can also be argued that there are four considerations about human resources when it comes to successful shipping operations:

- Personnel: the company ensured the correct mix of people onboard to operate and maintain the ship and its systems.

- Manning: the company ensures ships have the number of people required for the safe operation and security of the ship and for the protection of the marine environment in both normal and emergency situations.

- Training: the company continues to ensure personnel are competent and familiar with the ship and its systems.

Whereas personnel, manning and training refer to human resources, the discussion about the human element can also include several considerations about the human factors that a ship management company should bear in mind, cultivate and cater for in the course of the safe and successful operation of its fleet:

- **Habitability**: the company ensures accommodation, washing and toilet facilities, messrooms, group meeting and exercise areas are comfortable, clean (or cleanable) and convivial.

- **Manoeuvrability**: the company ensures its ships have the most appropriate manoeuvring capabilities.

- **Workability**: the company ensures its ships and systems are appropriate for the work situation.

- **Maintainability:** the company ensures operational maintenance tasks, manuals, diagnostics, and schematics are rapid, safe, and effective to allow equipment and systems to achieve a specified level of performance.

- Controllability: the company ensures appropriate integration of people with equipment, systems, and interfaces.

- Survivability: the company ensures that there are adequate firefighting, damage control, lifesaving and security facilities to ensure the safety and security of crew.

- Occupational health and safety: the company ensures appropriate consideration of the effect of work, the working environment and living conditions on the health, safety and wellbeing of seafarers.

- System safety: the company ensures appropriate consideration of the risks from people using (or misusing) ship systems.

Lloyd's Register's *The Human Element: Best Practice for Ship Operators* suggests that a four level categorisation of ship management companies depending on the involvement of the human factor in their operations.

- **Level 1** - Reactive: feedback on human element issues is gathered, the company listens to issues, reviews them and acts on them.

- **Level 2** - Proactive: the ship operator seeks out human element issues, takes action to gather data, and then acts on it.

- **Level 3** - Managed: human element issues are addressed as part of a plan, and there is a managed programme of work considering them.

- **Level 4** - Optimised: the ship operator is able to consider human element issues as part of the business strategy and to make costed trade-offs between topics such as manning, automation and operations.

From the above, it can be inferred that successful shipping operations have the human element – the capacity of the people to interact – at their core.

2.3.1. Tankers and their operations

Oil tankers generally fall into two types: smaller vessels up to Panamax which carry products and larger vessels which generally carry crude, but both of these share a lot of common characteristics. All oil tankers are double hull with segregated ballast tanks, manifold systems, hose-handling cranes and venting systems, and all over 20,000 dwt are fitted with inert gas (IG) systems. Most modern vessels are fitted with cargo heating systems consisting of heating coils. The cargo compartment of the majority of tankers is, like the bulk carrier, divided by a series of transverse bulkheads into cargo tanks numbered from the bow.

Table 1: Tankers carriers Characteristics

Type	DWT	Coated	Coiled	LOA	Beam	Draft	Tanks
Handysize	20-40,000	Y	Y	175,50	29,20	9,50	12
MR1	40-50,000	Y	Y	179,99	32,23	12,61	12
MR2	50-55,000	Y	Y	186,00	32,23	13,02	12
LR1	65-80,000	Y	Y	228,00	32,24	14,47	12
Panamax	60-80,000	N	Y	228,60	32,26	14,52	12
LR2	80-120,000	Y	Y	243,96	42,00	14,92	12
Aframax	80-120,000	N	Y	228,60	42,03	14,80	14
Suezmax	140-180,000	N	Y	275,00	50,00	16,00	14
VLCC	250-340,000	N	Y	332,00	60,00	22,00	15
Matrix 2. Tankers							

Owing to the sensitive nature of the cargo being transported (crude oil, gasoline, diesel fuel, fuel oil and petrochemicals), tankers have usually been the instigating factor leading to the adoption of key pieces of maritime legislation, usually in the wake of a high profile accident involving pollution to the environment by the escaping liquid cargo.

For example, in the beginning in the 1960s, great concerns about pollution were raised by a series of disastrous accidents involving tankers, including the 1967 grounding of the *Torrey Canyon* off Cornwall, England, the 1978 breakup of the *Amoco Cadiz* off Britanny, France, and the 1989 grounding of the *Exxon Valdez* off Alaska, U.S. The oil spills from these vessels caused

great damage, and political reaction led to strict rules on the construction and operation of oil tankers.

Most notably, in 1973 the International Convention for the Prevention of Pollution from Ships (known as MARPOL) was adopted by the International Maritime Organization, an agency of the United Nations to which some 170 countries belong. A series of amendments to MARPOL have worked toward establishing a worldwide tanker fleet in which all but the smallest ships have double hulls or some suitable equivalent. In a double-hulled ship, the sides and bottom consist of two layers separated by a space sufficient to reduce the chance that an incident breaching one layer will breach the other. After 1996 all new tankers were delivered with double hulls or some alternative, and by 2026, according to the terms of the MARPOL amendments, all but the smallest single-hulled tankers are to have been rebuilt to a double configuration or are to be retired.

A more in-depth analysis of the regulatory framework and the conventions that underpin modern tanker ship management will follow in the next paragraphs of this chapter. However, it should be made clear that the idiosyncrasies of tanker shipping operations, as opposed to those of bulkers, which in their majority to do not transport cargoes harmful to the environment, have led operators to adhere to a more strict regime when it comes to safety and security. This is an environment that has fostered the adoption of sophisticated ship management practices and has allowed for a learned discussion on soft skills.

2.4. Regulatory Scheme in tanker shipping operations.

The Four Pillars of Maritime Law play an important role in the levels of safety and environmental protection seen present across the shipping industry today. These standards would not be possible without a mutual, global effort to uphold the conventions and drive further improvements.

To monitor for compliance of each of the four pillars, Port State Controls (PSCs) of member flags may inspect a ship from a different flag state (and MoU) if there are clear grounds for believing that the ship, its crew, equipment or certification do not comply with the requirements of the SOLAS, MARPOL, STCW and MLC Conventions.

Ongoing work is completed by the relevant governing bodies, with the support of the wider maritime industry, to ensure each of the Conventions remain up to date in addressing current maritime operations, procedures, technologies, and concerns.

2.4.1: IMO – International Maritime Organization

Since its founding in 1948, the International Maritime Organisation (IMO) has played a key part in the structuring of policy and procedure across the global maritime industry. Alongside its sister-agency, the International Labour Organisation (ILO), a number of crucial, internationally recognized agreements have been enforced.

The IMO is the United Nations (UN) specialised agency with responsibility for the safety and security of shipping and the prevention of marine pollution by ships. Initially established as the International Maritime Consultative Organisation (IMCO) in 1948, it achieved full status as an agency of the UN in 1958. Its headquarters are in London.

The governing body of the IMO is the Assembly, which meets once every two years. The Assembly consists of 171 member states and three associate members. A Council of 30 member states elected by the Assembly, acts as IMO's governing body, known as the Council between the Assembly sessions.

In addition to the Assembly and Council there are five main committees: the Maritime Safety Committee (MSC), the Marine Environment Protection Committee (MEPC), the Legal Committee (LEC), the Technical Co-operation Committee (TCC) and the Facilitation Committee (FAL). A number of subcommittees support the work of the main technical committees.

The committees have contributed to promoting the adoption of some 30 conventions and protocols which fall under three main groups: maritime safety, the prevention of marine pollution and liability and compensation, especially in relation to damage caused by pollution. Outside the three major groups are a number of other conventions dealing with facilitation, tonnage measurement, unlawful acts against shipping and salvage. IMO has produced more than 600 codes and recommendations on related matters.

The IMO itself has **no direct power to enforce its conventions**. When they are adopted, they will be incorporated into the laws of the flag state, who are then responsible for ensuring compliance. The work of surveying and the issuing of certificates of compliance is dealt with by classification societies. Inspection and enforcement is undertaken by flag state coastguard agencies and port state control organisations. With the key goals of improving safety to ships, their operation and lives that sail upon them, in addition to improving the protection of the marine environment from pollution caused by routine operations and accidental damage, four key Conventions have been put in place to mandate requirements and standards surrounding safety procedures, pollution prevention practices, seafarer training and qualification, and labour laws of the maritime industry.

2.4.2: SOLAS – Safety of Life at Sea

Overview

With one of the industry's main concerns being the safety of crew and personnel on board vessels, SOLAS – Safety of Life at Sea – is generally regarded as the most important of all international Conventions.The international SOLAS Convention sets minimum safety requirements for the construction, equipment, and operation of merchant ships. The 14 chapters currently included in the SOLAS Convention consist of a range of codes and regulations which specify the minimum safety standards for the area mentioned above.The SOLAS Convention does not apply to all ships. Only vessels travelling international waters (excluding warships, cargo ships of less than 500 GT, non-propelled ships, wooden ships, non-commercial pleasure yachts and fishing vessels) will be held accountable to the standards enforced by SOLAS.All signatory flag states must ensure all ships registered under their flag comply with the standards set out under SOLAS. Certificates are issued to a ship to confirm that these standards have been met.

Current Operation

Still maintained by the IMO, today the SOLAS 1974, as amended, Convention continues to mandate basic safety aspects for ships travelling in international waters, such as machinery, fire protection, and lifesaving appliances. The SOLAS Convention is regularly updated and amended to remain abreast of the changing needs, technologies, and risks of the maritime industry. An up-to-date, detailed outline of the SOLAS Convention chapters can be found on the IMO website.

2.4.3: ISM CODE

The International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code) is also part of the SOLAS Convention. The background of to the introduction of the Code was a series of very high-profile maritime losses during the 1980s and early 1990s. In particular the loss of the Dover-Zeebrugge ferry *Harald of Free Enterprise* in 1987 with a large passenger death toll was almost entirely the result of a lack of safety management procedures. This was followed shortly after by the loss of the ferry *Estonia* in the Baltic and, although there was more doubt about the proximate cause, safety management was certainly a factor. There were other ferry incidents, not only in Europe but around the world.

However, although many of the total losses that occurred during this period were less high profile, a significant number were bulk carriers seriously or lost, sometimes without trace of vessel and crew. These were mostly large bulk carriers but there were also some new and well-maintained container ships. In some of these cases, there were failures of side shell plating owing to corrosion, particularly in the areas of the side shell frames. In other cases, the losses were because of failures in risk recognition and subsequent management.

The stated objectives of the ISM Code are set out in the preamble, paragraph I:

1.2.1 The objectives of the Code are to ensure safety at sea, prevention of human injury or loss of life, and avoidance of damage to the environment, in particular to the marine environment and to property.

1.2.2 Safety management objectives of the Company should, inter alia:

- *provide for safe practices in ship operation and a safe working environment*
- *assess all identified risks to its ships, personnel and the environment and establish appropriate safeguards and*

- *continuously improve safety-management skills of personnel ashore and aboard ships, including preparing for emergencies related both to safety and environmental protection*

1.2.3 The safety management system should ensure:

- *compliance with mandatory rules and regulations; and*
- *that applicable codes, guidelines and standards recommended by the Organization, Administrations, Classification Societies and maritime industry organizations are taken into account.*

The object of the ISM Code is safety management coupled with continuous improvement. There has to be an audit trail to prove this and the management office is audited annually by external auditors authorised by the flag country. Each vessel must be audited twice every five years. Between these external audits the managers must undertake internal audits to ensure that there is continuing compliance and must retain the documentary evidence of the internal audits. The audits have to show that what is written in the procedures actually takes place in practice and that there is evidence to support this.

2.4.4: MARPOL – The International Convention for the Prevention of Pollution from Ships

Overview

MARPOL – The International Convention for the Prevention of Pollution from Ships – is the main international maritime Convention covering the prevention of environmental pollution by ships. MARPOL covers pollution prevention from a routine operational and accidental perspective.

In addition to setting standards for the discharge and cleaning processes of operational shipping waste, the MARPOL Convention also sets standards for the stowing, handling, and transfer of hazardous cargoes. Unlike SOLAS, the MARPOL Convention applies to vessels of all types flagged under a State member of the Convention, or that operate within its jurisdiction, regardless of where they sail. Signatory flag states are obliged to incorporate MARPOL requirements into domestic law.

Current Operation

MARPOL remains under the governance of the IMO and has undergone further amendments over the years. Six technical annexes continue to specify regulations aimed at preventing and minimizing pollution from ships. One of the most recent updates to come into force was the IMO 2020. Under Annex VI, regulation 14 of the MARPOL Convention, the IMO set a limit for the Sulphur content in fuel oil used on board ships.

The new limit of 0.50wt% will significantly reduce the amount of Sulphur oxide produced by ships, resulting in far-reaching health and environmental benefits. The new regulation applies to all ships of member states, regardless of size, operation, or destination. An up-to-date, detailed outline of the MARPOL Convention Annexes can be found on the IMO website.

2.4.5: STCW – Standards of Training, Certification and Watchkeeping

Overview

The STCW – Standards of Training, Certification and Watchkeeping for Seafarers – sets minimum qualification standards for personnel and crew of all levels on board a ship, including masters, officers and watch personnel.

Similar to the other pillars, the main purpose of the international Convention is to promote safety at sea, alongside the protection of the marine environment. STCW is helping to further achieve these goals through a common agreement which ensures similar programmes of training with equal standards are carried out by all seafarers of equal role and rank globally. The STCW Convention requires that training leading to the issue of certification is provided by an approved source.

The STCW standards apply to all ships greater than 24 meters in length and apply to all crew members. Certificates, minimum sea-time, and refresher courses are required for some roles. Unlike other Conventions, the STCW applies to ships of non-Party States when visiting ports of States which are parties to the Convention.

Current Operation

Like the SOLAS and MARPOL Conventions, STCW remains governed by the IMO. The STCW Convention is made up of the STCW Code and Chapters. The Code is split into Part A and Part B. Part A provides mandatory standards regarding the STCW Convention and its annex, while Part B details recommended guidance. The Annex is comprised of 8 Chapters, which are divided into Regulations.

2.4.6: MLC – Maritime Labour Convention

Overview

The MLC – Maritime Labour Convention – sets out minimum standards for seafarers working on a ship. The comprehensive Convention provides an internationally recognized, single source of regulation and guidance.

Under the MLC, seafarers will have minimum working and living rights covering:

- Contracts of Employment
- Pay
- Manning Levels
- Hours of Rest
- Leave Entitlement
- Repatriation
- Compensation for Ship Loss or Foundering
- **Career and Skills Development**

Current Operation

Today the MLC stands as the fourth pillar of international maritime law, building on the three other key IMO Conventions (SOLAS, MARPOL and the STCW), and further promoting and supporting maritime safety and environmental protection.

The Convention demonstrates how "*international cooperation can combine constructively for the most globalized of industries to concretely address the challenges to securing decent working and living conditions for seafarers, while simultaneously helping to ensure fair competition for ship owners*," says Cleopatra Doumbia-Henry, Director of the International Labour Standards Department of the ILO. Under the MLC, the national authority of

the party has the power to withdraw a ship's maritime labour certificate if requirements and conditions are found to be in breach of MLC standards. Channels are available for safarers to open a complaint should they feel the MLC is not followed on board a vessel. Although the Convention is not ratified globally, the MLC applies to all ships entering ports of parties to Convention. Consequences may be faced by any vessel not complying with the MLC.

2.4.7: International associations.

2.4.7:.1 intertanko

INTERTANKO (the International Association of Independent Tanker Owners) is a trade association that has served as the voice for independent tanker owners since 1970, representing the interests of its Members at national, regional and international levels.

The organization champions an industry dedicated to support global energy networks by delivering safe, efficient and environmentally sound transport services.

INTERTANKO works closely with its industry counterparts including the Oil Companies International Marine Forum (OCIMF), Chemical Distribution Institute (CDI), Society of International Gas Tanker and Terminal Operators (SIGTTO), International Association of Class Societies (IACS), International Group of P&I Clubs, the Port State Control MoUs, US Coast Guard, European Commission and many others.

A recognized Non-Governmental Organisation (NGO), it has, among others, observer status at the International Maritime Organisation (IMO), the United Nations Conference on Trade and Development (UNCTAD) and the International Oil Pollution Compensation Funds (IOPC), contributing actively to their work. Through this engagement, Members have the possibility to influence strategically important developments at the highest level.

INTERTANKO's mission is to provide leadership to the Tanker Industry in serving the world with the safe, environmentally sound, and efficient seaborne transportation of oil, gas and chemical products. Meanwhile, INTERTANKO's vision is for a responsible, sustainable, and respected tanker Industry, committed to continuous improvement with INTERTANKO constructively influencing its future.

INTERTANKO's Strategic Work Plan includes major issues, high-level actions, and targeted benefits to Association Members in five Main Focus Areas:

- **Safety**
- **Environment**
- **Operations**
- **Commercial Sustainability**

Further to the above, INTERTANKO produces a wide range of guidelines and commentaries on issues related to technical, marine, operations, environmental, commercial and charter party issues. Many of these guidelines are an essential complement to government and operational regulations.

2.4.7.2: Oil Companies International Marine Forum (OCIMF)

OCIMF was formed in April 1970 in response to the growing public concern about marine pollution, particularly by oil, after the Torrey Canyon incident in 1967.

In the early 1970s, a variety of anti-pollution initiatives were starting to emerge nationally, regionally and internationally, but with little coordination. Through OCIMF, the oil industry was able to play a stronger, coordinating role in response to these initiatives, making its professional expertise widely available through cooperation with governments and intergovernmental bodies. OCIMF was granted consultative status at the IMO in 1971 and continues to present oil industry views at IMO meetings. Since then, its role has broadened to take account the changing maritime activities of its membership. Its remit now covers safety, health, security, and the environment pertaining to tankers, barges, offshore vessels and terminal interfaces.

The current membership of **OCIMF** comprises well over 100 companies worldwide. Today, OCIMF is widely recognized as the voice of the oil industry providing expertise in the safe and environmentally responsible transport and handling of hydrocarbons in ships and terminals and setting standards for continuous improvement. Membership is extensive and includes every oil major in the world along with the majority of National Oil Companies.

OCIMF has much to be proud of. Not only has it contributed to a substantial quantity of regulation at the IMO aimed at improving the safety of tankers and protecting the environment, but it has introduced important new guidance on pressing current issues such as piracy and Arctic shipping. With the process of introducing new Internationally-accepted regulation necessarily slow as it crosses many individual countries and jurisdictions, OCIMF is in the unique position of being able to leverage the expertise of its membership to press ahead with much needed guidance on important industry issues. This provides the means to improve practices in the membership and in the wider industry and serves as a valuable reference for developing regulation.

In addition to its extensive publications library, OCIMF has a rich portfolio of tools including its Ship Inspection Report (**SIRE**) programme and Tanker Management and Self-Assessment tool **(TMSA**), both of which have gained worldwide recognition and acceptance. It continues to develop new tools, with OVID the latest to be launched in January 2010, and a new Terminals inspection tool in development.

SIRE and VIQ

In 1993, OCIMF established a Ship Inspection Report (SIRE) Programme, which enabled OCIMF members to submit their ship inspection reports to OCIMF for distribution to OCIMF members and certain qualifying non-OCIMF members.

Under the SIRE Programme, the operator of any ship that is the subject of a report was given a copy of that report and the opportunity to submit written comments relating to the report, to both the inspecting OCIMF Member and to OCIMF.

Report recipients accessed the SIRE System Index by computer and this permitted the index to be viewed or downloaded. Programme recipients could order reports and any matching operator comments from the SIRE system. Reports and comments were transmitted by facsimile to the programme recipients' pre-registered facsimile numbers on request.The programme requires that participating submitting companies follow a uniform Vessel Inspection Procedure. This procedure has an Inspection Element and a Report Element. The Inspection Element uses a series of detailed inspection questionnaires as appropriate for the type of vessel inspected. These questionnaires address issues associated with safety and pollution prevention. Inspectors who are employed or contracted by submitting companies must (with certain exceptions) answer all these questions.

The Report Element is developed from the completed electronic questionnaire that is submitted by the Inspector, either directly to the SIRE web site, or to the submitting company for further processing prior to transmission to the vessel operator and to SIRE.

Using the SIRE Vessel Inspection Questionnaires (“VIQs”)1

The inspection questionnaires used in this programme contain a series of questions related to safety and pollution prevention applicable to the type of vessel that is inspected. These questions are consecutively numbered and are logically grouped into separate chapters.

Each chapter contains a series of questions to be answered by the inspector. Questions may be accompanied by guidance, namely:

1. Guidance notes to inspectors;

2. Reference source(s) citing regulation(s) or industry guidelines pertaining to questions; and

[1] OCIMF, Vessel Inspection Questionnaire Section 3.1

3. An indicator to identify issues when an inspector comment is mandatory.

The above-mentioned guidance, regulatory/industry references amplify the questions, and these are provided to assist the inspector to answer the questions.

The inspector must respond to all the questions appropriate to the type of vessel being inspected. Failure to do this will mean that the inspection report cannot be transmitted to the SIRE Internet site for processing by the principal who commissioned the inspection.

2.4.7.3 THE International Tanker Owners Pollution Federation (ITOPF)

ITOPF was established in 1968 in the wake of the Torrey Canon oil spill. Its original function was the administration of an oil spill compensation scheme. The Torrey incident provided the catalyst for the world's tanker owners to create a voluntary scheme to ensure that compensation was available to those affected by oil pollution. The scheme was set out in an agreement known as the Tanker Owners Voluntary Agreement concerning Liability for Oil Pollution (TOVALOP). ITOPF was originally established for the purpose of administering this scheme.

Despite the dramatic reduction in major oil spills since the end of the 1970s, growing environmental concerns and media coverage meant that demand for ITOPF's expertise and impartiality in this field remained strong. ITOPF's experience also led to a broadening of its work to include advisory services (such as assisting governments and industry with contingency planning), training, education and the provision of information. ITOPF has been providing its key service of emergency response to tanker owners since the 1970s. From 1999 this service was formally extended to the owners of other types of ship as well. Over the years, has also provided advice on spills of other substances, including vegetable oils, cereals, coal, and containerized cargoes. During the last half century, ITOPF has attended over 800 incidents in 100 countries, including landmark cases such as the Amoco Cadiz, Exxon Valdez, Braer, Sea Empress, Erika, Prestige and Hebei Spirit.

2.4.8: Tanker Management Self-Assessment (TMSA).

The introduction of the International Safety Management (ISM) Code in July 1998 required companies to develop and implement a safety management system (SMS) for vessels within their fleet. This was intended to standardise and document management processes that would assist with the reduction in the number of accidents on board and help to protect the marine environment.

However, within the tanker sector, inconsistencies in the application of the Code from one company to another soon became apparent to vessel inspectors and oil company ship vetting departments. To help address this imbalance the Oil Companies Marine Forum (OCIMF) introduced the Tanker Management Self-Assessment (TMSA).

2.4.8.1: Definition and history

Historically, Tanker Management and Self-Assessment program was released in 2004 by OCIMF as a tool for tanker operators to measure, improve and evaluate their safety management systems. The initial version of the TMSA was originally intended for tankers of at least 500 GTT following the 1974 SOLAS Convention requirements, and as that, of the ISM Code.

Four years of experience and comprehensive feedback from the oil industry brought about the publication of TMSA 2 in 2008. TMSA 2 was updated to widen its application to all tank vessels, irrespective of size. The third edition of TMSA (TMSA 3) was introduced in April 2017. TMSA 3 revised and updated all of the twelve existing elements and introduced a thirteenth: “Maritime Security”. This latest edition has been updated to provide clarity of wording, improve consistency of language and make conducting the self-assessment much easier. This edition of TMSA reflects current legislation, emerging issues and incorporates feedback from shipping companies worldwide. All thirteen key elements of TMSA refer to aspects of ship management and operational activity that should feature in every safety management system.

The introduction of TMSA 3 coincided with the integration of the TMSA system directly into the Ship Inspection Report Program (SIRE) application. Previously, the SIRE and TMSA systems had been operated separately. The new combined SIRE/TMSA program provides an improved, single area to maintain all data related to a tanker's technical operator.

2.4.8.2: Scope

TMSA system is designed to help companies continually improve their SMS through developed phased improvements, determined from self-assessment and audit results. Mainly, the TMSA provides a standard framework of self-assessment of a company's SMS which is a basic pillar of the guidance and aids the understanding of the nature of the guidance as well as its orientation. The process of a company's self-assessment is conducted according to the listed key performance indicators and best practice guidance on how to acquire appropriate standards of safety performance. The results from this assessment can then be used to develop an improvement plan, using the stages of achievement described in the program, to achieve safety and environmental excellence.

2.4.8.3:. Elements

The TMSA 3 sets out 13 elements of management practice that are important for the successful vessel's operation and for a sufficient management system. Each element defines the Aims and KPIs required to meet the main objective, together with examples of best practice for each stage of the development process. The new edition makes an effort to overhaul the measure performance process, not only with the streamline of KPIs but also with the introduction of non-financial measurements and the assessment of soft skills. Furthermore, TMSA 3 introduces a different approach by focusing on the human element and behavioural safety suggesting that crew competence is the tool for crew retention and development.

Element 1 and 1A – Leadership and the Safety Management System

Element 2 – Recruitment and Management of Shore-Based Personnel

Element 3 and 3A – Recruitment Management and Wellbeing of Vessel Personnel

Element 4 – Vessel Reliability and Maintenance including Critical Equipment

Element 5 – Navigational Safety

Element 6 and 6A – Cargo, Ballast, Tank Cleaning, Bunkering, Mooring and Anchoring Operations

Element 7 – Management of Change

Element 8 – Incident Reporting, Investigation and Analysis

Element 9 and 9A – Safety Management

Element 10 – Environmental and energy management

Element 11 – Emergency preparedness and contingency planning

Element 12 – Measurement, analysis, and improvement

Element 13 – Maritime Security

2.4.8.4: Reasons that led to the implementation of TMSA

To be effective, a management system needs to be much more than just procedures. A company's management should define the values and aspirations and detail and also how the company intends to achieve the objectives of their stated policies. Management should provide adequate resources to ensure that the vessels are properly managed, crewed, operated and maintained. The management system should also include procedures which ensure that incidents and near misses are investigated to determine root causes, so that corrective and preventative actions can be implemented. There should be systems in place to analyse risk to ensure exposure to risk is considered at every level of management.

TMSA contains all of these elements and provides a structure to assist owners and operators to assess the effectiveness of their own safety management system with suitable tools; so as to measure and improve aspects identified as being sub-standard or weak.

The **benefits** of the TMSA to vessel operators are clear:

- Helps to drive up the standards of safety management systems, leading to fewer incidents.
- Encourages a continuous improvement approach to safety management.
- Embeds a preventative approach to maintenance, reducing unplanned stoppages and delays for repairs.
- The reduced the risk of incidents and delays/breakdowns feeds back over time into higher performance in terms of safety and environmental protection and enhances the reputation of the company.
- Companies that incorporate the TMSA guidelines into their management systems are considered to have an active assessment process, even if not being inspected under SIRE or having adopted ISM.
- Reduced risk of incidents feeds back over time into lower insurance costs and higher earnings.
- The process is not imposed upon vessel operators from outside. It is owned and managed by the operators themselves and the resulting data remains fully under their control.

2.5:. Capturing quality and designing processes; the ISO standards.

The development of management systems on the basis of optional standards relating to quality, the environment, health and safety, and energy performance is a widespread practice among companies. In today's world, quality is seen as a constituent part of services for every well organised shipping company and an important factor for its success. Shipping companies place strong emphasis on quality considering it as an important value adding attribute of their services (Lagoudis et al. 2006). Academic research into this subject is limited (Thai et al, 2014). Nevertheless, accounts given by companies confirm the benefits arising for them from the development of quality management systems for cost, internal efficiency, reputation and competitiveness.

Quality is a dynamic state associated with products, services, people, processes, and environments that meets or exceeds expectations and helps produce superior value.

- The traditional view is that quality is defined solely as meeting customer specifications. In this regard, quality is inspected into the product. The defects are an expected part of producing a product. It is considered as a separate function in the organization/ — it should be everybody's responsibility. In cases of poor-quality results, it is employers to be blamed for them.

Total quality (TQ) is an approach to doing business that attempts to maximize an organization's competitiveness through the continual improvement of the quality of its products, services, people, processes, and environments.

- The TQ view is that quality means satisfying customer needs and exceeding customer expectations. In this regard quality is determined by product and process design and achieved by effective control techniques. In TQ, the defects are to be prevented using effective Control Systems. Quality is considered to be fully integrated throughout the organization — it should be everybody's responsibility of the effective control systems. In cases of poor-quality results, it is believed that at least 85% of quality problems are management's fault.

In shipping, Management Systems includes practices, processes, and responsibilities, resources for establishing, developing, maintaining, and improving the **environmental** policy **quality** policy **safety** policy.

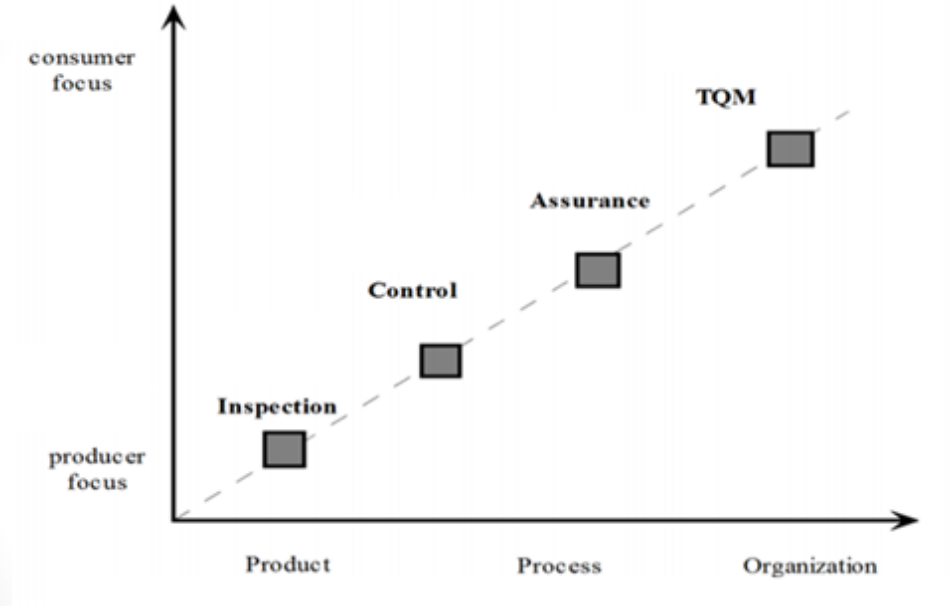


Figure 3: Total Quality Management System

In systems (Quality management systems) theory, W. Edwards Deming's played a significant role by developing the Known "Deming Cycle".

Deming Cycle was developed to link the production of a product with consumer needs and focus the resources of all departments in a cooperative effort to meet those needs. It includes the following:

Conduct consumer research and use it in planning the product **(plan)**

1. Produce the product **(do)**
2. Check the product to make sure it was produced in accordance with the plan **(check)**
3. Market the product **(act)**
4. Analyse how the product is received in the marketplace in terms of quality, cost, and other criteria **(analyse)**

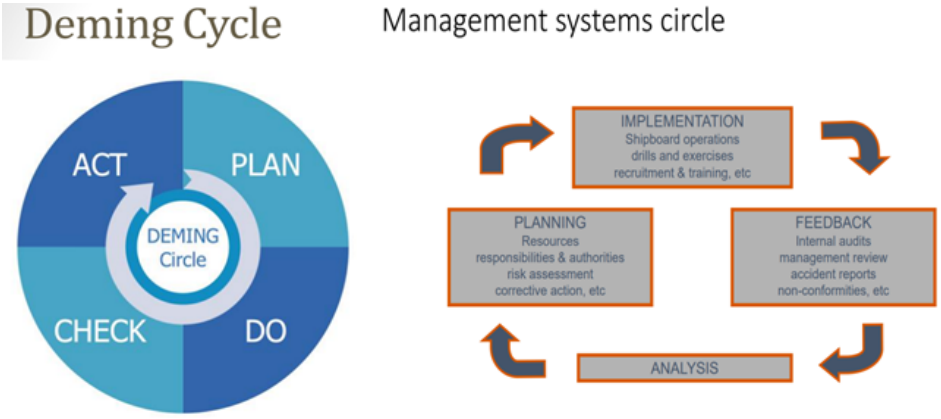


Figure 4: Deming and Management systems Cycle

The cycle of "Plan - Do - Check - Act" is also known as the Control Circle, or **PDCA**.

Kaoru Ishikawa has expanded Deming's four steps into six:

1. Determine goals and targets.
2. Determine methods of reaching goals.
3. Engage in education and training.

4. Implement work.
5. Check the effects of implementation.
6. Take appropriate action.

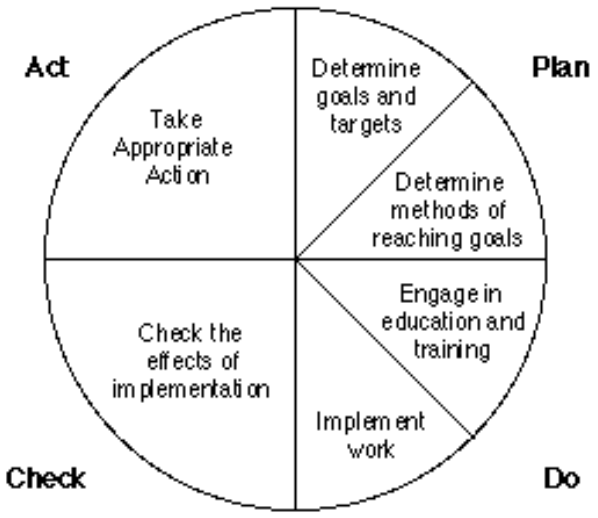


Figure 5: Kaoru Ishikawa expanded Deming's Cycle

Shipping companies are required to comply with a number of rules and regulations in connection with the protection of human life and of the environment and the ensuring of the quality of the services which they provide. The process of the management of safety, quality and environmental responsibility is connected with the efforts of the company to develop, operate and maintain management systems which safeguard its scheduled performance in these areas. While safety management is, in accordance

with the International Safety Management Code, mandatory for shipping companies, quality management and its certification, as well as the management of environmental responsibility and its certification, are an option for companies.

The standards **ISO 9001**, **ISO 14001**, **ISO 45001**, **ISO 50001** and **OHSAS 18001** are based on the management principles of continuous improvement, i.e., the Plan-Do-Check-Act (PDCA) cycle. These four items correspond to the steps in the Shewhart/Deming cycle, which is orientated towards continuous improvement. The Deming cycle includes a series of actions at each step. More specifically, 'Plan' involves the defining of the problem, its analysis and the taking of corrective measures; 'Do' is concerned with the implementation of the proposal for improvement by the solving of the Standards with common approach problem; 'Check' involves confirmation that the results are satisfactory, and 'Act' is about securing the benefit derived from the improvement and standardisation of the procedures (Dervitsiotis, 2005).

This leads many companies in most instances to opt for the development and certification of the quality management systems by the same organization as certifies their compliance with the ISM Code. *The code defines, a Safety Management System as a structured and documented system enabling Company personnel to implement effectively the Company safety and environmental protection policy.* Certification can be carried out on the basis of the ISO 9001 and ISO 14001 standards, respectively, which concern the safeguarding of quality and environmental responsibility. ISO 9001 was not designed exclusively for shipping, but it can serve as a supplement to the ISM Code.

A (safety) management system provides:

1. Confidence that the company is complying with (safety and pollution prevention) requirements
2. Systematic planning and implementation of activities and operations

3. Evidence of the application of controls (with respect to safety and pollution prevention)
4. Corrective action to prevent the repetition of problems

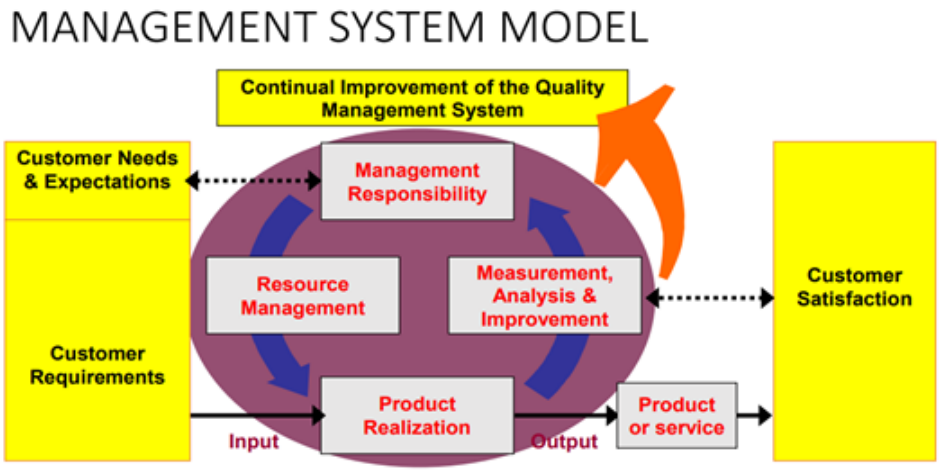


Figure 6: A Management System Model

The improvement of safety is more completely achieved when, in parallel, objectives are attained which have a connection with:

- the quality of the services,
- the management of the environment,
- health, and safety at work,
- energy performance.

The improvement of safety constitutes a central goal, which is, however, more completely achieved when, in parallel, objectives are attained which have a connection with the quality of the services, the management of the environment, health and safety at work, as well as energy performance. Studies have confirmed the compatibility and advantages of the joint

development of safety and quality systems in the effective operation of shipping companies (Celik, 2009a, 2009b; Pantouvakis & Karakasnaki, 2016).

For this reason, the development of management systems on the basis of standards relating to quality, the environment, health and safety and energy performance is a widespread practice among companies. Unlike the ISM Code, which is a mandatory code exclusively for shipping, **the ISO 9001, ISO 14001, ISO 50001 and OHSAS 18001 standards are options for companies and have wider application** that will be explained further at this subchapter.

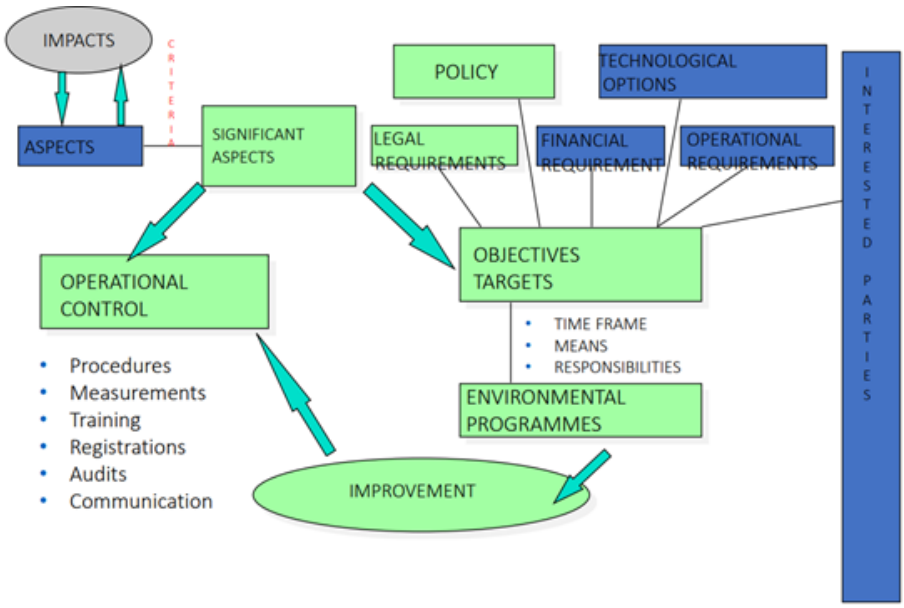


Figure 7: ISO Systems

The International Organization for Standardization (ISO) defines standardization as the activity of establishing, with regard to actual or potential problems, provisions for common and repeated use, aimed at the achievement of the optimum degree of order in a given context. A Standard is a document, established by consensus and approved by a recognized body, that provides for common and repeated use, rules, guidelines or characteristics for activities or their

results, aimed at the achievement of the optimum degree of order in a given context. Standardisation in general and the ISO standards in particular have had a profound impact in the business world and subsequently elements of standardisation have penetrated the business of shipping.

A quality management system can be defined as a collection of business processes focused on consistently meeting customer requirements and enhancing their satisfaction. Quality management principles are a set of fundamental beliefs, norms, rules, and values that are intertwined with a company's operations and are accepted as true and can be used as a basis for quality management.

ISO identifies seven **quality management** principles:

- customer focus
- leadership
- engagement of people
- process approach
- improvement
- evidence-based decision making
- Relationship management.

The ISO 9001 family of standards has had a significant impact in the design and proliferation of quality management systems in an array of diverse industries. The aforementioned seven quality management principles also demonstrate the significance **of the human element in quality management systems**. Like the ISM Code which only concerns the context of maritime

industry, ISO 9001 series are generic standards that can be applied both in manufacturing (Kammoun and Aouni 2013) and services organizations (Psomas, Pantouvakis, and Kafetzopoulos 2013) and determine the basic requirements that an organization must fulfill in order to develop a quality management system. ISO 9001 standards provide guidelines for the proper systemization and formalization of companies' processes and emphasize the importance of documenting such procedures (Tarí, MolinaAzorín, and Heras 2012).

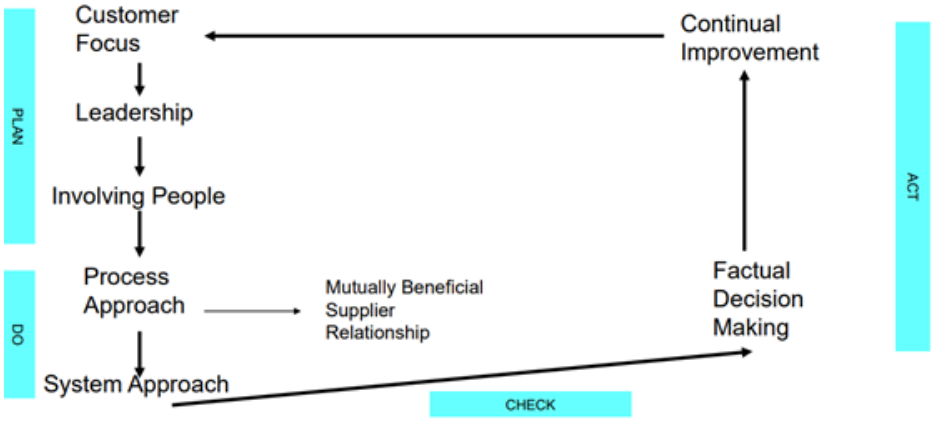


Figure 8: ISO 9000 Management Principles

2.5.1: ISO 9001:2015 – Quality Management

It sets out the requirement for a quality management system (ISO, 2015b). It is based on quality management principles of customer focus, leadership, engagement of people, process approach, improvement, evidence-based decision-making and relationship management, and helps businesses and organisations to be more efficient (ISO, 2015a)

ISO 9001:2015 establishes 5 groups of requirements:

- Quality management system
- Management responsibilities

- Resource management
- Product (service) realization 8: Measurement, analysis & improvement

In this ISO Ship Based Activities are defined as follow:

1. Navigation
2. Responsibilities
3. Cargo & Ballast Operations
4. Training & Awareness
5. Mooring
6. Documentation and Records
7. Bunkering
8. Quality Programmes
9. Port/Terminal Activities
10. Monitoring and measurement
11. Maintenance

Whereas Shore Based Activities are:

12. Purchasing, procurement and contractor management
13. Training and Awareness
14. Chartering
15. Documentation and Records
16. Manning
17. Quality Programmes
18. Office Facilities Management
19. Monitoring and measurement
20. Responsibilities

Certification on the basis of Standard 9001 can contribute to an increase in the company's competitiveness and yield; this has been confirmed by a series of studies (Dimara et al, 2004).

2.5.2:ISO 14001 – Environmental Management

ISO 14001 sets out the criteria for an environmental management system and can be certified to. It maps out a framework that a company or organization can follow to set up an effective environmental management system. It helps organisations improve their environmental performance through more efficient use of resources and reduction of waste, gaining a competitive advantage and the trust of stakeholders (ISO, 2015c). It specifies requirements that enable an organisation to achieve the intended outcomes it sets for its environmental management system.

Establishment of an environmental management system, should take into account the issues arising for ship operators such as:

- Air pollution
- Water pollution
- Water use
- Other resource use
- Hazardous substances
- Interface with other Health and Safety Issues
- Biological hazards
- Noise
- Community concerns
- Marine life
- Accidents and emergencies
- Waste

Environmental Aspect Element of an organisation's activities or products or services that can interact with the environment. A significant environmental aspect has or can have a significant environmental impact Environmental Impact is defined as any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisations activities or products or services

2.5.3: ISO 50001 – Energy Management

This is a standard which gives organisations a recognised framework for developing an effective energy management system. Its purpose is to enable organisations to establish the systems and processes necessary to improve energy performance, including energy efficiency, use and consumption. Implementation of ISO 50001 is intended to lead to reductions in greenhouse gas emissions and other related environmental impacts and energy cost through systematic management of energy (ISO, 2016).

2.5.4 OHSAS 18001 – Occupational Health and Safety

OHSAS 18001 is a framework for an occupational health and safety management system which can help organisations to put in place the policies, procedures and controls needed to achieve the best possible working conditions, aligned to internationally recognised best practice (BS, 2017)

- ISO 45001 enables organizations to put in place an occupational health and safety (OH&S) management system. This will help them manage their OH&S risks and improve their OH&S performance by developing and implementing effective policies and objectives.
- ISO 27001 is an international standard on how to manage information security and enables organizations of any kind to manage the security of assets such as financial information, intellectual property, employee details or information entrusted by third parties.

2.6. The move toward behavioural management

There is no reference in the ISM Code to the concept of safety culture. Nevertheless, the development of a safety culture is one of the most crucial factors for the successful implementation of a system of safety management. Safety culture is defined as "shared values (what is important) and beliefs (how things work) that interact with an organization's structures and control systems to produce **behavioural norms** (the way we do things around here)" (Uttal, 1983).

As Theotokas has pointed out[1], "*safety culture presupposes participation in the system of safety management and a knowledge of the parameters which define it on the part of the people who are involved in its implementation, a willingness to learn and constant improvement by means of observation, recording and analysis, and confidence of individuals in the system. Within this framework, the role of management and its commitment* ***to respect for the above principles is essential and a precondition for the necessary change in behaviour of individuals****."*

The behavioural management theory is often called the human relations movement because it addresses the human dimension of work. Behavioural theorists believed that a better understanding of human behaviour at work, such as motivation, conflict, expectations, and group dynamics, improved productivity. The theorists who contributed to this school viewed employees as individuals, resources, and assets to be developed and worked with, not as machines, as in the past.

Behavioural management broadly aims to improve health and safety performance across the business by mitigating risk taking behaviour. More specifically, it aims to:

- Engage the workforce to make contributions and recommendations towards continuous health and safety improvement.
- Create an environment where the workforce is encouraged to repeat safe behaviour, to support the business and prevent loss.
- Improve communication between management and the workforce addressing root causes and working towards permanent solutions to removing unsafe practices.
- Raise awareness of health and safety and providing training and interpersonal skills to proactively manage health and safety at all levels.
- Prevent the occurrence of further accidents/incidents by tracking behavioural data and looking at leading indicators of unsafe practices.

Understanding the root cause of the one's behaviour is essential, as without this it is unlikely that any behaviour strategy will be sustainable. There are five basic models in understanding someone's behaviour.

These include:

- **Biological**: People have a tendency to interact with the environmental influences around them and this interaction informs their behaviour.
- **Behavioural**: Behaviour can be modified through conditioning. This is achieved by another event following an action. There are two types of conditioning. Classical conditioning – a behaviour is connected with a certain stimulus, for example a people feel happy and excited on a Friday afternoon. Operant conditioning – a behaviour is

connected and repeated by rewarding the positive behaviour and issuing sanctions for the negative behaviour.

- **Cognitive**: The cognitive approach helps people judge and reason effectively and have a perception of their surroundings. This means that the way in which we behave is influenced by our thinking.
- **Systemic**: The systemic approach looks at targeting the individual's behaviour within the system. These systems can include: their family, friends, colleagues, and community. The quality of these systems is a great influence on one's behaviour. This can be best demonstrated with the example of a child living in a family where domestic violence takes place will naturally struggle within another system, i.e. school. The behaviour the child experiences at home, for example shouting, violence and/or aggressiveness, will not work in a school context which can cause problems for the child.
- **Psychodynamic**: The psychodynamic approach is one used in a clinical setting as it focuses on understanding and intervening by unravelling past conscious and unconscious experiences in order to help someone deal with them.

Improved technical standards, including more demanding survey regimes and stronger regulation enforced through a rigorous port state control system, have had a strong positive influence on safety. However, there is a limit to how much additional improvement is possible if attention is only focused on the structural, mechanical, electrical and electronic components. Further improvements will require a focus on the way that a ship is used; in other words, considering the overall ship system. This can't ignore the people operating it, often known as the 'human element'.

CHAPTER 3: SOFT SKILLS INTO THE SHIPPING INDUSTRY NEW ERA

3.1. Defining soft skills

Non-technical skills have become widely acknowledged as important for workplace outcomes in addition to traditional technical skills. The Collins English Dictionary defines the term "soft skills" as "desirable qualities for certain forms of employment that do not depend on acquired knowledge: they include common sense, the ability to deal with people, and a positive flexible attitude. However, there is no universal definition for these skills. Different terminology is often used and can highlight different elements of these skills. Some examples of the various labels of non-technical skills including:

- **Transferable skills:** are skills that can be applied in varied contexts – for example a skill which can be developed in one job or industry but is still relevant and useful in another job or industry, even where the contexts are very different. This terminology is used by the Committee for Economic Development of Australia (2015) and is cited as being increasingly important as employees transfer to different industries more frequently.

- **Employability skills:** defined by the Department of Education, Employment and Workplace Relations (2002) as 'skills required not only to gain employment, but also to progress within an enterprise so as to achieve one's potential and contribute successfully to enterprise strategic directions'. Some universities such as Deakin University, RMIT, and Sydney University also use the term employability skills to highlight their importance for graduate employment outcomes.

- **Enterprise skills**: a combination of developed problem-solving techniques and ability to think creatively to come up with new solutions and recognise business opportunities (Foundation for Young Australians 2016).

- **Soft skills**: often used by the business community that relate to a series of interpersonal or intrapersonal qualities necessary for individual. OCIMF and INTERTANKO at the Behavioural-Competency-Assessment-and-Verification paper, approach soft skills by a rough definition of *" An ability to interact successfully with other people, systems and*

equipment, procedures and their environment." On the same paper, Human Element is attributed as: "The effective interaction of people with procedures, equipment and each other"

As we are going to discuss later on, soft skills vary. Stephen M. Kosslyn in his article supports that two non-routine kinds of work seem to me to be particularly common, and difficult to automate:

First, emotion. Emotion plays an important role in human communication (think about that physician sitting with the family, or that bartender interacting with customers). It is critically involved in virtually all forms of nonverbal communication and in empathy. But more than that, it is also plays a role in helping us to prioritize what we do, for example helping us decide what needs to be attended to *right now* as opposed to later in the evening. Emotion is not only complex and nuanced; it also interacts with many of our decision processes. The functioning of

emotion has proven challenging to understand scientifically (although there has been progress), and is difficult to build into an automated system.

Second, context. Humans can easily take context into account when making decisions or having interactions with others. Context is particularly interesting because it is open ended — for instance, every time there's a news story, it changes the context (large or small) in which we operate. Moreover, changes in context (e.g., the election of a maverick President) can change not just how factors interact with each other but can introduce new factors and reconfigure the organization of factors in fundamental ways. This is a problem for machine learning, which operates on data sets that by definition were created previously, in a different context. Thus, taking context into account (as a congenial bartender can do effortlessly) is a challenge for automation.

Our ability to manage and utilize emotion and to take into account the effects of context are key ingredients of critical thinking, creative problem solving, effective communication, adaptive learning, and good judgment. It has proven very difficult to program machines to emulate such human knowledge and skills, and it is not clear when (or whether) today's fledgling efforts to do so will bear fruit. And in fact, these are the very skills that employers across industries consistently report seeking in job candidates. For example, in one survey, 93% of employers reported that "a candidate's demonstrated capacity to *think critically, communicate clearly, and solve complex problems* is more important than his or her undergraduate major." In addition, employers seek candidates who have other sorts of "soft skills," such as being able to learn adaptively, to make good decisions and to work well with others. These sought-after abilities, of course, fit perfectly with the sorts of things that people can do well, but are and will continue to be difficult to automate.

All of this suggests that our educational systems should concentrate not simply on how people interact with technology (e.g., by teaching students to code), but also how they can do the things that technology will *not* be doing soon. This is a new approach to characterizing the underlying nature of "soft skills," which are probably misnamed: These are the skills that are hardest to understand and systematize, and the skills that give — and will continue to give — humans an edge over robots.

- Capabilities: specify a standard expected in professional practice. They represent a holistic view of an individual's ability to perform in a range of contexts and their potential to improve (Bowles and Lanyon 2016).

- Personal attributes: describes the intrinsic traits of an individual such as loyalty or motivation. The Department of Education and Workplace Relations (2002) considered these personal attributes as separate from employability skills.

- Competencies: are the specification of the skills, knowledge, and attributes required to achieve performance standards for specific occupations (Bowles and Lanyon 2016).

Competencies can be difficult to define and assess. As **behavioural competencies are vital for safe and efficient vessel operations** we should be able to define them more clearly and describe an assessment system. Further on (see chapter 4) we are setting up the types of behaviours (behavioural indicators) expected in order to ensure successful performance in different types and levels of tasks. Whether or not someone displays a particular competency will depend on their ability (do they know how to act in that way?) and their motivation (do they desire to act in that way?), as well as the opportunity (when or in what situations they can demonstrate that behaviour).

Despite the variety in terminology and emphasis, there are clearly overlapping elements among these skills. For example, Figure 3 shows the overlaps between four skills frameworks – the Australian school curriculum's general capabilities framework, the employability skills listed by the Department of Education Science and Training, Deakin Co.'s list of capabilities, and core competencies listed by the OECD.

Table 1.1: Typologies of non-technical skills

Skill	Australian curriculum	Department of Education, Science and Training	DeakinCo.	OECD core competencies
Self-management	✓	✓	✓	
Communication		✓	✓	✓
Teamwork		✓	✓	✓
Problem solving		✓	✓	✓
Digital literacy	✓	✓	✓	
Critical thinking	✓		✓	✓
Innovation		✓	✓	
Emotional judgement	✓		✓	✓
Global citizenship	✓		✓	
Professional ethics	✓		✓	
Enterprise skills		✓		✓

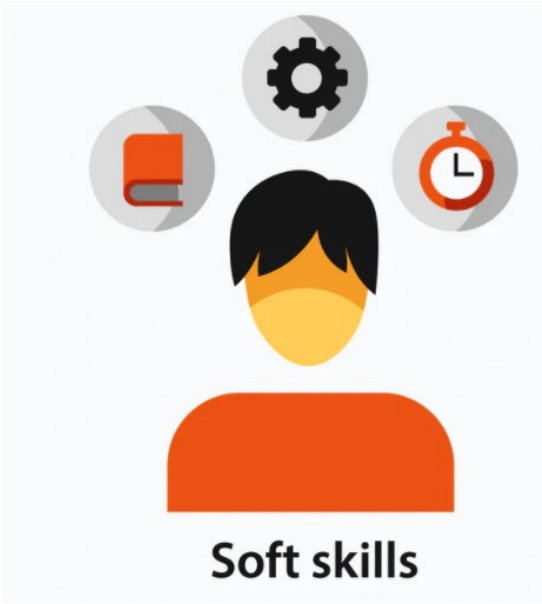
Source: Bowles and Lanyon (2016), Department of Education, Science, and Training (2002), Australian Curriculum Assessment and Reporting Authority (2016), OECD (2014).

3.2. The importance of soft skills

In our study we claim that shipping industry demands intensive social skills occupation either onboard or onshore. In fact, interpersonal skills, self-management skills and ability to cope with unstructured tasks are about to become the main factor that differentiates between the low performing and the high performing crews. Tanker Industry recognizes that more focus should be placed on soft skills. Personnel behavior and attitude are key elements of a positive safety culture and promote a safe work environment and helps reduce incidents. At the following paragraphs we demonstrate a more holistic approach to this subject discussing soft skills importance from a broader view.

Skills, abilities, and motivation play a key role in performance at both the individual and organizational level. High performance organizations increasingly recognize that is **not what people do** but how they do their jobs that makes the difference in achieving objectives. **It is crucial to have systems and practices in place that are geared towards defining, assessing**

maintaining and developing the soft skills that contribute to a culture of high performance, which can be observed through people's actions and behaviours.



As noted by the World Economic Forum, soft sills are especially relevant in the 21st century. Technology enhancements enable many routine technical tasks – like operating machinery and bookkeeping – to be automated. Yet businesses increasingly rely on critical thinking, emotional judgement, and problem-solving skills in their staff to not just understand what technology is saying, but analyse why it is saying it, and what ought to be done. And although globalisation offers businesses access to a broader customer base, it also exposes them to increasing competition.

Being able to understand the needs of customers from different geographical and cultural backgrounds, communicate meaningfully, and deal with complex and ambiguous problems can be the key to customer service and differentiation. In this environment, the need for soft skills is going to intensify. Automation and artificial intelligence will result in a greater proportion of jobs relying on soft skills. Advances in technology have caused tasks that require hard skills to decline, making soft skills a key differentiator in the workplace. A study by Deloitte Access Economics predicts that "Soft skill-intensive occupations will account for two-thirds of all jobs by 2030".

3.2.1. Soft skills that drive business outcomes

A person with good communication skills could be easier to work with and relate better to clients, ultimately driving business outcomes. Critical-thinkers and problem-solvers can identify potential issues before they become significant and implement optimal solutions. Team members with strong self-management skills could require less oversight and be more reliable. Figure 4: Ways that soft skills can contribute to business success Source: Deloitte Access Economics Innovation Global citizenship Business success Collaboration Lower brand risk

Customer focus Employee engagement (lower turnover) Exports and foreign investment Teamwork Emotional judgement Communication Professional ethics Problem solving Critical thinking Emotional judgement Individuals with good emotional judgement and teamwork skills could help to foster better workplace culture.

Ultimately, businesses value soft skills because they contribute to business success. Studies show that soft skills contribute to higher revenue, productivity, and profitability, across industries and countries. In a study of 1,100 manufacturing plants in the UK, for example, Haskell et al. (2003) find that differences in the level of soft skills of employees account for 3% of the total factor productivity gap between firms in the top and bottom deciles. This controls for a range of other factors – like age, experience, qualifications, and the firm of employment. This increase in productivity means more revenue for businesses.

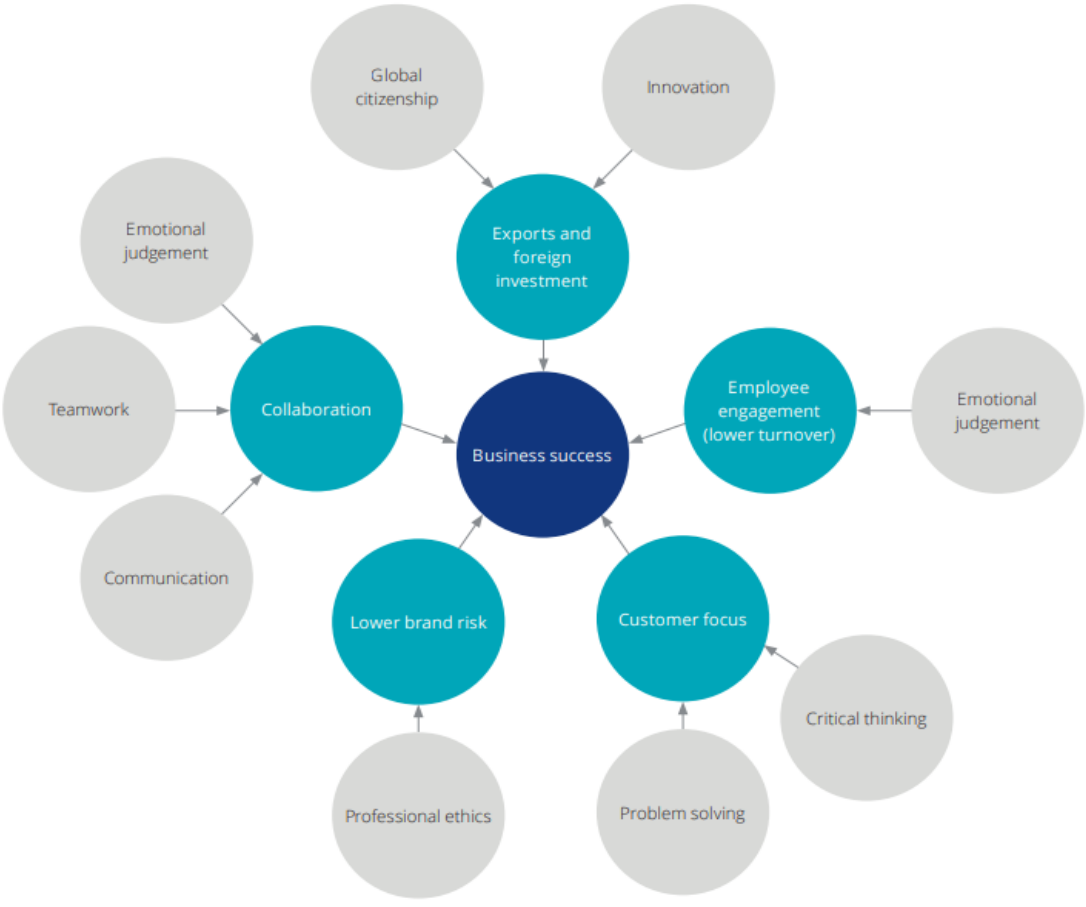


***Figure 9**: Ways That Soft Skills can contribute to business success*

3.2.2. Soft skills and the modern workplace

Skills such as active listening, collaboration, presenting ideas and communicating with colleagues are all highly valued in the modern workplace. Strong soft skills ensure a productive, collaborative, and healthy work environment, all crucial attributes for organisations in an increasingly competitive world. Moreover, LinkedIn included soft skills in its Global Talent Trends 2019 report, as the skills which impact the future of any business. There are specific human capabilities which cannot be automated and these concern assertiveness and resilience amongst others. Furthermore, with technology applied everywhere, employees are required to have the necessary skills to collaborate and make effective decisions.

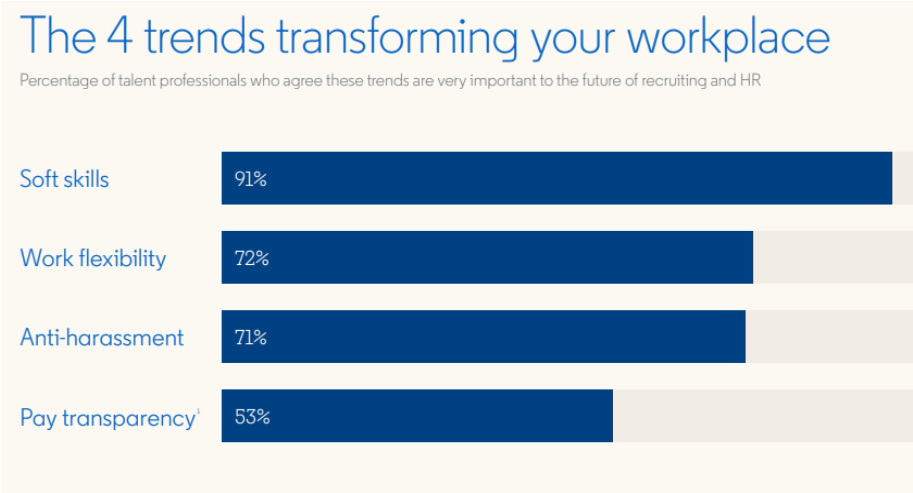


Figure 10.: *Workplace Transformation Trends*

Empirical studies also show that developing soft skills increases the value of the employee. One study found that returns to investments in soft skills were equal to the return to hard skills. In a study of 1,500 employees, Balcar (2016) found that increasing soft skills and hard skills would increase the value of employees by 8.51% and 8.84% respectively. This additional value to businesses is a result of a range of factors including time savings – they can more quickly find information from others and spend less time replicating work already performed. It also improves the quality of the work produced. Further details involving the methodology of this calculation can be found in the Appendix. And the benefits of investing in soft skills can be even higher for businesses who have low levels of existing soft skills in their

businesses. For example, female employees in an Indian garment factory who were randomly assigned to a soft skills training program recorded a 12% increase in productivity (Adhvaryu et al. 2016). The magnitude of this increase may be attributable to lower starting stock of soft skills, and as such may not be replicable more broadly. However, it does demonstrate that soft skills can bring significant benefits, even – and perhaps especially – in industries where these are traditionally seen as less critical.

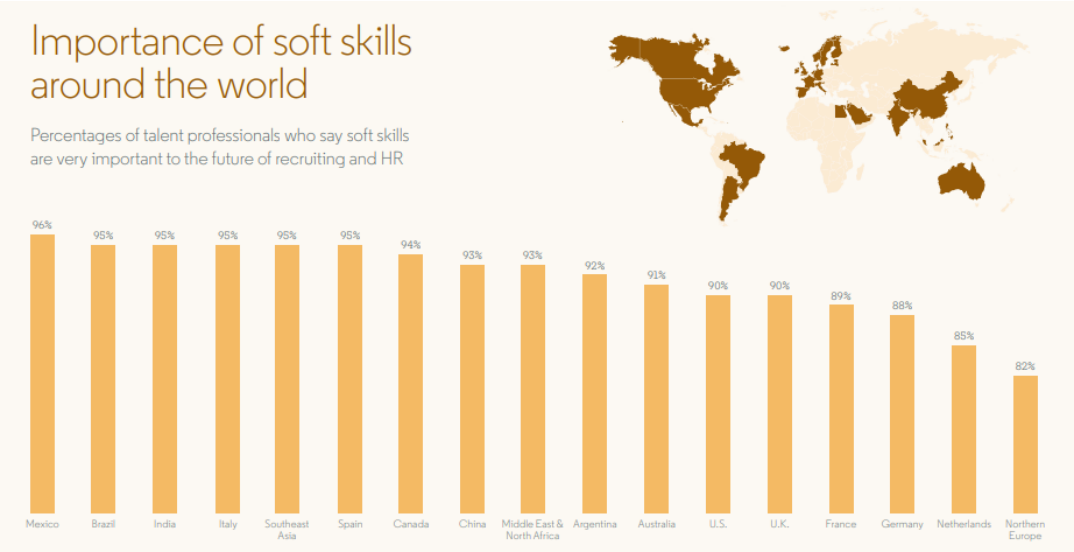


Figure 11: *Importance of Soft Skills around the World*

Soft skills are becoming key indicators for significant employers. One bank's new performance framework uses a 'behaviours first approach' to ensure professional standards are maintained in every interaction with customers. The program also encourages employees to adopt a 'growth mind set' that places the onus on individual employees to self-manage individual programs and develop their own capabilities required for leadership positions. For example, at Deloitte, soft skills are used to differentiate high performing staff ready to move to the next stage of their career. According to human capital partner, Kate McDonald "When we designed our consulting performance framework we reflected on the things that set high performers (at any level) apart – and it came down to very much the 'non-technical' skills." For McDonald, the skills that make the difference in a high performing team include:

- Having intellectual curiosity
- Being comfortable with ambiguity and new experiences
- Demonstrating flexibility when things change
- Seeking to collaborate
- Building relationships based on empathy
- Developing self and others
- Having strong communication skills

2.2.3. The importance of soft skills in shipping.

ESCA in its EU Maritime Growth Plan for Sustainable Maritime Jobs Focuses on:

- The development of soft skills strategy, in order to ensure that EU seafarers acquire new skills as necessary as digitalisation and autonomy increase in importance.

- Developing voluntary 'additional competencies and training', which may include a broader set of skills, including soft skills (e.g. shipboard management), digital skills and green skills. These could help transferability of skills and additionally prepare seafarers for management roles ashore. This would help to prepare for careers in wider maritime cluster on shore.

The increasing demands in regulation and technology makes soft skills really imperative to carrying out the work of seafarers as it is today. The fact that the maritime industry is progressively adopting automation, artificial intelligence and rapidly heading towards autonomous ships, leads us to assume that the human element is becoming of lesser importance. This assumption is entirely incorrect. In reality, across different industries, technology seems to create more jobs than it destroys. For example, in UK alone, between 2001 and 2015, technology had contributed to the loss of 800,000 jobs but it has helped to create 3.5 million more, with higher added value. The same applies to the maritime industry and the fact is that the

technological evolution is merely creating a shift in job requirements for seafarers rather than making them obsolete.

Seafarers are now in need of a different set of skills, a set of soft skills, which are able to augment artificial intelligence and enable safer and more efficient operations on board. The introduction of automation may have taken away the need for technical skills but it in turn put a high emphasis on the officers ability to process large amounts of information and make appropriate decisions based on the provided data. The decision-making skills of the officers is the key in ensuring that this is handled adequately, and this is only one example. The resurgence in soft skills does not mean that the importance of 'hard' job-specific skills will fall by the wayside. But the importance of balancing these types of skills is only set to grow alongside the rise of automation. Embracing this concept and incorporating it into your crewing process is a key to safe and successful operations of maritime industry in the era of automation and AI.

In shipping, customers and clients demand soft skills. "Charterers don't buy the boat; they buy the crew" has Knut Steinar Dyrkorn stated once. This signifies that in some segments of shipping the ship is part of Charterers basic requirements, and the crew is the competitive advantage. During a recent visit (to NTNU) from a shipping line which employs a large number of European officers, it became clear just how significant an impact the onboard crew and its competence makes for the operational cost of the ship. It was revealed that a voyage in calm vs rough sea differed in fuel per mile efficiency by a factor of more than two. In this context, knowledge of the strategies and capability to exploit the fuel-saving opportunities are all-important and rest entirely with the crew. This shift also applies to the shore-based positions. Through lifelong learning (LLL), an improved interface between seagoing and shore-based jobs can help with building up transversal competences and skills in the maritime sectors. A possible client would definitely demand for:

- Adapting to constantly changing teams and environments
- Long Term Planning
- Keeping calm in difficult situations.
- Working in a multi-cultural, multi-national environment.

3.3. Global industries that benefit from soft skills.

While the maritime industry is only starting to value the importance of soft skills, many leading global companies across various industries have already incorporated this concept into their core human resource management processes. In this article, we are going to see how these organisations are doing it and how it helped them to build a better performing workforce.

The 2018 Millennial Survey by Deloitte Global indicates that the top four skills employers seek to ensure long-term success are interpersonal skills, confidence/motivation, ethics/integrity and critical thinking. These happen to fall under soft skills, often referred to as essential for recruiting or evaluating and training existing employees.While reputable companies like Deloitte conduct very important surveys to further substantiate the demand for soft skills, many organisations are already using soft skills to build high-performing teams. Let's take a look at some of the largest sectors in the world that have already benefited from this.

3.3.1. Soft skills in the aviation sector

In the aviation industry, soft skills are even taught in specific workshops. This applies to Lufthansa Airlines, the largest airline in Germany and the largest airline in Europe in terms of passengers carried. Lufthansa researched soft skills and introduced online assessments for hiring, as well as for training. In this way, the company focused on the most valid candidates for the job, while ruling out the ones less likely to succeed. During training, the company conducts workshops, aiming to introduce the company and its processes as well as "valuable soft-skills" as they define them. The workshops include training in regards to positive attitude, cultural diversity, communication skills, self-management and leadership tools. Likewise marine, aviation sector is heavily regulated. The foundation of core competencies for professional pilots as defined by the International Civil Aviation Organization (ICAO). Those are presented below:

- **Communication**
- **Aircraft Flight Path Management - Manual Control**
- **Aircraft Flight Path Management - Automation**
- **Leadership and teamwork**
- **Problem solving and decision making**
- **Application of procedures**
- **Workload management**
- **Situational awareness**

As it can be seen, most of the above, are referring to soft skills.

Communication for example is defined as a process by which information is exchanged between individuals through a common system of symbols, signs, or behaviour.**Effective leadership** and teamwork aspect are mentioned in regard to leadership involves teamwork - and the quality of a leader depends on how successful the leader is in building relationships with his team. **Problem solving and decision making**, refers to Accurately identify risks and resolve problems. A professional pilot should use the appropriate decision-making processes. **Competency of applying procedures**. It is important that pilots are able to study, understand and apply procedures when they go about their duties. It is the skill that demands the dentification and application of procedures in accordance with published operating instructions and applicable regulations, using the appropriate knowledge. The considerations required to operate a commercial airliner, simplified as **Workload management**. Last but not least, **Situational Awareness** is a term that encompasses several elements of the pilot's knowledge regarding his/her position, the environment they are operating in and the position of other aircraft relative to their own. It also includes being aware of what your aircraft is doing at any given time and predicting possible situations that could arise in the future.

3.3.2. Soft skills in the energy sector

Global energy company Shell is one of the world's largest companies, with operations in more than 70 nations and customers from many cultures and industries. Employers rely on a range of skills their employees possess or need to develop, to successfully navigate this multinational type of business. What the company "saw" in soft skills was that they helped not only the company, but the employees themselves as well. Their people work remotely from many different countries; consequently, excellent communication skills are vital to the company's successful operations. Additionally, this is an industry which values interpersonal skills such as relationship-building and believes soft skills contribute to the exceptional internal relations of its employees. In order to define soft skills, the company conducts assessments during hiring processes and afterwards helps its employees to strengthen them. This tactic has helped the employees to consequently help the company to evolve.

3.3.3. Soft skills in the food sector

One of the biggest fast-food chain companies, McDonald's, supports and implements the soft skills concept for its workforce. The company even carried out a campaign titled "Backing Soft Skills Campaign", to emphasise the economic importance of soft skills. Tesco, the British multinational groceries and general merchandise retailer, the third-largest retailer in the world measured by gross revenues, supported McDonald's on this soft skills campaign. "*We believe soft skills have a vital role to play in any workplace, helping individuals to realise their potential, building great teams and helping us deliver great service for our customers*". – Ms Judith Nelson, Tesco UK Personnel Director.Additionally, McDonald's released findings of its Workforce Preparedness Study where teamwork, customer service and responsibility were found to be overwhelmingly important.

A relevant research study titled "The Value of Soft Skills to the UK Economy" points out: "*McDonald's is one of a growing number of major employers and other organisations in the UK that recognises the value of soft skills as a key component of the overall skill set of the UK workforce, and of its own 100,000 UK employees. These skills are vital to people's success in*

their careers and lives. They are also essential to creating high-performing and successful organisations". "*As employers, we should re-examine which skills matter most, especially for the next generation entering the workforce. We should lay that foundation for employees to build the soft skills they need that will serve them throughout their career*." – Melissa Kersey, McDonald's US Shipping, as well as maritime industries and services, operates in a global market and the global market significantly influences national transport systems. This mutual interaction will remain, or probably become even more important in the years ahead. Due to the nature of the industry, human capital is probably the single most important factor making the shipping industry efficient, effective and safe. Therefore, to support shipping competitiveness, its human capital needs to be strengthened.

3.3.4. Key managerial competencies for industry 4.0.

A recent study divulges the below managerial competencies that are needed from contemporary managers, in order to cope with new challenges in Industry, including all skills and abilities for general problem solving and decision making for example: analytical and research skills, conflict and problem solving, creativity. Analysis was focused on ability to make business decisions and lead subordinates within a company, include ability, negotiations tactics and response behaviour. Social competencies include an individual's social values, motivations for example: ability to transfer knowledge, leadership skills, ability to work in a team. Social competence is the foundation upon which expectations for future interaction with others are built, and upon which individuals develop perceptions of their own behaviour. Often, the concept of social competence frequently encompasses additional constructs such as social skills, social communication, and interpersonal communication. At this study exploration of the managerial competencies of future managers and engineers was assessed. Based on existing studies and analyses, a total of eight competencies were identified:

Creativity: Creativity is becoming key focus area for employers looking for the 21st century employee. Creativity is characterised by the ability to perceive the world in new ways, to find hidden patterns, to make connections between seemingly unrelated phenomena, and to generate solutions.

Entrepreneurial thinking: Entrepreneurial thinking skills refer to the ability to identify marketplace opportunities and discover the most appropriate ways and time to capitalize on them. It is more like a state of mind that opens your eyes to new opportunities.

Problem solving: Solving problems involves both analytical and creative skills. Analytical or logical thinking includes skills such as comparing, evaluating and selecting. It provides a logical framework for problem solving. Problem solving is an essential skill in the workplace and personal situations.

Conflict solving: Resolving conflict is a key part of a manager's role. Managing and resolving conflict requires emotional maturity, self -control, and empathy. Resolving conflict in a positive manner is a skill than can be developed and practiced.

Decision making: Decision making is the process of making choices by identifying a decision, gathering information, and assessing alternative resolutions. Decision making is an integral part of modern management. Essentially, rational, or sound decision making is taken as primary function of management. According to the Oxford Advanced Learner's Dictionary the term decision making means – the process of deciding about something important, especially in a group of people or in an organization.

Analytical skills: Analytical skills are the thought processes required to evaluate information effectively. Analytical skills are the ability to visualize, gather information, articulate, analyse, solve complex problems, and make decisions.

Research skills: Research skills can be from need to be able to use reliable sources for continuous learning in changing environments. Being able to provide in depth information and advice on a given topic is an important skill. The most successful people tend to develop research skills early and use them consistently

Efficiency orientation: An 'efficiency' approach is one that stresses the efficient use of resources as the main determinant of decision and action. Efficiency orientation is inevitable.

What is more, at this study a Comparison of managerial competencies analysis between Pharmaceutical Industry and Automotive sector was performed. At the following the results are presented.

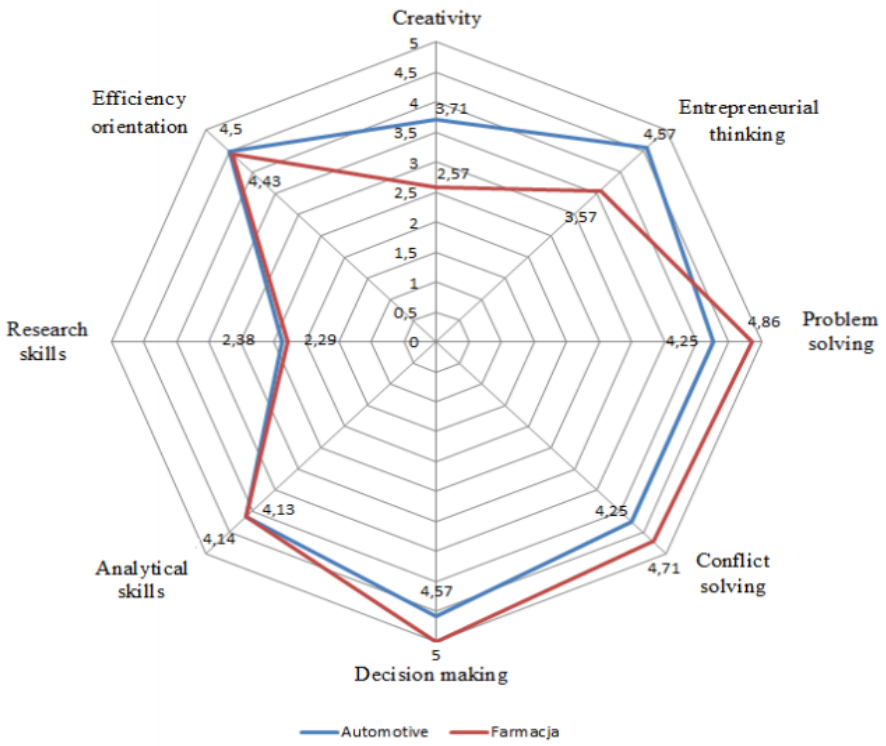


Figure 12: *.Competencies Comparison*

Knowledge becomes a key determinant of the development potential of enterprises Employees with entrepreneurial thinking skills stand out because they tend to think creatively and take ownership of their jobs as well as performance. This is recognized by experts from the automotive sector. Experts (practitioners) attach a very high value to competencies related to decision-making (Figure 7). Such thinking probably arises from the view that the ability to make optimal and effective decisions is the only way to increase efficiency and win a strategic advantage.

The development of new technologies triggers improvements in the quality of life of people and the welfare of whole societies. It is also the main driving force behind the contemporary global economy. Industry 4.0 requires basic research, new solutions implemented in the economy, monitoring of practical effects of such implementations and identification of the potential for new implementations. For those to be possible, employee support and improvement of their competencies are necessary.

2.4. Soft skills in shipping operations.

Shipping, as well as maritime industries and services, operates in a global market and the global market significantly influences national transport systems. This mutual interaction will remain, or probably become even more important in the years ahead. Due to the nature of the industry, human capital is probably the single most important factor making the shipping industry efficient, effective and safe. Therefore, to support shipping competitiveness, its human capital needs to be strengthened. The present and future challenges faced by the maritime industry will create significant pressure on the present model of manning the maritime industry, both on ships and ashore. There are strong indications that new technologies and the resulting social interactions will significantly affect the required core skill sets, the modes of acquiring skills, and the relationships among key stakeholders, those being active at the labour market(s) as well as others. The maritime industry is a highly dynamic industry, exposed to numerous external influences.

At the same time, it is a highly regulated industry, at international, regional and national levels. The maritime industry is a highly competitive industry, thus heavily dependent on effectiveimplementation of modern technologies. Admintance of such changes will inevitably alter the required skill sets required for both on-board and shorebased jobs and positions. It is of the main pursoses of this paper to map the already spotted and regulated required softs skills set as well as identify and predict the ones required in the future. On the other hand, seafarers work

in one of the most risk-aware environments. They are trained to a very high technical standard and are therefore able to contemplate risks and prevent them from becoming potential incidents. However, a focus on soft skills would enhance overall safety and further reduce incident rates.

While many of the industries around the world have already adopted and benefited from nurturing soft skills as we discussed on 2.3, the maritime industry is only beginning to accept this practice. Organizations such as Intertanko and OCIMF have already embraced the concept of psychometric assessments by including it as a requirement in the TMSA. The maritime industry is not so far behind but is only gradually beginning to gain momentum on incorporating soft skills into the core crewing processes. It is obviously seen that; technological developments will radically change the employment patterns in maritime industry in forthcoming years and similarly, skillsets and training needs required both in the immediate, medium term and long term future of the shipping industry will be different than today. The potential change in the work and the employment patterns will produce two big challenges in maritime industry. The first one will be a shortage in the supply of skilled seafarers worldwide and the second one will be the prediction of the future skills needs respect to technological developments. These challenges pull policy makers into a harsh race to spend continued efforts to invest in the skills required for the changing needs of the ships in the future and to build workforce with futureproof skill.

3.4.1. The nature of soft skills required for onboard operations.

With the spread of digitalization and automation in the shipping industry, the requirements and skills needed for individual jobs will change. In particular, an increase in shore-based jobs and reductions in the number of crew on board vessels might be expected. New and different skills and knowledge, especially in relation to information technology, will be required from seafarers if

they are to assume the redefined roles on board and ashore that will be necessary to ensure the safety of vessels and efficiency of operations. Global climate changes result in severe weather conditions, where human performance is constantly tested onboard. Crews are required to have the perfect combination of technical skills to operate high-tech machinery and the soft skills to cope under pressure and quickly bounce back after an unfortunate incident. It is interesting to know that for the worst US commercial maritime disaster in 2015, the El Faro, the reason which was reported as the cause for the incident was lack of soft skills. The National Transportation Safety Board identified the captain's decision making as the main reason for the tragedy that killed 33 people, as well as the crew's lack of assertiveness, as a contributing factor.

Seafarers are exposed to an increased number of work-related stressors: fatigue, long hours, monotony, noise, vibration, temperature changes, a multinational environment, limited recreation, isolation, long periods away from home. It has become apparent that seafarers should possess not only the knowledge but also the skills and experience which can help them efficiently deal with such stressors. Seafarers who are required to lead, perform within a diverse group of people, achieve tasks and be efficient should develop a strong skillset in a range of areas such as coping under pressure, self-management and interpersonal skills.

Coping Under Pressure: Life at sea requires mental resilience which most seafarers learn and get better at with experience. According to Gard, Every seafarer has his or her own coping mechanisms to deal with feelings of anxiety, loneliness, helplessness and depression. Certain unique aspects of life at sea can contribute to stress for seafarers, causing reactions which can jeopardise physical health, well-being, and workplace morale.The demands of work onboard, such as split shift patterns, the pressure of frequent inspections and administrative tasks all create a very demanding environment. Other challenges such as excessive responsibility, monotony, fatigue and others all affect well-being and mental health on board.The ability to cope under pressure, make decisions and maintain healthy functioning are of utmost importance to survive and thrive in such an environment. Seafarers must manage to make decisions, plan and respond efficiently to pressure and stress. How seafarers respond varies from one to the other, depending on the soft skills they possess.

Self-management: Well-being and efficiency are linked with competency and confidence. It is essential to have the knowledge and skills to perform at high standards and support self-assurance. Further, the ability to adapt to change and still thrive are critical to successful performance in a fast-paced workplace. Learning to adapt and be open to new ideas and procedures are essential to be able to maintain healthy functioning. By being confident and capable and performing to high standards, seafarers can be considered accountable and trusted by others and thus boost the overall well-being.

Interpersonal Skills: Seafarers are one of the most isolated groups when at work as they have little contact with others, being at sea for weeks before they can reach a port. It is of utmost importance to be able to connect and work with others. Connecting with other crew members, their practices, communication, culture, and habits is vital to increase the quality of work and maintain well-being. The interpersonal skills of seafarers such as agreeableness, assertiveness and conformity play a vital role in their overall well-being. It may not be easy, but seafarers who respect and can build relationships with the fellow crew members will have improved well-being. Working onboard is a "team effort". According to Marine Insight, It is essential to enhance the interpersonal relationship between people to ensure that all jobs are done smoothly and safety.

3.4.2. Correlation between the shipping operations and the human element.

Revising chapter 2 tankers operations, our methodological aproach includes the follwing critical operations:

Navigation: navigation in congested waters or anchorages, passage plan and monitoring, approach to pilot stations, entering or leaving a port, crossing a Traffic Separation System (TSS), bridge equipment failure, etc.

Cargo operations: cargo plan and operations, use of various pumps, inert gas system, tank cleaning, ballast/de-ballast during cargo operations, etc.

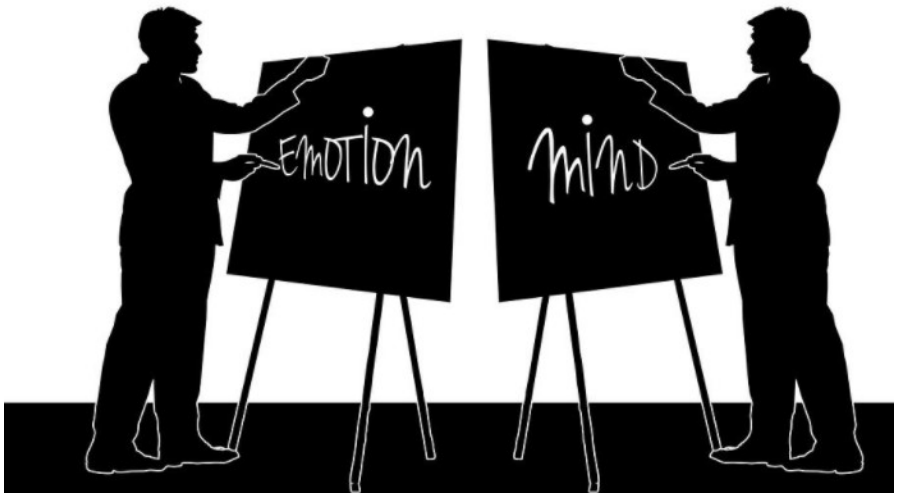
Mooring: berthing, unberthing, use of tugs, anchoring, Single Point Mooring (SPM) operation, etc.

Engineering: stand by routine maintenance and repairs, bunker operations, change of fuel, use of emergency systems, etc.

At the following paragraphs we correlate Human Aspect mentioned in 2.1 with above critical operations.

HUMAN ASPECT	OPERATIONS
Making sense of things	Navigation Cargo operations Mooring Engineering

People strive to make sense of things in order to make the world sufficiently certain to support our goals, plans and activities. People also use sense-making to modify our plans when the world breaks through anyway – because these plans can never completely deal with its uncertainty, ambiguity and complexity. Inappropriate sense-making is a large and costly problem for the shipping industry – whether measured in lost profits, fines, investigation, legal and insurance costs, environmental damage, or sheer human misery. Sense-making is a significant factor in virtually all marine incidents, which remain numerous. Lloyds Register tells us that between 1995 and 2007, an average of 182 large ships were lost every single year. Over the 12 years, this amounts to 160 million gt. Cases of sense-making leading to catastrophic consequences abound in other safety-critical industrial sectors too, including Defence, Petro-chemical, Nuclear, Rail and Air.



The problem is not specific to maritime and is found wherever there is human activity. Human sense-making problems in the shipping industry arise in several ways. Firstly, there are now many practices, procedures, technologies,

rules and regulations aimed at controlling the way things are done on land and at sea. They are well intended, but they can do the opposite of what they are meant to. This is because it is assumed that, ultimately, enough rules and technologies will have been created to cope with all situations. For example, accident investigators and regulators typically come up with new procedures to plug the gaps exposed by the latest incident. But, the situations aren't out there in the world. Instead they are created by people who are trying to make sense of their surroundings, informed by their current needs, constraints, purposes and past experiences. And each situation is new – not just because things never happened quite like this before, but because the pattern of human needs influencing each of the people involved is also unique.

Rules and technologies that are created to plug holes in previous operations tend to be either over-prescriptive or over-complicated, likely to conflict with each other and overload the people required to use them. At worst they don't apply because their creators did not (and could not) foresee the situation people are now in. Bigger rule books and more gadgets increase uncertainty, ambiguity and complexity – resulting in greater opportunity for more interpretations of "Automation creates new human weaknesses ... and amplifies existing ones" Lützhöft & Dekker (2002) Human Element Guide v1.0 – page 11 unfolding events. Automation in particular creates greater distance between people and the world around them, making them more isolated from it, and less able to notice or take effective action if things go wrong. People can be lulled into a false sense of security by confusing the reliability of technology with its robustness in dealing with novel or unexpected developments. The widely used expression 'radarassisted collisions' refers directly to this kind of problem.

A second problem is when insufficient attention is paid by shipping organisations to training in teamworking skills, communication skills and the true nature of human sense-making (eg as part of BRM, OOW, Rating, Deck and Engineering Officer progression training courses). Sense-making in the shipping industry is particularly vulnerable to differences in the ethnic cultures of crew members (see earlier panel, How does a person's culture affect their sense-making?). The lack of attention in this area results in increased risk of misunderstandings arising between people who depend on each other for their safety, the integrity of the environment and, ultimately, the profitability of their employers. Together, these two problems create a vicious

circle. The more rules and technologies there are, the more technical training time is required to teach them. This reduces the time available for training in the true nature of sense-making.

Sensing and making sense: what's the difference? It is easy to assume that the five human senses simply capture the world and, somehow, store it in memory for later use – much like a video. If it was really like this, we would of course quickly drown in a vast sea of data. Just like a Master on a ship with a passage to make, we need the means to get our bearings, and navigate a course that has some meaning and value for us. While it is the five senses through which information is collected, it is the context we create for ourselves that mainly controls what we pay attention to and create meaning for. Human senses are physiological marvels, but they are not of central importance in this study. Instead, our focus is on how people create context and meaning for themselves – in short, not how we sense, but how we make sense.

How do we make sense of things?

There are a number of factors that determine what we pay attention to, and how we use this information to interpret the world around us. These include:

Our personal needs: A sudden, shocking event – like a loud noise or alarm – will usually interrupt whatever we are doing so that we may decide whether to confront the threat or escape from it. This 'fight or flight' reaction automatically (and rather sensibly) grabs our full attention in an attempt to preserve our safety. It is triggered in a very old part of the brain that is also responsible for emotions, such as anger, fear and happiness. The advantage is that this part of our brain works very fast – even before we are consciously aware of what we are responding to.

Our self-concept: Each of us has a sense of who we are and what we are like. This sense of personal identity is developed through contact with family, friends, workmates, supervisors, management and, ultimately, by the working and ethnic cultures in which we live. Cultural differences are particularly relevant in the maritime world due to the involvement of several major seafaring nations. Cultures tend to differ in several important ways. These differences not only sensitise people to the world in different ways, but they also affect their interpretations of

people from other cultures. Some cultures like to stay detached and focus on one thing at a time. For example, Germans, Scandinavians, Americans, Canadians, Australians and British tend to pay attention to one thing at a time, for which they like to set aside a specific time slot. They like to stick to plans, quietly follow laid-down procedures and focus on 'the facts'. They rely on information from statistics and reference materials and tend to remain job-focused and unemotional. They confront problems with logic, use minimal body language to communicate with their colleagues, and don't like to lose face.

Some cultures like to get engaged and let things interact For example, Indians, Pakistanis, Polynesians and many Mediterranean peoples prefer to be involved in several things at once. Timetables tend to be fluid, changing as the several tasks in hand unfold. Plans change often and tasks are allowed to influence each other. Indeed, the unpredictable impact of one task on another is precisely the reason why detailed plans and schedules don't work. People depend on word of mouth and allow the relative importance of facts to change as a search is made for a balance that will best satisfy multiple goals. They often confront problems emotionally and use demonstrative body language to communicate. They don't lose face easily since failures tend to be attributed to circumstances rather than to people.

Some cultures like to be holistic and subtle. For example, Japanese, Chinese, Taiwanese, Koreans and Filipinos prefer to observe an unfolding timetable of events, respectfully listening to people while paying attention to the whole picture in order to decide upon (usually) small adjustments. They use information obtained both from reference books and first-hand contact with people. They avoid confrontation, use subtle body language, eg nods and slight movements, and pay attention at all times to protecting their colleagues from the culturally important issue of losing face.

Our past experience: The conclusions and reflections that people generate from their past experience play a big part in shaping the sense we make of the present. This past experience may consist of beliefs, mental models, rules, procedures and stories that we apply to features of the present environment to render it meaningful. The more experience people have, the more likely are to recognise the present as familiar. But note that any familiarity we notice is a projection we

have made from our own past. By the same token, there is no good reason why anyone else is able to make the same projection and so attach the same meaning to a situation. Further problems can arise if we confuse experience with expertise. They are not the same thing at all. For example, a person's experience may result in wrong conclusions and bad practice; or it may not yet be sufficient, leading to overconfidence, inadvertent risk taking and complacency. Another section of this Guide deals with the problem of risk and what factors affect our perception of it.

The goals we share with others: People are helped to make sense of a situation if they are engaged with each other in pursuing a common goal. What seems to be important is that people agree joint goals, refine their understanding, take action and maintain a balance to their activities within a shared operation such as crewing a ship or managing a shipping company. It is the shared goal-based context of these activities that provides big clues about how to make sense of what's happening at any moment.

Goal-sharing can be helped considerably by training aimed at helping people to develop shared methods, together with a realistic understanding of each other's roles and capabilities. Problems arise when the goals of people in the same organisation begin to diverge. A good example of this is when safety considerations appear to conflict with profit-making. This can happen, for example, when shareholders' shorter-term views are allowed undue significance.

When one perspective is permitted to dominate others, it not only indicates that goals cease to be shared, but that sub-goals (e.g. safety or profit; seeking to avert ambiguity or seeking a straightforward passing) are being mistaken for overall goals. If this situation is allowed to continue, failure occurs. The same is true for different organisations which are part of the same enterprise, such as the shipping industry as a whole. For example, if the regulators end up dominating the operations of the shipowners (or vice-versa), then the whole enterprise will become dysfunctional.

Our current practicalities: In any situation where we have things to achieve, we do not have infinite amounts of time and usually have a strong sense of diminishing returns In making sense of things, we usually stop when we have enough information to decide on a course of action that

seems plausible. Our preference is for a working level of understanding rather than a search for absolute truth. For example, when faced with uncertainty or too much information, an Officer of the Watch (OOW) will simplify their information needs to support a decision that seems workable in the time available. This may or may not turn out to be sufficient to deal with the reality of the unfolding event. There are many maritime examples where available information from modern bridge technology turns out to be ignored. Training can help, but it needs to be highly effective to overcome people's overwhelming need for simplicity in times of crisis.

HUMAN ASPECT	OPERATIONS
People Take risks	Navigation Cargo operations Mooring

Risk refers to the chance that our sense-making turns out to be inadequate to deal with the world safely and effectively. Our perception of risk has little to do with the actual probability of something bad happening (see panel, Are risk and probability the same thing?). The problem is not a matter of calculating probability – though that is difficult enough for most of us Just as there are a number of factors that affect the sense we make of things, so there are a number of factors affecting our assessment of the risks we take. There are three main factors that influence our sense of risk:

The amount of control we think we have: The more control people believe they have, the less risk they believe they are taking. In the maritime industry, shorebased staff believes the risk of ship incidents is twice as great as crew members do as Bailey has shown. The high degree of control a person thinks they have may be real – due to a well-calibrated sense of their own well-developed skills, together with a highly pertinent assessment of the situation they are in. At the other extreme, it may be far from the truth – due to over-confidence, lack of appreciation of missing skills or knowledge, stress or fatigue – amongst other influences.

The amount of value something has for us: The more a course of action appears to support a goal that we regard as important or highly desirable, the less risky it will appear to be (or the more we will overlook the risk normally associated with it). For example, one foggy morning, the Master of a passenger ship decided to leave his berth 10 minutes before a cargo ship cleared the same channel. He was already running late and his company and his passengers were all keen to avoid further delay. After the collision that followed, 17 passengers were hospitalised.

The extent to which things are familiar to people: The more a circumstance or action seems familiar, the less risky it will appear to be. Complacency is a much mentioned problem in the shipping industry and is often attributed to people who allow familiarity to blunt their sensitivity to risk. Likewise Human error, complacency is better seen as an effect rather than a cause.

The important thing about these three factors is that their overall mix is determined by the person who is exposed to risk. The actual risk any one of us takes is a combination of our personal mix on the one hand and, on the other, the problems in the outside world that really do have nothing to do with us, eg metal fatigue, instrument failure, or a severe storm. It is no wonder that risk and its assessment is such a challenging topic. **Dealing with the perception of risk is not really about spotting dangers in the external world and avoiding them. It is much more about spotting weaknesses in our own assumptions about the world and managing the relationship between the world and our own imperfect knowledge of it.**

HUMAN ASPECT	OPERATIONS
People Make Decisions	Navigation Cargo operations Mooring Engineering

By decision making, we mean the proccess of rational decision making. In fact fully rational decision making is considered impossible as it faces with two major problems:

- First, the practicalities of our ongoing tasks mean that we do not have time to do it. Instead we must rely on an alternative approach which produces the best decisions using the available information in the available time.

- Second, we live in an uncertain world where complete information is never available.

Rational decision making proccess in its purest form, it depends on:

- Having complete information about all the alternatives: As you we discussed see on the aspect of Making sense of things, people only use a fraction of the information that is available to us: perception involves an active search for information whose relevance is determined by a series of mental filters. If people in operational settings such as seafaring do not have either the time or the information to make purely rational decisions, what are they doing?

- Being able to distinguish and understand all the relevant differences between the alternatives.

- Using comprehensive criteria – that will be relevant throughout the life of the decision's consequences – for rank ordering all the alternatives.

- Efficiency vs thoroughness: If safety and quality are paramount to an organisation or the individuals within it, thoroughness will tend to be favoured by individual decision makers. If production targets and output are emphasised, then efficiency will be favoured. In practice, most organisations must be both safety conscious and profitable. However, the fact that efficiency and thoroughness are trade-offs means that it is impossible to maximise both at the same time. This tension is the source of a huge organisational problem. Simply stated, the problem is that every decision made is always a compromise. The amount of unnecessary risk – either to profits or to safety – signified by a particular decision depends on the extent to which the decision maker is accurately aware of the real (not just perceived) risks they are dealing with. Appropriate thoroughness is produced by training, mentoring, and properly debriefed job experience, acquired over time. Such training and experience also produces a natural efficiency of performance that arises from expertise and good judgment. A less natural kind of efficiency arises when organisational requirements to be profitable and competitive start to influence decision making against an individual's better judgment. If people are not sufficiently trained or, alternatively, if they perceive organisational expectations as too demanding, then the risks they take in their decision making will increase. Furthermore, we and our colleagues will often not know the extent of this increased risk until the illfounded assumptions or undue pressures that underlie our decisions are catastrophically tested. Generally speaking, people want to make decisions that allow them to carry out a stream of work as efficiently as possible. Usually this is because people want to maximise the time available for the next thing they have to deal with – whether this is a planned activity or because we need to plan for the unexpected. The amount of training and properly managed experience people have had will help them apply due care and attention (ie thoroughness). Inappropriate organisational pressure will tend to decrease such diligence. We might expect this to be a particular problem for anyone who has not received the right training and experience.

- Having the time to do all of the above: The time available for people to think and act is a major determinant of the decisions they make. Experienced people often appear to have more time, resulting in smoother performance. Experienced people who are also experts

perform not only more smoothly in the available time, but also perform more effectively and more safely over time.

In shipping operation practicality seems to drive most of peoples decisions. Professor Robert Full, a biologist at the University of California at Berkeley, has observed that **"nature works on a 'just good enough' principle, not a 'perfecting' principle**". This is also true of human nature. Here are 10 'good enough' rules that seem to govern our behaviour in the workplace.

- It looks fine or It's not really important – so we can skip this step. Aka, If it ain't broke, don't fix it.

- It's normally OK or It's much quicker this way. Aka, We've done this millions of times before, so trust us.

- It's good enough for now. Aka, It's good enough for government work. ie it exceeds some requirement that passes as minimal in this organisation.
- It was checked earlier/will be checked by someone else later – so we can skip this check now and save ourselves some time. Particularly dangerous if used in combination!

- There's no time (or no-one) to do it now ie don't worry – we'll do it later – and trust we don't forget!

- I can't remember how to do it'– and have no time to look it up – but this looks like the right way. Aka, When all else fails, look in the manual.

- We must get this done in time – so we can't afford to follow all the procedures on this occasion.
- It looks like something we know, so it probably is. This assumption makes things convenient, since we then know what to do next.
- If you don't say anything, I won't either ie I've bent the rules to your (or our) advantage, so in return, I'll trust you to keep quiet about it.

- I'm not the expert, so I'll let you decide ie I will take comfort in someone else taking responsibility for what happens next. This also gives us more time to attend to other things we have to do.

Culture affects decision making: Vessel's work place is influenced by two different sets of cultural issues. The first of these relates to differences due to a person's cultural background.A person's cultural origins may make them more or less likely to break with laid-down procedures, defer to expertise, or more generally, prefer efficiency to thoroughness (or vice versa). A person's ethnicity may also make them more or less sensitive to the demands of the second set of cultural issues – the organisational culture in which the decision makers are embedded. The panel, How does organisational culture influence decision making?, describes some of the main efficiency-thoroughness tradeoffs that work at cultural levels within organisations.

How does organisational culture influence decision making?

Organisational policy may be written down or informally transmitted by what people see each other do. Either way, it exerts powerful influences on decision making – usually by emphasising efficiency over thoroughness. Here are five common mechanisms.

- Incident reporting policy Many organisations now have incident reporting schemes in which people are asked to report things that go wrong. One problem arises when such reporting conflicts with performance targets on which reputations, opportunities and bonuses depend. Another problem is that the absence of reports may be innocently taken to mean that all is well. Either way, the focus on reporting incidents may improve efficiency but, ironically, not necessarily safety.

- Management policy Managers tend to favour the efficiency of meeting their administrative deadlines rather than the thoroughness of maintaining high visibility with their teams. This is because it is their non-efficiency that the organisation will notice first, and if things go well, they will be praised for their efficiency. Of course, if they do not, they will be blamed for their lack of thoroughness.

- Subcontracting policy Subcontractors often feel under pressure to meet their client's safety standards for openness and reporting. But they may also believe that they will suffer if they report too many things compared with their competitors. This tension may be resolved by reporting enough to sound credible but not so much that the contract is lost, which favours efficiency over thoroughness.

- Cost policy Understandably, organisations like to reduce unnecessary costs. The problem is in the interpretation of 'unnecessary' and who does it. It is often used to improve efficiency over thoroughness.

- Policy integrity Organisations often say that safety (which requires thoroughness) is the most important thing for them but implement policies and performance measures that require efficiency. Adapted from Hollnagel (2009).

In making decisions, we differ in terms of the amount of situational awareness we have and the amount of situational familiarity we can recognise. Decision makers are dependent on their training and experience for the quality of their decisions. In particular, in making decisions, lots

of relevant experience allows us to be better tuned to the real risks of the situation we think we are in. A large amount of research points to two main ways in which experts and novices differ:

The first of these is the accuracy of the mental picture of what's going on – and what can happen next. This is often referred to as situational awareness. Good situational awareness depends on three levels of mental activity – all of which take place simultaneously, and all of which are subject to the active mental filters described in the aspect of Making sense of things. These three levels are:

- Perception: In making decisions people must be able to pick out all the pieces of information in their environment that are relevant to our goals. Some of these may be very subtle, such as small changes over time in what an instrument says or the sea state. Some may rely on memory, such as what someone told them on watch handover. And some will be very obvious, such as a bridge alarm. In complex situations, many disparate information sources may be relevant and they all may be simultaneously competing for our attention. They may also be hidden away, requiring a deliberate search to find them.

- Comprehension: However disparate or numerous the relevant individual information elements are, in making decisions people must be able to integrate them in a way which allows us to form a coherent picture of what is going on around us. It is here that people establish the meaning, significance and priority of the information relevant to their goals. For example, if a chief engineer sees warning lights and hears unusual engine noises while under assisted tow in a restricted channel, the extent of the problem must be quickly evaluated to work out the implications for the ship and the accompanying tugs.

- Projection: Projection requires us to have good mental models of the dynamic relationships between the relevant parts of our environment over time. Experts focus a lot on creating their own futures via present decisions. In turn, these decisions are formed out of their comprehension of the likely interactions of all the elements they deem both relevant and important.

The second is the directness with which experts are able to arrive at good decisions – often under extreme time pressure. This depends on situational familiarity. Experts try to recognise important elements of the current situation from previous experience. For example, a fire chief called to an apartment fire noticed billboards on the roof and remembered a previous case when their supports caught fire, sending the boards crashing down on the crowds below. He moved the onlookers back and saved many lives on this new occasion. If experts are faced with a novel situation, they might borrow an idea or plan from another set of circumstances in their experience that was similar in some way. Whether faced with routine or novel problems, expert decision makers spend time mentally running through their plan for the current situation, projecting a story into the future, altering details as they go, until they can see the outcome they want. They then act.

As a result, their experience of the decision process is a relatively smooth, direct and continuous stream of thought, driven by a recognition of similarities between the current situation and their previous experience. For expert decision makers, it is usually obvious what to do. For non-experts, it is hardly ever obvious. If time permits, they must rely on their knowledge of the rule book, or more likely where to find it so they can look up the relevant procedure. Very often, however, there is little time for this. If they cannot consult with a mentor, they will do whatever makes the most sense based on their limited experience.

HUMAN ASPECT	OPERATIONS
People make mistakes	Navigation Cargo operations Mooring Engineering

The real problem in safety-critical industries like seafaring is that some mistakes have such serious consequences that they need to be caught before they have a chance to develop into disasters. Most of the time, seafarers catch their own (and each other's) mistakes quite successfully. However, sometimes they don't and because of the nature of what they do, the results can be very serious. It is widely reported that human error continues to be responsible for most maritime and offshore casualties. What is the nature of people's mistakes?

There are three main sorts of activity in which people make mistakes:

Skill-based activity: Where people are well practised in what we do. Here, because we can work without thinking too much about it, we can find ourselves doing something familiar (eg operating a well-used panel switch) when we should be doing something else (eg operating a less frequently used, but adjacent, panel switch). Or else, people can suffer a memory lapse (eg suddenly forget what we were going to do next).

Rule-based activity: Where people have more conscious involvement with the task, and need to apply rules and procedures to what we are seeing and doing. Here, people can make a mistake by

failing to apply a rule correctly, or at all (eg assuming that give-way vessels will always give way, or not realising themselves to be the give-way vessel).

Knowledge-based activity: Where people must have even more conscious involvement with our task (eg where people are attending a fire and must make decisions in novel circumstances). Here, the kind of mistakes people make are often to do with the way we make sense of the situation.

Factors contributing to mistakes. There are a number of factors that increase the likelihood of mistakes. Some of these factors operate at an individual level, while others are organisational.

Individual influences on mistake-making:

- Inadequate rest or high stress levels: Fatigue and stress reduce attention, concentration and response times.
- Insufficient training and experience: Poor training or lack of experience may result in attempting to do tasks with insufficient knowledge ('a little knowledge is a dangerous thing') or else a failure to prevent a dangerous situation developing). Lack of investment in training and structured experience also contributes to a poor safety culture by sending strong signals to the workforce that they are not valued.
- Inadequate communications: Successful communication is not simply a matter of transmitting messages clearly. It entails empathy on the part of the messenger to assure the listener's readiness to hear, and active listening on the part of the hearer (see section on Communicating with others). Much communication depends on both parties' ability to make sense of the situation they share (see section on Making sense of things).

Organisational influences on mistake making:

- Inadequate time: If there is not enough time to get everything done, people look for ways to be more efficient at the expense of thoroughness. people are also likely to experience high workload levels, which increases stress levels and accelerates fatigue.

- Inadequate safety culture: The most influential source of a good safety culture is the seriousness with which senior management approaches it via training, staff investment and the implementation of work processes that accommodate the time that safe practices take. Workforce mistakes increase not just because of the absence of this investment, but also because of the meaning people attach to the absence of the investment by their senior management.

***Systems Thinking**:* As made clear in the aspects of Making decisions and Taking risks, people's behaviour – at all organisational levels – is more like a deft, smooth flow around the obstacles they encounter. This flow makes perfect sense at the time to all involved. It is only later, when things have gone wrong that some of their decisions and actions are re-interpreted as mistakes. The World of shipping operatons is not completely predictable as a series of causes and effects. The question raises: how can it be understood sufficiently well to stop serious mistakes in their tracks? Doing so requires a shift of view – driven by a number of observations about the way in which the world has changed in recent years. This shift of view emphasises the maritime world as a complex system of interacting, circular relationships. This is also known as systems thinking. It is out of these interactions that behaviour – both good and bad – emerges. This systems view brings into focus a number of important points relating to humans and the organisations they create. Here are four.

Humans create safety: In the systems view, people are not seen as sources of error so much as the creators of safety (see panel on previous page, Where is safety – in people or in rules?). This view recognises that there will always be gaps in any system because designers and rule makers cannot envisage all situations and contingencies. This means that human operators must be given some degree of freedom to cope with the unexpected. In turn, this increases the need for the human operator to identify and manage the risks that arise.

Organisations are actually organic: In the systems view, organisations are not static, and safety emerges continuously from the overall behaviour of an organisation's interacting components – including its people. Many forces, such as political or economic concerns, can cause an organisation to drift away from safety. A good safety record can promote complacency, allowing

risks to grow unseen. Perhaps the most common threat to safety is when change in one part of an organisation's functioning unwittingly disturbs functioning in some other part of the organisation.

Organisations create the behaviour they get: Assessment of the risks of operational error or adverse events often miss the point that the real risk to safetycritical operations is in the interfaces – the natural fault lines – between an organisation's different parts. These include the 'fault lines' between training and practice; managers and operators; designers and users; shipowners and crews; officers and ratings; efficiency and thoroughness. Focusing on the real risks is one challenge. Another is knowing how these risks are changing over time and, in particular, how far the organisation is drifting towards dangerous levels of behaviour.

Decision making must be based on systems thinking: All safety-critical industries are formed of different organisations which must interface successfully. In the maritime industry, these include shipbuilders, shipowners and managers, Masters and crews, port authorities, flags, insurance clubs and so on. In the absence of applied systems thinking, organisational decisions are taken that are locally optimised (ie too narrowly-focused on a small part of the problem) at the expense of global effectiveness. There are countless examples of this in the maritime industry – mostly driven by apparent opportunities to save money in the immediate future.

It is clear that it is normal for people to make mistakes. It is also clear that wider organisational factors play a huge part in helping to create our behaviour – including our mistakes. These twin realisations have allowed a new approach to safety management to emerge in recent years. The key insight has hinged on the need for safetycritical organisations to shift from a blame culture to a 'just culture'.

A 'just culture' is founded on two principles , which apply simultaneously to everyone in the organisation:

- Human error is inevitable and the organisations' policies, processes and interfaces must be continually monitored and improved to accommodate those errors.

- Individuals should be accountable for their actions if they knowingly violate safety procedures or policies.
-

Just Culture

Steps towards a 'just culture'

- Address corporate and legal issues
  - Need to obtain unambiguous boardroom commitment
  - Need to create indemnity for incident reporters against legal proceedings – this may require changes to existing legislation
  - Need to separate reporting system staff from disciplinary staff
- Design and integrate reporting system
  - Need to identify responsibilities and incident report investigators with domain expertise in safety, operations, management and HR
  - Need to create a rapid, efficient reporting process that captures and yields useful information at the right level of detail
  - Need to create clear, easily-accessible process that will be used and trusted
  - Need to decide if new process will be integrated with current incident-reporting procedure
  - Need to create investigative and assessment processes for deciding accountabilities and action
- Develop, promote and roll out reporting system
  - Need to identify and assign development resources
  - Need to identify champion(s) and communications strategy • Need to educate users
  - Need to collect feedback from users
  - Need to feed back useful results to users at all organisational levels – including impact on production, efficiency, communication and cost benefits

HUMAN ASPECT	OPERATIONS
People get tired and stressed	Navigation Cargo operations Mooring Engineering

Seafaring and fatigue are going hand in hand. The widely-shared belief that fatigue played a significant part in marine incidents had been made official. Issues of reduced manning, increased workload and resulting fatigue have continued to play a major role in many maritime accidents to the present day. Reduced manning is an organisational policy aimed at increasing efficiency. It is often made possible by the introduction of automation. increased efficiency usually means a corresponding decrease in thoroughness.

Automation solves some problems at the expense of creating others. In the case of the unfortunate crew on Exxon Valdez, the demands placed on them increased fatigue to the point where it became a serious threat to safety. Rather obviously, people get tired when they have been awake too long. But how long is “too long”? Several factors affect this, as follows:

- **Workload**: The harder people work, the sooner they need time to recover from it. Workload itself is influenced by the design of the tools, equipment and procedures people

must use, and the expertise they have acquired through training and experience. In fact, the problem of workload and its measurement is a little more complicated than it looks at first sight. This is because it is the result of a mix of external and subjective factors.

- **Sleep debt**: People need enough sleep of the right sort to recover from their wakeful activities. In its absence, they build up a 'sleep debt' which severely affects their ability to stay alert. Sleep debt causes people to misread situations, overlook key information and fall asleep even when they know it will put them and their colleagues at extreme risk. There are two main causes of sleep debt:
    - Disruptions to sleep itself – such as loud noises, bright light, cold, heat, motion, sickness, chronic pain and infection.
    - Disruptions to natural sleep patterns, such as shift work, operational demands (eg paperwork, ship inspections, drills and emergencies), personal worries, and inadequate, inappropriate or badly-timed food and fluids. One of the most distressing things for someone who is tired is to be given the opportunity to sleep, but to be unable to. Insomnia can be both a cause and an effect of increasing sleep debt, forming a vicious circle that must be broken before the effects of fatigue create serious consequences.

- **Perceived risk or interest**: If people are stimulated by their sense of risk or interest in what they are doing, they can stay awake and alert for longer. However, the time they then need to recover from sustained activity will also get longer. If people are engaged on tedious or boring tasks, they will feel tired sooner. People often increase their exposure to risk in order to create the levels of interest and alertness they need.

- **Diet**: Inadequate levels of nutrition accelerate the onset of fatigue. Different foods also affect alertness. For example, heavier meals dominated by carbohydrates encourage sleepiness, while lighter, protein-based meals encourage wakeful alertness.

- **Fitness and movement**: People who are overweight and/ or lacking in exercise will tend to feel fatigued earlier than their leaner, fitter or more active colleague.

- **Time of day**: People live by natural daily rhythms, which means that they feel least alert in the small hours of the morning and most alert in the period before midday.

- **Environment**: People become more fatigued in environments with bad levels of light, noise, vibration, temperature and motion. Research has shown that some aromas, such as lemon scent, encourage alertness. As part of the Human Factors Integration Plan, the specific design activities relevant to avoiding undue fatigue relate to the following environmental factors:

    - **Lighting**: Ship lighting systems are not powerful enough to overcome the natural human slow-down in the early morning that is associated with sleep. It has been found that installing special lighting systems that generate 1,000 times the light of normal systems helps people to adjust to night shift working by resetting the body's normal rhythm.

    - **Noise**: High levels of noise can impair hearing either permanently or temporarily and ship designers generally take account of this. However, continuous exposure to lower levels of background noise, eg from distant diesel engines, is a source of stress (see later in this section). Lower levels of continuous noise accelerate the onset of fatigue, disrupt restorative (deep) sleep and produce other tell-tale signs of stress such as high blood pressure and digestive problems. Noise levels of 40 to 50 dBA start to interfere with sleep. 70 dBA significantly disrupts sleep for almost everyone. Over and above the 'safe' limits, ship designers need to pay attention to the sources and pathways of noise and aim for quieter equipment, and better noise isolation, dampeners, barriers and absorption.

    - **Vibration**: Vibration from a ship's onboard machinery and ship movement affects everybody onboard. The crew are always in contact with one or another ship's surface, through which vibration is transmitted. Even quite brief exposure to vibration leads to fatigue and stress. Ship designers avoid levels of vibration

known to lead directly to physiological damage. However, the recommended maritime limits of vibration guidelines are still high enough to significantly disrupt sleeping patterns, leading to the dangerous accumulation of sleep debt. The bad effects of even 'safe' levels vibration are wideranging. Physiologically, they include changes to heart rate, breathing, blood flow and pressure. Seafarers can experience pain, nausea and problems with visual focusing, coordination and altered perceptions – all of which are sources of fatigue and stress. To reduce this problem, ship designers need to pay attention to increased dampening and isolation to reduce vibration to well below the current recommended levels.

- **Indoor climate**: This includes temperature, ventilation and air quality. Safe limits for all these aspects are well known and already available to ship designers. Like noise and vibration, however, the recommended levels tend to be focused on preventing harm, rather than fatigue. Getting too hot makes us feel tired and sleepy, reduces what we are able to do and leads us to make mistakes. Getting too cold lowers our levels of alertness and affects our ability to focus on.

- **Ship motion**: This is also a known source of fatigue and stress for seafarers. The problems of disrupted sleep through pitching and rolling are worsened by joint soreness caused by compensating movements of the lower back, knees and ankles during wakefulness.

The connection between fatigue and stress: Fatigue is a normal human response to normal human activity. Similarly, sleep is a normal human response to tiredness. The daily cycle of work/fatigue/sleep is a normal, healthy part of human life. As people pass through this cycle, their level of arousal fluctuates, which in turn helps to determine how alert they can be to their surroundings. When people are faced with very few demands, their arousal levels tend to be very low. As a result, their alertness suffers, and they will often feel bored and tired. As the demands around them increase, people become more aroused in order to cope with them. Their alertness levels increase and, unless they are suffering from a severe sleep debt, their feelings of fatigue can disappear.

The problem comes if demands go on increasing. Stress is produced when the demands on people (perceived or real) consistently exceed their ability to meet them. Stress produces a complicated series. One of the first signs of chronic stress is difficulty in sleeping, which can then contribute to the development of sleep debt. The inability of people to repay their sleep debt through stress-induced insomnia can itself become a source of stress. This creates a particularly vicious circle in which stress increases sleep debt which increases stress level, with the result that performance levels decline ever faster. So, normal fatigue is not stress. However, the inability to deal effectively with fatigue can become a source of stress, as can the sleep debt that results. In addition, stress can increase fatigue by stimulating too much production of adrenalin – the source of the human 'fight or flight' reaction.

Causes of stress: Stress can be caused by a large number of factors. Some of these factors are work-related while others may belong to the private lives of the person affected. Seafarers are particularly vulnerable to both sources since their work brings them into contact with many known work-related stressors as well as removing them from their home lives and countries for long periods. The panel, Common sources of seafarer stress, summarises the research findings as they relate to seafarers in particular.

HUMAN ASPECT	OPERATIONS
People Learn and develop	Navigation Cargo operations Mooring Engineering

Learning is a fundamental survival mechanism of all mammalian species, and humans are particularly good at it. So the question for safety-critical organisations like the maritime industry is not whether people learn, but what they learn – and by what means. The answer to these questions is more – or less – in the control of their managers and employers. As a result, it is less – or more – of a danger to everybody concerned, for without the right guidance, people learn the wrong things.

How do maritime people learn? A common, but incorrect, view of learning is that it involves transmitting information from outside the individual to inside their head. This view places emphasis on the skill of the teacher or the appeal of the learning materials, the better for the learner to 'absorb' them. While instructional skills and content formats are certainly important, learning is an activity exclusively carried out by the learner. No-one else can do it for them, and it doesn't happen by absorption. Fundamentally, people learn by actively creating meaning for new things in relation to things that already have meaning for them.

Formal or Informal Learning*?* People informally learn what our colleagues do, what the shortcuts are, what seems to make sense to them, and what behaviours are rewarded. Informal learning may or may not result in safe behaviour. Often, the organisation will not find out until an unsafe behaviour is transformed by a host of other circumstances into injury, loss or worse. People form attitudes towards their organisation – and the industry as a whole – about the quality (low or high) of the effort to provide them with the information they need. And whatever people learn, they in turn transmit to others, helping to define and maintain the nature of the overall culture to which they belong.

Education or training? The aims of education and training are quite different. Education is aimed at widening and extending people's horizons. Its goal is to increase the number of future possibilities for the individual, and to increase the number of potential ways that the individual can approach each of those possibilities. By contrast, the aim of training is to constrain the possibilities, focusing the trainee on the particular responses and behaviours required to achieve specific and consistent operational performance standards. However, the differences between the two are really just a matter of scale. Both education and training demand a large increase in a person's mental and behavioural repertoires. The difference is that with education, the increase is with respect to the whole universe of possibilities, while with training it is going into much more detail in a highly constrained corner of that universe. In both cases, however, the same fundamental learning process is required for a person to engage with them.

HUMAN ASPECT	OPERATIONS
People Work with each other	Navigation Cargo operations Mooring Engineering

When it comes to working with others, the jobs of most seafarers fall into two different sorts of activity. The distinction rests on whether the goals of the activity are individual and independent, or else team-based and shared:

- **Working with individuals**: Individuals with independent goals must work with each other to trade information and evaluate its meaning. The resulting decision – arising from, say, a selection interview – will affect the goals of both. The same applies to two people in a job appraisal interview or other formal staff discussion, between accident investigators and witnesses, or between different parties who are in negotiation with each other. In all of these cases, people need sets of interaction skills that will best serve their own, individual goals.

- **Working in teams**: In a team task, people must work with each other in mutually supportive ways to achieve a shared goal. Many seafaring jobs require people to work with each other as team members, each of whom contributes their effort to an objective that is bigger than any one of them. In these situations, people need skills that permit not just effective interaction between people, but good teamwork. A team is more than a group. While a group may be united by a common location (eg a group of bystanders), or common interests (eg members of a club), a team is united by a common goal, with each member having a defined role to play in achieving it. This means that each team member must have not only the technical skills to carry out

their role, but the necessary team skills to carry out the role in concert with other team members.

Research over many years in a number of different safety critical industries has revealed five main types of team skill that are essential to team effectiveness. They are as follows:

- **Team leadership**: This includes motivating, directing and coordinating team member activities, and assessing and developing team members' knowledge and skills. Good team leaders clarify team roles and performance expectations and engage team members in planning and feedback sessions. They also spend time synchronising individual contributions and seeking information that affects overall team performance.
- **Mutual monitoring**: This is concerned with the ability of team members to monitor each other's performance within a common understanding of the constraints and opportunities of the environment in which they must work. Team members who are good at mutual monitoring identify mistakes in their colleagues' actions and provide feedback that helps them to correct themselves.

- **Back-up behaviour**: This refers to the ability of team members to understand each other's tasks and responsibilities sufficiently well that they can anticipate problems (eg unacceptably high workload) in each other's tasks and even take over if necessary. Team members who are skilled in back-up behaviour, work continually to avoid problems for their colleagues or take some of the load, since they know that failure to do so will lead to problems for the whole team.

- **Adaptability**: This refers to the ability of team members to respond to continuous changes in the environment that affect their plans. Adaptable teams can identify external changes, understand their implications and develop new plans accordingly. They can also create new and better ways to accomplish routine tasks while remaining vigilant about the impact of such procedural changes on their safety.
- **Team orientation**: This refers to the degree to which team members are able to see themselves as team members with a common goal, rather than individuals with

independent goals. Team members who are highly team oriented are very receptive to the suggestions of their colleagues. They also involve each other in setting goals, and then choosing strategies and sharing the information needed to achieve them.

People need to use all of these five types of team skill if they are to function as an effective team. However, to assure success, they must also employ three types of 'team glue'. This glue serves to keep team members together through updates on their progress and performance as they carry out their roles. The three types of 'glue' are:

- Similar mental models – so that team members have an agreed understanding of each other's situations and responsibilities, and how they each contribute to team goals and strategies.
- Mutual trust – so that each team member feels that their actions, misgivings and mistakes will be responded to efficiently and constructively with due regard to overall team goals.
- Effective communication – so that messages between team members are delivered with as much completeness and certainty as possible within the prevailing conditions (see the section Communicating with others).

HUMAN ASPECT	OPERATIONS
People Communicate with each other	Navigation
	Cargo operations
	Mooring
	Engineering

Human communication is the process of influencing a human receiver to create thought and action that is consistent with, and responsive to, the sender's purpose. A common language, context and culture always increases the speed and bandwidth by which intended communications can occur. However, these commonalities do not eliminate the construction of unintended meanings. Many communication failures arise precisely because people fail to recognise that they are exchanging signals that have as many possible meanings as can be constructed by the receiver, and not just the single meaning intended by the sender. If the communication takes place between team members, then any command or response always takes place in the context of the team's greater purpose. This means that effective communication in a team requires every team member to understand not only their own communication needs, but also how these dovetail with the communication needs of other team members.

Requirements for successful human communication: people must have different perspectives

- Both parties experience the world differently, but with enough similarity to be able to explore the differences. If their experience was identical in every respect, no communication would be needed. At the other extreme, if there were no similarities, there could be no common starting point to explore their differences

- People must have a shared means to explore the differences. We all have different points of view. For communication to be successful, we must have the means to realise that we do – and understand the differences between them. We can achieve this through a common dialogue in which we ask questions, provide answers, give commands, make responses and demonstrate agreements.

Why does human communication fail? As we have seen, people need to have different points of view in order for communication to be required at all. This requirement is easy to meet since it is in an inevitable part of being human that people form their own individual views from the information available to them. However, these differences in perspective are also the source of misunderstandings if dialogue is interrupted – or omitted – before shared meaning can be established. There are two main reasons why human communications fail:

- Insufficient dialogue – where an important difference between people's understanding remains undetected.
- Insufficient opportunity for dialogue – where a difference is suspected, or detected, but is not resolved in time.

How can communication failures be prevented?

- **Lack of media skills and knowledge**: People may know what needs to be communicated, when, and to whom, but are physically unable to do so. This may be due to operations in a noisy environment, lack of training in the use of the communications equipment, or the failure to share (enough of) a common language. These factors are best addressed by appropriate recruitment and selection policies, procedural training courses, and procedure-based manuals. Training in Standard Marine Communication Phrases (SMCP) is an essential foundation for ensuring clearer safety-related verbal communication at sea.

- **Lack of task skills and knowledge**: People may not have enough training or experience in their own job to know what information it is important to communicate and when. This is best addressed by task training to defined performance standards, with appropriate refresher training to prevent skill fade. Particularly important in the maritime industry is the provision of well-designed, properly translated shipboard documentation and procedure-based manuals that can be understood by their target audience.

- **Lack of social skills or cultural knowledge:** People may not possess the personal skills needed to engage effectively with other people. This includes knowing how to overcome personal differences or incompatibilities so that they do not interfere with effective performance. It also includes knowing how to get the best out of people, motivating them and encouraging them to work with each other (see section on Working with others). Or people may not appreciate how cultural differences affect people's understanding of different communication styles. This is best addressed by personal skills, leadership, cultural awareness and diversity and equality training programmes.

- **Lack of communications process skills and knowledge**: People may not understand enough about their own – and others – mental processes involved in successful communication. As a result, they may not be sufficiently disciplined in their assessment of the information quality they receive, or in the inferences and associated risks they take before using it. This is best addressed by training in leadership and critical thinking.

- **Lack of time**: People may be surprised by fast-moving, sudden or emergency conditions. Lack of time can also arise through high workload, leading to slips and lapses: people can simply forget to communicate or be distracted by having too much to do. This is best addressed by good job design, mentoring, task and team training programmes across a wide range of scenarios, and regular team-based emergency drills.

3.4.3. Seafarers generic soft skills and competencies overview

From the perspective of maritime industry, as a one of the most important research, International Association of Maritime Universities (IAMU) were conducted a survey in March 2018 to figure necessary seafarer skills under for Industry 4.0. The survey has 214 respondents from all regions of the world and diverse work areas of the maritime industry. According to the result of IAMU survey, the competencies presented in in Table x deemed to be of the most important competencies in short, medium of 5-10 years and long term of 20 years. It is obviously seen from the Figure 8, technical competencies regulated in STCW still play significant role in maritime

industry in short, medium and long terms. On the other hand, technological awareness, computing and informatics skills, and environmental/sustainability awareness/concern will be essential competencies for the future seafarer with the effects of emerging challenges in Industry 4.0.

Table III: *Top 15 competencies of a future seafarer for different time periods*

Competency	Short	Medium	Long
Technical competencies	1	2	2
Technological awareness	3	1	1
Adaptability and flexibility	7	4	4
Computing and informatics skills	9	3	3
Teamwork	2	7	8
Communication skills	4	6	8
Leadership	6	5	7
Discipline	3	9	10
Environmental/Sustainability awareness/concern	12	5	5
Learning and self-development skills	9	9	6
Complexity and critical thinking	8	7	11
Language ability	5	8	14
Professionalism and ethical behavior	9	9	9
Responsibility	5	11	13
Inter-personal and social skills	14	9	10

A PWC report stresses that: "*regulation is increasing, so ship's officers will need to keep up-to-date on new laws and regulations. Work-related stress is increasing too, so more training on stress and time management will be important. Piracy is also on the rise, so ship's officers will need to be briefed on how to deal with a crisis. Companies should also have support systems in place to help cope after a traumatic event*" At the same publication, they describe Ship's officers needed skills as follows:

- strong social skills
- ability to work with people of other cultural and ethnic backgrounds
- time management
- stress management

Desired Attributes and Skills in Demand: Another recent study examples of skills in demand now and in the future are presented at Figure 9. Those seeking successful careers in the Sea Transport sector can set themselves apart by developing these attributes and acquiring the skills in demand.

Figure 13: *Desired Attributes' and skills in Demand*

At this stage we considered an overview of theoretical competencies and soft skills that a marine employer may be attributed with in a shipping company before we present the regulatory side (TMSA requirements). The following subchapters 34.1 &3.4.2 provide an indicative list of the

top 5 Generic soft skills for each (possible) employee not only onboard but also ashore. Each skill is categorized as per its proficiency level required and its function is presented the tables that follow

Table IV: Generic Skills and Competencies

GSC	GSC Description	Proficiency Levels		
		Basic	Intermediate	Advanced
Communication	Convey and exchange thoughts, ideas and information effectively through various mediums and approaches.	Communicate information with others to respond to general inquiries and to obtain specific information.	Articulate and discuss ideas and persuade others to achieve common outcomes.	Negotiate with others to address issues and achieve mutual consensus.
Computational Thinking	Develop and use computational models, tools and techniques to interpret and understand data, solve problems and guide decision-making.	Use computational models, tools and techniques to identify patterns in a problem and develop a solution.	Modify existing computational models, tools and techniques to develop different solutions.	Develop and create computational models, tools and techniques to implement new solutions and apply to other problems.
Creative Thinking	Adopt a fresh perspective to combine ideas or information in new ways and make connections between seemingly unrelated fields to create new ideas and applications.	Connect ideas or information from related fields or applications to address an immediate issue.	Connect or combine ideas or information from unrelated fields or applications to generate multiple ideas to bring about a specific outcome.	Create original applications or ideas to reveal new possibilities and reshape goals through high level of innovativeness.
Decision Making	Choose a course of action from various alternatives using a reasoned process to achieve intended goals.	Make decisions of simple or routine nature to achieve intended goals using given information and guidelines.	Make decisions in a complex setting to achieve intended goals using a structured process and multiple sources of available information.	Make decisions in a volatile and ambiguous setting using a structured process and limited sources of available information to achieve intended goals.
Developing People	Help others to learn and develop their capabilities to enhance their performance and achieve personal or professional goals.	Use demonstration and explanation to teach a familiar task to inexperienced co-workers.	Provide coaching to others to develop their skills and knowledge on their jobs to enhance performance.	Provide mentorship to help others in their professional and personal development to improve performance and further their careers.
Digital Literacy	Use ICT tools, equipment and software to create, evaluate and share information digitally with others.	Perform basic functions using software programmes pertaining to computer operating systems and file management, and search online information.	Use available software features to create and edit documents, customise templates and reports and evaluate online information.	Use available software features to enhance documents, analyse and manipulate data, and use ICT to organise, share and communicate information clearly and coherently.
Global Mindset	Awareness of diversity across global cultures and markets. Seek opportunities to adopt successful practices and ideas.	Demonstrate understanding of global challenges and opportunities and how to transfer best practices across cultures. Respect cultural differences and needs of a diverse workforce.	Develop global networks and manage virtual relationships while balancing both local and global perspectives. Adopt a local and global perspective when making decisions.	Build the organisation's capabilities to compete in a global environment. Manage tension between corporate requirements, global and cultural differences.

Table V: *Generic Skills and Competencies*

GSC	GSC Description	Proficiency Levels		
		Basic	Intermediate	Advanced
Interpersonal Skills	Manage relationships efficiently and communicate with others effectively to achieve mutual consensus and outcomes.	Recognise own internal feelings and emotional states to manage interpersonal relationships in social situations.	Detect and decipher emotions of others to manage interpersonal relationships in social situations.	Influence, guide and handle others' emotions to build instrumental relationships and manage conflicts and disagreements.
Leadership	Lead others to achieve objectives in the most effective way. Provide an inclusive workplace that cultivates workplace relationships and teamwork, and foster the development of others.	Demonstrate professionalism to set a good example at peer level. Support others through own initiative and enthuse others through own positive and energetic approach.	Lead by example at team level. Encourage and guide others to adopt a point of view, make changes or take action. Provide a team environment that facilitates relationships building, teamwork and the development of others.	Lead by example at organisational level. Inspire, motivate and guide others to adopt a point of view, make changes or take action. Cultivate an open, cooperative and collaborative learning culture for the organisation.
Lifelong Learning	Seek out opportunities to enhance one's knowledge and skills. Access and acquire new knowledge and skills actively for continual learning.	Organise and manage own learning by setting learning targets. Identify learning approaches to achieve work or career goals.	Engage in collaborative learning by discussing one's learning with others and soliciting feedback to continually improve oneself.	Conduct self-reflective practices to review one's learning to facilitate continual growth in one's career or profession.
Managing Diversity	Work well with people from different ethnic, social, cultural and educational backgrounds and understand the concerns and interests of diverse work groups.	Demonstrate sensitivity to the cultural characteristics, values, beliefs, and behaviors of another ethnic or cultural group.	Build relationships with different ethnic or cultural groups by engaging in cross-cultural cooperative projects.	Manage conflicts arising from different ethnic or cultural groups and work effectively in cross-cultural settings.
Problem Solving	Generate feasible and efficient solutions to solve problems and capitalise on new opportunities.	Identify easily perceivable problems and follow given guidelines and procedures to solve the problems.	Identify less perceivable problems and use problem solving tools and techniques to solve the problems.	Anticipate potential problems beyond the current scope and apply higher order problem solving tools and techniques to turn problems into opportunities.
Resource Management	Efficient and effective deployment and allocation of resources when and where they are needed. Include planning, allocating and scheduling of resources to tasks, which typically include manpower, machines, money and materials.	Use resources to ensure optimum and efficient use of resources.	Deepen insights into the planning, allocation and deployment of resources to anticipate needs. Plan the allocation and deployment of resources efficiently and effectively.	Establish strategies for the allocation and deployment of resources efficiently and effectively.

Table V: Generic Skills and Competencies(Continiued)

GSC	GSC Description	Proficiency Levels		
		Basic	Intermediate	Advanced
Sense Making	Organise and analyse data and information accurately to identify relationships and detect patterns and trends to gain insights for decision-making.	Identify relationships and linkages within different components of data.	Interpret data to uncover patterns and trends between various sources of data.	Analyse data relationships, patterns and trends to gain important insights and make informed decisions.
Service Orientation	Commit to exceeding both internal and external customers' needs. Proactively identify customer needs and sustain a culture of service excellence within the organisation.	Exceed customer needs and expectations and handle service challenges with a positive mindset. Demonstrate an understanding of the organisation's service vision, mission and values.	Anticipate customer needs and expectations and elicit feedback from customers to improve service. Build relationships with customers to create and sustain customer loyalty.	Model, lead, train and motivate staff with a focus on sustaining a culture that encourages commitment to service excellence and high performance.
Teamwork	Work collaboratively and effectively with others to contribute to group efforts to achieve identified objectives.	Contribute to a positive and cooperative working environment by fulfilling own responsibilities and providing support to co-workers to achieve team goals.	Facilitate work team activities, provide assistance and support needed by team members and promote ownership and commitment among team members to work goals to improve team performance.	Establish teams, design and assess tasks to continually improve team effectiveness and cultivate a sense of organisational ownership and a cooperative working environment.
Transdisciplinary Thinking	Understanding of concepts across multiple disciplines, with the capacity to synthesise the knowledge and insights to guide decisions and foster cooperation.	Research and adapt concepts from outside one's field of expertise to supplement one's core knowledge and proficiency.	Co-relate material from diverse knowledge bases to guide decisions and policy making. Participate in reflective and trans-disciplinary communities within and outside the organisation.	Synthesise knowledge and insights across disciplinary boundaries to aid strategic decisions and foster cooperation within and outside of the organisation.
Virtual Collaboration	Use online collaborative communication tools to work as teams to accomplish tasks or projects.	Participate and contribute in a virtual team. Set up appropriate online collaborative tools and supporting equipment.	Use interactive collaborative tools to foster cohesion and commitment among virtual team members to achieve goals. Keep up-to-date with innovative online collaborative tools and applications to enhance one's proficiency in engaging in virtual collaboration.	Leverage on diverse team talent, latest online collaborative technologies and virtual platforms to produce collaborative behaviour and achieve technological savviness in virtual collaboration.

In regard to previous analysis of human aspect in shipping operations, and combining above matrices, we present a suggested scheme of generic skills and competencies for a typical tanker personnel. Before assesing those, we present a typical levels of authority and lines of communication of on shipboard chart.

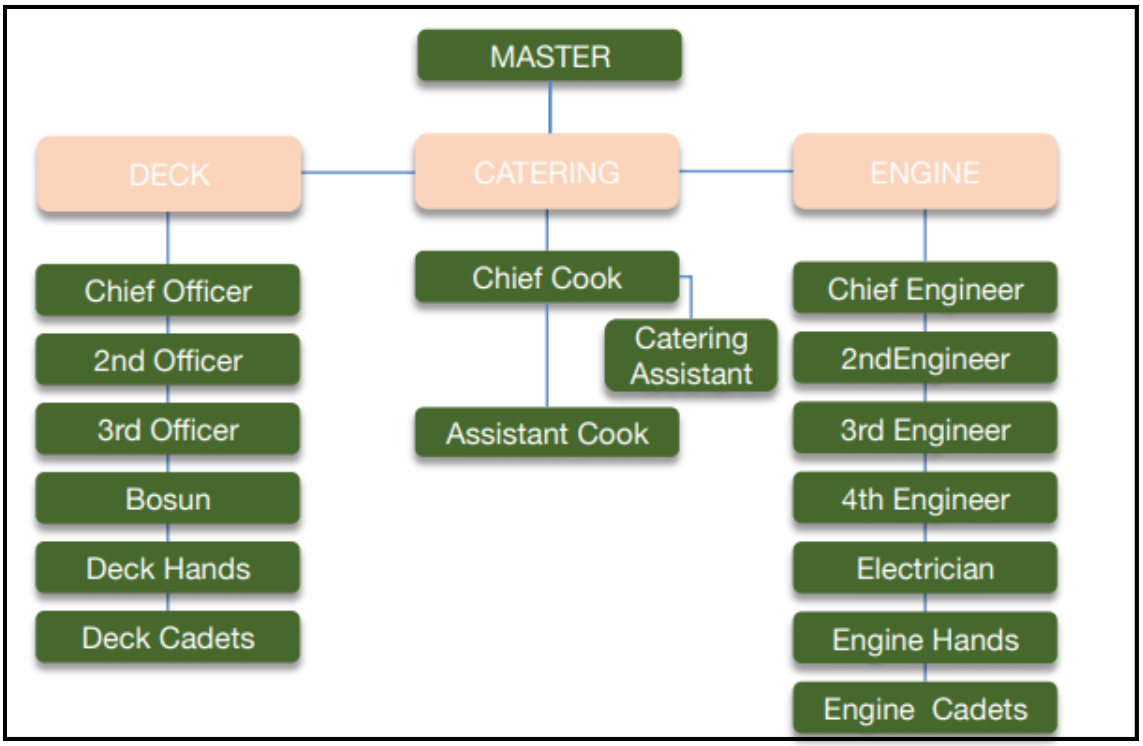


***Figure 14**: levels of authority and lines of communication & shipboard chart*

For the needs of our research we are stressing the top 5 of them as to provide readers and other researches an generic approach. We focus on Deck and Engine Officers. Firthermore we *discuss Aspects of Seafarers' Wellbeing Onboard.*

DECK

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Advanced
Decision Making	Intermediate
Global Mindset	Intermediate
Interpersonal Skills	Intermediate
Leadership	Intermediate

Ship Master: The Master has overall command and control of the ship's crew, navigation, manoeuvring, cargo handling and stowage, communications and safe handling of the ship while ensuring compliance with the local and international laws, as well as the port state and flag state policies. He/She must adhere to the budget assigned for the voyage, and is responsible for delivering the cargo safely. He oversees search and rescue operations, and is an organised person with a strong eye for detail. The Ship Captain/Chief Mate must pass a colour vision test and fulfil the requirements stipulated in the Standards of Training, Certification and Watchkeeping for Seafarers (STCW) issued by the International Maritime Organisation (IMO).

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Intermediate
Decision Making	Basic
Global Mindset	Basic
Interpersonal Skills	Intermediate
Managing Diversity	Basic

2nd/3rd Chief Officer: The 2nd/3rd Officer is responsible for maintaining the bridge navigational and communications equipment and safety equipment related to saving lives and fighting fires on board. He/She reports to the Master and is primarily responsible for safe route planning, maintaining charts and publications. He also assists in emergencies by responding to search and rescue operations, while exercising sound judgment during emergencies and crises. The 2nd/3rd/4th Mate must pass a colour vision test and must fulfil the requirements stipulated in the Standards of Training, Certification and Watchkeeping for Seafarers (STCW) issued by the International Maritime Organisation (IMO).

ENGINE

Chief Engineer/2nd Engineer: The Chief Engineer/2nd Engineer oversees the marine engineering department on the ship and is responsible for the maintenance and operation of all engineering equipment on board ships powered by main propulsion machinery. He/She ensures that the engine-room is suitable for inspection by port authorities and maintains an inventory of fuel and spare parts. He is highly organised and is able to work under pressure and time constraints during an emergency. The Chief Engineer/2nd Engineer must pass a colour vision test and fulfil the requirements stipulated in the Standards of Training, Certification and Watchkeeping for Seafarers (STCW) issued by the International Maritime Organisation (IMO).

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Advanced
Decision Making	Intermediate
Global Mindset	Intermediate
Interpersonal Skills	Intermediate
Leadership	Intermediate

3rd/4th Engineer: The 3rd/4th Engineer acts as an Engine Watch Officer in a manned engine-room or as designated duty engineer in a periodically unmanned engine-room of ships powered by main propulsion machinery. He/ She oversees the operation, maintenance and repairs of the engine-rooms and is responsible for the maintenance of the ship's safety and emergency equipment. He is an organised person who is able to multi-task at times and is cognisant of the regulatory requirements of manning engine-rooms. The 3rd/4th/5th Engineer must pass a colour vision test and fulfil the requirements stipulated in the Standards of Training, Certification and Watchkeeping for Seafarers (STCW) issued by the International Maritime Organisation (IMO).

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Intermediate
Decision Making	Basic
Global Mindset	Basic
Interpersonal Skills	Intermediate
Managing Diversity	Basic

***Aspects of Seafarers' Wellbeing Onboard*:** Seafaring is a very challenging profession and life onboard has its own unique characteristics. Seafarers are far away from home, family and friends and they lack access to many facilities. They are isolated and have to deal with difficult circumstances at their job. All these can have an effect on their wellbeing. Lately, the maritime industry has shed its focus on finding ways to address and improve the wellness of seafarers. Wellness of seafarers is a multi-dimensional holistic concept that combines social, emotional, physical and spiritual wellness. All these different features have to be in balance to ensure healthy, quality of life and wellness.

Social Wellness: Socially, seafarers face many challenges on board. They are away from friends and family for a long time and many of them live isolated lives while onboard. The automation onboard ships has led to smaller crews with diverse backgrounds. Thus, communication may be difficult leading to loneliness and the crew may be vulnerable. Humans are social animals and it is important to have a sense of community.Seafarers constantly talk about the importance of social events onboard, such as movie nights, BBQs or even videogame competitions. These events give them the opportunity to chat with others and break free of the work and cabin cycle. It is important to fit the crew together to build a positive environment. This is a foundation of social wellness. Interpersonal skills are crucial to help them communicate with others onboard and deal with diversity competently. A greater understanding of one other significantly improves life on board.Further, seafarers mention how important is for them to be able to connect with their families and friends and have good quality internet access. All these, help them improve and maintain social wellness on board the vessel. The social aspect is as much of the shipping industry as is the navigation of a ship.

Emotional Wellness: There are several factors that can impact seafarers' mental health, such as job stress, family pressures and limited shore leave. Being away at mean you may miss important family moments, which can have a negative impact on your emotional wellness. It is never easy to be away from home for extended periods of time. More than a quarter of seafarers suffer from depression and nearly 6% of deaths at sea are attributable to suicide. Therefore, one can understand how important emotional wellness at sea is. Thus, it is of utmost importance to help

seafarers find meaning, purpose and accomplishment in life, both on and off-shore wellbeing. They should feel confident to handle the challenging situations at sea and to be empowered to understand and manage their emotions while onboard. They should communicate and be connected with other crew members and their families in order to feel and understand that they are not alone. Further, it is important for them to have people to discuss and share their thoughts and feelings. Thus, social activities will enable them to maintain their emotional wellness too.

Physical Wellness: It is also important that seafarers look after their own health. Where possible, they should try to make nutritious and healthy food choices and ensure a healthy diet. It seems that a balanced diet means a lot for seafarer's wellness since food quality and catering proficiency are foundations for a happy crew. Thus, access to healthy food options and variation is a foundation for physical wellness. Proper nutrition, along with exercise and adequate rest and sleep help to prevent diseases and improve physical health. Exercise is a proven wat to release the 'happy hormones' serotonin and endorphin which make us feel happy, satisfied and enhance well-being. Exercising and sports also encourage team-building through social interaction and as a result enhance social wellness. Attention should also be given to sleep and rest period in order to have fresh and fully rested seafarers on board. Due to the fact that fatigue seems to be affecting seafarers' wellbeing, leading to maritime incidents, it is important to acknowledge the severity of fatigue and help seafarers rest and sleep properly. Thus, seafarers should keep a healthy diet, exercise regularly and rest properly to empower their physical wellness.

Intellectual Wellness: Intellectual wellness relates to how one engages in creative and stimulating activities and expands knowledge outside of the traditional knowledge relevant to seafaring. It is important for seafarers to spend time to empower their intellectual wellness while on board. They should spend time being informed and updated with issues related to them. This can include knowledge about seafarers' rights and others. Knowledge about such matters will help them know their rights and negotiate in a better way with confidence.Further, seafarers should aim to engage in creative and stimulating activities such as reading, listening to music, watching movies or playing games. These activities will also offer opportunities for social activities and will help to maintain intellectual wellness.

Spiritual Wellness: Spirituality is also vital since it can serve as a factor to alleviate stress and as a result enhance wellness. Seafarers should spend time to their spiritual needs. They should create an awareness of their own beliefs but also for other crew members beliefs and respect them. These beliefs guide their responses and actions so they should be aware of them.. It is vital for seafarers to share their beliefs and thoughts with other crew members. These will help them maintain their wellness onboard the vessel. The spirituality of seafarers will help them acknowledge others' point of view, respect them, and comprehend and react appropriately to life experiences at sea.A seafarer acts as an organized whole and thus a holistic approach should be taken to address and improve wellness of the seafarers. Seafarers deserve to have a better life and sea. Therefore, the maritime industry should prioritise crew wellness and invest on assessing and training the non-technical skills that are important for the maintenance of wellness and optimal performance on board the vessel.

3.4.4. On Shore Personnel Generic Soft Skills and competencies overview

In order to define On Shore Personnel Generic Soft Skills and competencies as we conducted on previous subchapter for onboard personnel, we need to describe a typical shipping company departmentalization structure, thus the job description that derives from this model. In the following paragraphs, departments and their basic main principles and objectives are defined; soft skills and competencies for employee is following. As Theotokas has pointed out: *"Departmentalisation is the division of the totality of the work into specialised jobs and the organisation of these jobs into separate departments. The objectives sought by departmentalisation are effective management, co-ordination, the achievement of synergy and economies of scale, the effective use of resources, co-operation and job satisfaction on the part of employees*. In Our study we consider a functional structure[2], as activities are grouped on the basis of their functional specialisation and Jobs related to the same process are located in the same department. Functional structure is the traditional form of organisation in shipping companies. The traditional functional structure can be effective because it brings together personnel with the same specialisation, ensuring at the same time their unification at the top level of the hierarchy. At the following page we present a typical structure that includes departments:

- HSQE
- Legal
- Chartering
- Technical
- Operations
- Crew
- Training
- New Buildings
- Vetting
- Personnel
- Security
- IT
- Purchasing
- Accounting

[2] As Theotokas has pointed out: *"Departmentalisation is the division of the totality of the work into specialised jobs and the organisation of these jobs into separate departments. The objectives sought by departmentalisation are effective management, co-ordination, the achievement of synergy and economies of scale, the effective use of resources, co-operation and job satisfaction on the part of employees*.

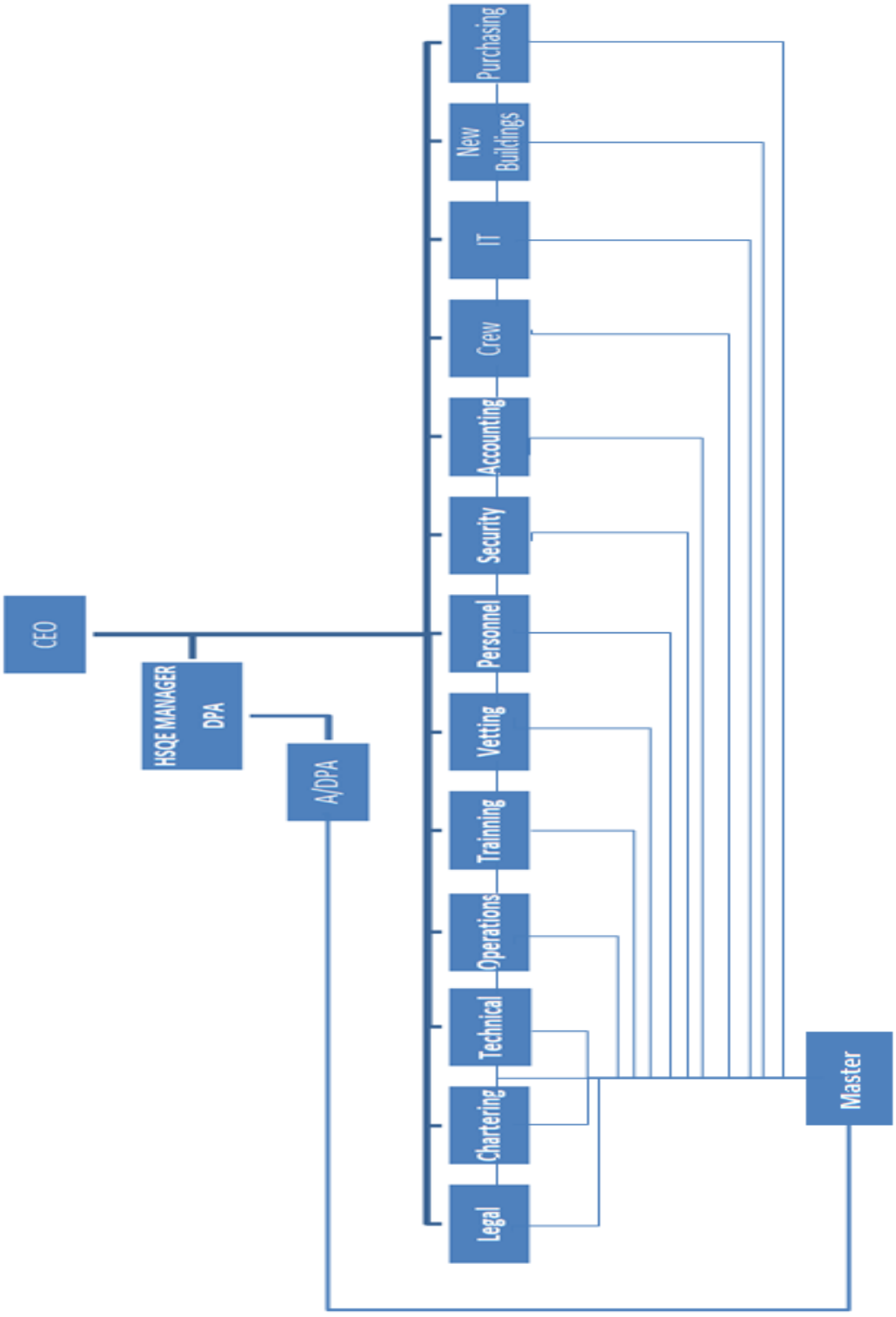


***Figure 15**: Organizational Chart of typical Tanker Company*

CEO - Managing Director/General Manager

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Leadership	Advanced
Interpersonal Skills	Advanced
Communication	Advanced
Teamwork	Advanced
Resource Management	Advanced

Conveys the Company's policy to all Departments, follows its implementation and coordinates all activities in the operation and management of the vessels as per Company's stated policies, i.e. in a manner that encourages: a) Safety and Environmental Protection, b) Efficiency and Cost-effectiveness. He/She Reports to the board of Directors. Her/His Objective is to attain and implement the Company's General Management Policies and Principles. He/She oversees the organisation's strategic priorities in shipping, chartering and fleet management. He/She inspires the organisation towards achieving business goals and fulfilling the vision, mission, and values, while inspiring a culture of innovation and process improvement. He/She is a strategic thinker who solves highly complex problems with informed, timely and decisive actions. He/She is Substituted by the Operations Manager

The CEO is responsible for:

- Overseeing the shore / ship implementation of the Company's stated policies, as per the HSQE Management System Manuals; encouraging HSSQEEn awareness, compliance, and commitment by all personnel.
- Co-ordinating tasks among the Company's Departments
- Ensuring the proper manning of the Company's shore/onboard operations with qualified personnel and crew.
- Ensuring that all vessels fulfil all National, International, Industry and Company requirements and standards.
- Providing full support, consultation and guidance to the DPA during the development, implementation and corrective action-taking of the Company's HSQE Management System.
- Monitoring, motivating and encouraging all Company personnel that is related to HSQE for their active participation in the implementation of the Company's Safety, Quality and Environmental policy and other issues outlined in the HSQE Manual.
- Performing management reviews of the HSQE Management System at appropriate time intervals.
- Following-up all new developments that take place in the various Maritime Organisations and all technological innovations related to Shipping.
- Establishing good relationships with Classification societies, Shipyards, Sub-contractors, Suppliers, Oil Majors and Charterers.

- Approving realistic annual budgets and overseeing Company's results.

Authority: The CEO may undersign all Company Correspondence and sign for all expenses and procurement

Qualifications (minimum):

- A degree from an Institution of higher education, (University degree) recognised by all appropriate State and National Authorities, or a valid Ship Master's license, recognised by State and National Authorities.
- Working knowledge of the English language.
- At least 10-year experience in managerial position in Shipping Enterprises and Organisations (to be decided at the time of employment).
- Strong knowledge of maritime legal & industry requirements
- Interpersonal skills, leadership and extensive management experience.

Table VI: *Critical Work Functions and Key Tasks of a Tanker Company CEO*

CRITICAL WORK FUNCTIONS	KEY TASKS
Oversee ship compliance to regulatory requirements and legislation	• Ensure compliance to regulatory requirements and legislation and keep abreast of changes in compliance requirements • Institute compliance systems and practices to monitor adherence to regulations • Set directions, goals and targets to ensure achievement of organisational vision, mission, goals and objectives • Review and refine organisation strategies and targets for endorsement • Oversee the organisation's Planned Maintenance System, ship inspections, audits and dockings
Oversee crew management matters	• Oversee crew management policies and procedures • Promote engagement strategies to improve crew performance
Manage budget and expenditure	• Evaluate the organisation's financial performance • Establish key performance indicators for financial performance
Grow organisation's shipping and chartering business	• Explore new opportunities and areas of collaboration to expand the organisation's business and networks • Keep abreast of key trends and best practices in shipping and chartering business
Manage business risks	• Formulate the organisation's risk management strategy • Detect new and emerging risk areas and formulate pro-active steps to address them
Lead improvements to enhance efficiency	• Drive organisation's ship efficiency management • Build a culture of innovation within the organisation to encourage continuous improvement

HSQE Department

To assist the Company's top management on all issues relating to Safety and Pollution Prevention and to be responsible for the establishment of a Quality Safety Environmental Management System according to the ISM Code/ISO9001/ISO14001/ISO45001/ISO50001; to bring to the attention of the appropriate Departments reporting of non-conformities and suggestions for improvement to current procedures, to carry out internal audits ,record ashore and onboard practices that may violate the Company's policies and propose changes of respective procedures to the appropriate Departments; to follow-up the implementation of Safety Management principles and communicate all requirements ashore and onboard Company Ships.

HSQE Manager/ Designated Person Ashore (DPA)

Member of Company's management reports to CEO and he/she is substituted by 1st Deputy: Assistant Designated Person Ashore the responsibilities of whom are same as of DPA, 2nd Deputy: Operations Manager. 3rd Deputy: Technical Manager. Rregardless of his other assigned duties, if any, is responsible for the following:

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Service Orientation	Advanced
Interpersonal Skills	Advanced
Communication	Advanced
Leadership	Intermediate
Creative Thinking	Advanced

Quality Management System Requirements (*Management Representative)*

- Ensuring that HSQE Management System is established, implemented and maintained in compliance with the requirements of the ISM, ISO 9001, ISO 14001, ISO 45001, ISO 50001 Standards, requesting CEO's support as necessary.
- Ensuring understanding and commitment of Company employees (in co-operation with department heads) with Company's Quality, Occupational Health, Security, Safety, Environmental and Energy policies.
    - Promoting the concept of HSSQEEn excellence throughout the Company's organization.
- Co-ordination of preparation (in co-operation with other department heads), maintenance and issuance of the HSQE Management System documentation, in accordance with document and data control procedure.
- Carries out the faction of Management Representative according to ISO 9001
- Ensuring (in co-operation with other department heads), that vessels are supplied with latest known publications on legislation, rules and regulations as well as on operational, technical and safety relevant matters required to be carried on board.

- Distribution of controlled copies of HSQE Management System documentation as per Master Distribution List of each document.
- Reporting to CEO on performance and effectiveness of HSQE Management System, for purpose of reviewing and as a basis for further system improvement.
- Participation in Management Review Meetings with responsibility for ensuring that MRM is carried out in accordance with the Company's Management Review Procedure.
- Investigation of non-conformities pertaining to the HSQE Management System in co-operation with other department heads and verification/follow-up on the agreed corrective action.
- Ensuring that internal Audits are carried out in accordance with defined schedule and relevant procedure, to verify implementation and effectiveness of the HSQE Management System.
- Required liaison with external bodies on matters pertaining to Company's HSQE Management System.
- Approving the supply of Nautical books, publications and Charts (in Digital or paper form).
- Arranging the inspections by P&I Clubs, flag states and Port/State Controls, in co-operation with Operation Manager.

Safety Management System Requirements *(as Designated Person Ashore):*

- Required liaison with external bodies on matters relating to company's Safety Management System, as required.
- Provide a link between shore and ship-based management concerning safety and pollution prevention.
- Ensure that adequate resources and shore-based support are applied to the vessel, as required.
- Monitor and verify that the HSQE management system is implemented and effective.
- Reviewing the implementation and maintenance of nautical standards and analysing results of navigational audits for the identification of trends, communicating them to the Management Review Committee Meetings.
- Reviewing navigational practices and procedures to ensure navigation standards are maintained by adopting improved navigation practices, equipment, training and procedures
- Monitor managed vessels with regard to safety and pollution prevention.
- Submit proposals to the CEO for improvement of the HSQE Management System.
- Forward report for deficiencies, accidents and non-conformities pertaining to the HSQEMS to the CEO and appropriate department heads.
- Monitor and verify / follow-up on corrective action pertaining to the restoration of deficiencies, accidents, incidents and non-conformities pertaining to the HSQEMS.

- Monitor and co-ordinate the issue, modification and revision of documents pertaining to the HSQEMS.
- Co-ordination of Management Review Meetings on matters pertaining to safety and pollution prevention.
- Monitor and verify that shore - based and shipboard personnel implement Company's training program in matters pertaining to safety and pollution prevention.
- Forward reports of Health and Safety Committee Meetings carried out on board managed vessels to the appropriate level of management.
- Monitor and follow - up to ensure that measures / corrective actions, in response to HSQE Committee Meetings are undertaken in consultation with the Vetting Manager.

Authority: The DPA may undersign all Correspondence related to the Department's activitiea2s and sign for the procurement of supplies and provisions in accordance with ad hoc decisions of the General Management

Qualifications (minimum):

- Qualifications from a tertiary institution recognized by the Administration or by the recognized organization, within a relevant field of management, engineering, or physical science, or
- Qualifications and seagoing experience as a certified ship Officer pursuant to the STCW, as amended, or
- Other formal education combined with not less than 3-years practical senior level experience in ship management operations.
- Minimum five (5) years' experience in the implementation of Management Systems in Shipping.
- Good knowledge of the National and International shipping legislation and best practices.
- Proper qualified to carry Internal Audits as per the requirements of ISM/ISO Standards
- Working knowledge of the English language.
- Skilled organizer and with abilities to convince and motivate people.
- Team leadership skills.

Vetting Department

Arranging the vetting of the vessels by Oil Majors, follow-up Port State control inspections, as well as flag inspections and keeping records of same.

Vetting Manager

Reporting to CEO, his/he main objective is to work in conjunction with other Operations staff towards achieving the department's staff principles and objectives. He/She is substituted by other Vetting Port Captain.

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Service Orientation	Advanced
Interpersonal Skills	Advanced
Communication	Advanced
Leadership	Intermediate
Creative Thinking	Advanced

Responsibilities: The Vetting Manager is responsible for :

- Arranging the vetting of the vessels by Oil Majors, follow-up Port State Control inspections as well as Flag inspections and keeping records of same
- Verifying, through Port Captains, Superintendents Engineers and personal visits that all activities and procedures required by the HSQE Manuals are properly carried out and that Company's commitment to high ethical standards, legal compliance, and integrity is reflected in the safety and environmental policies and practices.
- Keeping records of the functioning and condition of all instruments and equipment onboard, relating to safety.
- Monitoring the compliance of the safety and pollution prevention aspects of the operation of Company's vessels on a continuous basis by examining whether all safety-related forms (described later to this manual) are filled out properly and sent to Company Headquarters on a regular basis.
- Organising the supply and distribution of adequate resources and shore-based support in case of emergency.
- Proposing and issuing Circular letters in relation to HSQE, in cooperation with Safety and Training Manager.
- Briefing and debriefing onboard personnel on Safety and HSQE policies prior to joining and after signing off duty.
- Reporting to the DPA on matters that have slipped attention by the Safety Management System.
- Demonstrating his commitment to HSSQEEn excellence, by his behaviour.

Authority: The Vetting Manager may undersign all Correspondence related to the Department's area of the responsibility

Qualifications (minimum):

- A valid Ship Captain's license, recognised by State and National Authorities.
- Proper qualified to carry Internal Audits as per the requirements of ISM/ISO Standards
- Working knowledge of the English Language.
- At least 5-year experience in Tanker Industry in managerial position and proven track record of in a related field and discipline (to be determined at the time of employment).
- Excellent communication & interpersonal skills.
- Team leadership skills.

Port captain

Reporting to Vetting Manager, his/he main objective is to ensure the safe and efficient operation of Company's vessels in accordance with HSQEMS. He/She is substituted by other Vetting Port Captain.

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Service Orientation	Advanced
Interpersonal Skills	Advanced
Communication	Advanced
Problem Solving	Advanced
Transdisciplinary Thinking	Advanced

Responsibilities: The Port Captain is responsible for:

- Assisting the Vetting Manager in his duties.
- Maintaining nautical standards onboard vessels and implementing suitable controls by adopting improved navigation practices, equipment, training and procedures.
- Supervising and monitoring all aspects of assigned vessel operation including navigation, cargo/ballast handling, safety and environmental protection aspects, etc. to ensure that these are carried out in compliance with the Company's requirements and maritime rules, regulations and Industry Standards for a flawless, efficient, competitive and customer focused operation.
- The effective implementation of preventive maintenance of the vessel's hull, deck equipment, etc, as described in the PMS and set by the Class/Flag State requirements.
- The timely correction/rectification of any outstanding items related to the HSQEMS.
- Inspecting managed vessels in port and en-route and providing specific instructions to the Officers for issues pertaining to the HSQEMS.
- Making recommendations for rectification of deficiencies or improvements to the existing situation.

- Monitoring of the Flag State and PSC requirements and following-up of third-party inspections' results.
- Checking the passage plans of the vessels.
- Tracking and analysing shipboard navigational audit reports and addressing the findings to the HSQE Manager.
- Close monitoring/assessing of pre-loading/pre-discharging plans, as well as of the ballast management plans.
- Matters related to cargo nature, hold/tank cleaning and approval from authorities, safe navigation, etc.
- Monitoring the inventories of mooring equipment, safety equipment, lifesaving, firefighting equipment and portable instruments.
- Attending Vetting and third-party inspections.
- Demonstrating his commitment to HSSQEEn excellence, by his behaviour.

Authority: The Vetting Manager may undersign all Correspondence related to the Department's area of the responsibility

Qualifications (minimum):

- A valid Ship Captain's license recognised by State and National Authorities.
- Proper qualified to carry Internal Audits as per the requirements of ISM/ISO Standards
- Working knowledge of the English Language.
- Theoretical and practical experience in ship's operation.
- At least 5-year experience in Tanker Industry in Similar Position and proven track record of in a related field and discipline (to be determined at the time of employment).
- Excellent communication & interpersonal skills.
- Excellent knowledge of SIRE Vetting Inspections.

Training Department

Responsible to monitor the compliance of the safety and pollution prevention aspects of the operation of Company's vessels; to screen industry training programs; to overlook onboard personnel performance on Safety and HSQEMS issues; to carry out all activities of Class Certifications, Company's in-house Marine Training Centre, as per Maritime Training Centre's Management System Manual.

Training Manager

Reporting to CEO, his/her main objective is to attain and comply with the Training Department's stated principles and objectives. Captain.

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Advanced
Interpersonal Skills	Advanced
Resource Management	Advanced
Developing People	Advanced
Building Resilience	Advanced

Responsibilities:

The Training Manager has the following responsibilities:

- Ensures that Company's HSQE Protection Policy and associated procedures are implemented by Company managed vessels and verifies that company's commitment to high ethical standards, legal compliance and integrity is reflected in the safety and environmental policies and practices.
- Attends vessels to ensure overall condition performance of maintenance and repairs and provides training and advice to shipboard personnel.
- Verifying that navigation and onboard safety operations are carried out with commitment to Company's Quality, Occupational Health, Security, Safety & Environmental Protection Policy as per the HSQEMS stated requirements

Marine Manager

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Service Orientation	Advanced
Interpersonal Skills	Advanced
Communication	Advanced
Leadership	Intermediate
Creative Thinking	Advanced

The Marine Manager provides marine-related input and advice, coordinates ships managed by the organisation and liaises with others to achieve annual key performance indicators. He/She develops a framework to manage risk in the organisation and oversees the implementation of workflow improvements. He manages and motivates a team of Marine Superintendents/Senior Marine Superintendents and is a self-starter in the improvement of marine operations and management of the organisation's ships.

Senior Marine Superintendent

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Service Orientation	Advanced
Interpersonal Skills	Advanced
Communication	Intermediate
Creative Thinking	Intermediate
Problem Solving	Advanced

The Marine Superintendent/Senior Marine Superintendent ensures the safe operation of ships and compliance to the statutory requirements of the International Safety Management (ISM) Code and International Ship and Port Facility Security (ISPS) Code. He/She assists in the implementation and upkeep of the Safety Management System, analyses risk and ensures compliance to the organisation's risk management framework. He provides guidance to the Master on board for nautical matters and conducts incident investigation on board the ship, while promoting a culture of continuous improvement.

Technical Department

Responsible for all technical matters pertaining to the performance, purchasing of machinery spares and engine stores, on board safety aspects of each vessel in such a way that the vessels' equipment and machinery are best protected from accidents and abnormalities and operated safely, efficiently and in compliance with all mandatory rules and regulations. Cooperates with the Operations Department, in fulfilling the vessels' commercial obligations. It is technical Manager responsibility to ensure that each fleet is consisting of at least two technical superintendents , one with a degree from a technical institution of higher education (technical university) and one with an equivalent chief engineer's license with a minimum of three(3) years tanker experience of a ratio 1/1.

Technical Manager

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Leadership	Advanced
Interpersonal Skills	Advanced
Communication	Advanced
Creative Thinking	Advanced
Problem Solving	Advanced

The Technical Manager has the ultimate responsibility and accountability for the safe, efficient, and cost-effective performance of ships assigned. He/She advises on the ship's maintenance to ensure its seaworthiness and compliance to regulatory and organisation risk management procedures and requirements. He possesses good analytical, problem-solving, time management, project management and decision-making skills.

Technical Superintendent/ Senior Technical Superintendent

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Service Orientation	Advanced
Interpersonal Skills	Advanced
Communication	Intermediate
Creative Thinking	Intermediate
Problem Solving	Advanced

The Technical Superintendent/Senior Technical Superintendent oversees the safe, economic, and efficient operation of ships assigned, and ensures ships are managed and operated in accordance with organizational policies, operating procedures and management systems. He/She analyses risks and ensures that all procedures are adhered to and comply with International Safety Management (ISM) Code and classification rules. He is well organized, is able to work in a team and may occasionally be required to sail on-board ships

Operations Department

Responsible for all Operational and Onboard Safety operations of all Company's vessels, performing in accordance with commercial and legal commitments.

Senior Operations Manager

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Advanced
Interpersonal Skills	Advanced
Resource Management	Advanced
Developing People	Advanced
Leadership	Advanced

The Senior Operations Manager oversees ship operations, as well as the safe and efficient operations of ships while ensuring operational costs are kept to a minimum and compliance to regulatory requirements. He/She develops departmental plans, oversees risk management for the business and manages resources. He establishes systems and practices to encourage workflow improvements to enhance the business unit's productivity and is able to work independently.

Operations Manager

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Advanced
Interpersonal Skills	Advanced
Decision Making	Advanced
Problem Solving	Intermediate
Sense Making	Intermediate

The Operations Manager provides advice to ships and management on cargo requirements, tank cleaning, stability and stress and maintains all statutory requirements for the ships. He/She analyses operational data to help improve inefficiencies and to predict operational problems and develops action plans for resource utilization. He is a good communicator, has strong problem-solving and analytical skills and may be required to work irregular hours.

Ship Operator

The Ship Operator acts as the primary communications link with the ship's crew and is accountable for the monitoring of ship movements and cargo transfer operations. He/She assists with the planning of cargo intakes, liaises with regulatory bodies, maintains customer contact, and responds to problems that may arise in the course of executing shipping operations. He has excellent communication skills and is able to juggle the demands of multiple parties at any one time.

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Advanced
Decision Making	Advanced
Teamwork	Advanced
Problem Solving	Advanced
Resource Management	Advanced

Post Fixture Manager

The Post Fixture Manager monitors the timely issuance of invoices and collection of receivables and is responsible for the achievement of the department's key performance indicators. He/She has a sound understanding of operational issues and their implications and serves as the contact point for complex claims, handling disputes related to them, and ensuring adherence to the organisation's risk management procedures. He is adept at negotiations and has excellent analytical and problem-solving skills, with the ability to communicate with various stakeholders.

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Creative Thinking	Intermediate
Problem Solving	Intermediate
Sense Making	Intermediate
Transdisciplinary Thinking	Intermediate
Communication	Intermediate

Post Fixture Executive

The Post Fixture Executive monitors a ship schedule and its status before arrival at the ports, the delivery and re-delivery notices for ships and arranges for hire payments. He/She ensures timely payment of receivables and oversees the processing of brokering

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Creative Thinking	Intermediate
Problem Solving	Intermediate
Sense Making	Intermediate
Transdisciplinary Thinking	Intermediate
Communication	Intermediate

commissions to brokers. He has strong organizational skills and possesses strong analytical and numerical skills, complemented with good communication skills.

Chartering Department

Responsible for the chartering of all Company's vessels

Chartering Manager

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Advanced
Interpersonal Skills	Advanced
Leadership	Advanced
Problem Solving	Advanced
Service Orientation	Advanced

The Chartering Manager manages the chartering function and oversees a team of Charterers and Senior Charterers in the execution of the organisation's chartering business, which includes conducting complex negotiations. He/She evaluates potential business development opportunities and is able to synthesize complex concepts and information to distil them into actionable propositions. He is a self-motivated individual who works independently to lead a team and support their efforts in accomplishing goals and provides guidance where necessary.

Senior Charterer

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Advanced
Interpersonal Skills	Advanced
Teamwork	Advanced
Service Orientation	Advanced
Problem Solving	Advanced

The Senior Charterer handles all aspects of chartering activities and ensures the profitable employment of operated ships, while monitoring adherence to the organisation's risk management procedures. He/She analyses market research, identifies business development opportunities for the business unit and has a sound understanding of the ship chartering market with a strong drive to succeed. He has excellent analytical and problem-solving skills, with the ability to communicate with various stakeholders.

Senior Chartering Broker

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Advanced
Interpersonal Skills	Advanced
Leadership	Advanced
Problem Solving	Advanced
Service Orientation	Advanced

The Senior Chartering Broker oversees the chartering business, develops department and resource plans, and oversees risk management for the business while monitoring and managing the business' performance. He/She undertakes research and competitor analysis to create a market advantage and demonstrates a sound understanding of business imperatives to offer solutions with real competitive advantage. He is a self-motivated individual who works independently to lead a team and provides guidance. He possesses excellent communication and interpersonal skills, and leverages on them to conduct complex negotiations.

Chartering Broker

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Advanced
Interpersonal Skills	Advanced
Teamwork	Advanced
Service Orientation	Advanced
Problem Solving	Advanced

The Chartering Broker acts as an intermediary between charterers and cargo owners and is responsible for arranging the best possible deal for cargo rates, while ensuring compliance with legal and regulatory requirements. He/She assess the viability of new business opportunities and maintains a strong working relationship with existing clients and customers to ensure service standards are adhered to. He solves issues and oversees the implementation of workflow improvements, guides and provides on-the-job coaching to junior colleagues.

Assistant Chartering Broker

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Advanced
Interpersonal Skills	Advanced
Teamwork	Advanced
Service Orientation	Advanced
Sense Making	Advanced

The Assistant Chartering Broker monitors the freight, ship hire and cargo rates closely, identifies ships available for charter and prepares contracts aligned to the client's requirements. He/She sustains the organisation's relationships with existing clients by ensuring that service standards are met and assesses market data to identify potential clients to management. He has initiative and with a flair for numeracy and accuracy.

Senior Sales and Purchase Broker

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Advanced
Interpersonal Skills	Advanced
Leadership	Advanced
Problem Solving	Advanced
Service Orientation	Advanced

The Senior Sales and Purchase Broker oversees the ship sales and purchase brokering business, develops department and risk management plans while monitoring and managing the business' performance. He/She oversees compliance to all legal and regulatory requirements and possesses an in-depth knowledge of ships while recognising potential business opportunities and clients in order to grow the business. He manages a team and instils a culture of innovation to encourage workflow improvements.

Sales and Purchase Broker

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Advanced
Interpersonal Skills	Advanced
Teamwork	Advanced
Service Orientation	Advanced
Problem Solving	Advanced

The Sales and Purchase Broker acts as an intermediary between buyers and sellers of ships and is responsible for overseeing the sale and purchase of ships while ensuring compliance with legal and regulatory requirements. He/She assesses the viability and risks of pursuing new business opportunities and analyses risk management data to highlight potential areas of concern to management. He guides and provides on-the-job coaching to junior colleagues in their daily work.

Accounting Department

To be responsible for preparing Budget & Projected Cash Flows, invoicing, cost-control management, collection, and payment of all due sums to ships and third parties.

Crewing Department

Responsible for all crewing and onboard safety aspects of all Company's vessels.

Legal, Insurance and Claims Departments

To provide the best possible legal advice to the Company's management whenever the opportunity arises; to approve contracts and agreements between the Company and third parties.

Purchasing Department

Responsible for the purchases of stores and spares for all Company vessels.

Personnel Department

Responsible for all Personnel matters within the Company.

Security Department

Responsible for all security matters of all Company’s vessels

New Buildings Section Department

Responsible for all new acquisitions’ matters within the company.

In maritime industry, employment of highly qualified human resources/seafarers plays a crucial role to ensure and to enhance the safety on board ship. At that point, **functional competencies** are highly important to manage the critical operations on board ship in safe manner. Additionally, **behavioural competencies** like communication skills, teamwork skill, leadership and language ability are other important competencies which contributes the safety concern on board ship. Also, future seafarers are expected to be professional with ethical behaviour, discipline and responsibility. **It is therefore Behavioural Competency System needed in order to monitor and assess.** This need we are going to cover in chapter 4.

CHAPTER 4: A BEHAVIORAL COMPETENCY ASSESSMENT SYSTEM

As discussed at 3.1 the behavioural competencies are vital for safe and efficient vessel operations. In this part, we are approaching a definition based on OCIMF and Intertanko at the Behavioural-Competency-Assessment-and-Verification paper. The behaviours have been organised in a hierarchical structure:

Competency domains: broad categories of behaviour. The competency framework consists of six competency domains:

- Team working
- Communication and influencing
- Situation awareness
- Decision making.
- Results focus
- Leadership and managerial skills

Elements: narrower categories of behaviour that form part of the higher-level domains. For example, participation is an element in the competency domain team working.

Each of the above domains has been defined with elements identified for each domain. Each element has a non-exhaustive list of behavioural indicators, i.e. observable behaviours that relate to the competency.

Behavioural indicators: the positive and negative observable behaviours associated with each element.

A list of negative behavioural indicators has also been provided for those that would like to adopt negative marking. The essential concept is that this system can achieve an objective assessment of seafarers' soft skills. Indicators are there to help the assessment by providing

examples of some behaviours that are easy to understand and observe and therefore help the assessment of competency domains and elements.

In general, behavioural competencies apply to all seafarers. Good communication, situation awareness and accountability are elements that all officers should demonstrate. However, the level depends on rank, e.g. a different level of leadership is expected from the Master compared to the 2nd Officer as we have already suggested at 2.4.2 chapter.

4.1 Team Working

Works effectively in a team, building productive working relationships through cooperation with colleagues, treating others with respect, resolving conflicts among team members and balancing individual and team goals.

Table VII: Team working behavioural indicators

Elements	Positive Behavioural indicators	Negative Behavioural indicators
Participation	★ Actively participates in team tasks. ★ Establishes an atmosphere for open communication and participation. ★ Encourages input and feedback from others. ★ Builds rapport and establishes a common bond with others. ★ Encourages idea generation	∅ Blocks open communication. ∅ Creates barriers between crewmembers. ∅ Competes with others. ∅ Supports individualistic or silo ways of working
Inclusiveness and Consideration of Others	★ Helps others feel valued and appreciated. ★ Welcomes and includes others. ★ Demonstrates respect for others and their differences. ★ Shows understanding of others' perspectives and personal situations. Notices the suggestions of other crewmembers. ★ Gives detailed and constructive personal feedback	∅ Displays little appreciation for others' contributions and perspectives. ∅ Ignores suggestions of other crewmembers. ∅ Shows a lack of concern for others' problems. ∅ Shows a lack of respect. ∅ Treats some crewmembers more favourably than others
Supporting Others	★ Helps other crewmembers in demanding situations. ★ Shares expertise with others.	∅ Hesitates to help other crewmembers in demanding situations. ∅ Creates reasons resources and support cannot be shared. ∅ Withholds information and refuses to share knowledge that would help others do a better job.
Conflict Resolution	★ Keeps calm in conflicts. ★ Suggests solutions to resolve conflicts. ★ Expresses disagreement constructively by giving alternative or different perspectives.	∅ Overreacts emotionally in interpersonal conflicts. ∅ Reluctant to consider a compromise or solution to a conflict, thus allows it to escalate. ∅ Blames other crewmembers for the conflict situation. ∅ Unable to deal objectively with conflicts and disputes when they arise. ∅ Avoids challenging inappropriate language or behaviours

4.2 Communication and influencing

Gives and receives communication clearly, precisely and in a convincing way to groups as well as individuals at all levels, including senior/line managers, colleagues and subordinates. Interacts with others sensitively and effectively in a risk- and time-sensitive environment.

***Table VIII**: Communication and influencing behavioural indicators*

Elements	Positive Behavioural indicators	Negative Behavioural indicators
Shared Understanding	★ Clearly explains plans, expectations, and roles to each person, ensuring that they understand them. ★ Gives clear and concise briefings and updates at appropriate times. ★ Asks questions and observes others to confirm their understanding. ★ Uses a range of communication methods (such as spoken, written, hand signals, etc.) to suit the message and the intended recipients.	Ø Blocks open communication. Ø Does not clearly communicate plans, expectations, and roles. Ø Briefings are unclear, lengthy and/or delivered at inappropriate times. Ø Does not check whether plans and expectations have been understood. Ø Communication is one-way and does not seek feedback or encourage questions
Style of Communication	★ Uses language appropriately, e.g. clear phrasing, terminology and speed of delivery. ★ Acknowledges cultural diversity in communications. ★ The amount of communication is appropriate for the situation. ★ Clearly puts forward views and personal position while listening to others. ★ Uses the right medium to deliver the message (face-to-face, radio, email, telephone, etc.)	Ø Uses inappropriate or unacceptable language or communication methods, e.g. jargon, body language, tone. Ø Fails to consider cultural diversity in communications. Ø Provides too much, too little or vague communication. Ø Communication is one-way and fails to allow or encourage questions or feedback. Ø Communication is not tailored to individual needs, e.g. style, method, timing
Feedback	★ Actively seeks and acts upon feedback. ★ Receives feedback constructively	Ø Does not seek or welcome feedback and does not take action on feedback. Ø Reacts defensively or aggressively to feedback. Ø
Persuasion	★ Keeps calm in conflicts. ★ Influences others in a way that results in acceptance, agreement and/or behaviour change. ★ Communicates in a way that elicits appropriate action from others.	Ø Fails to gain buy-in to important messages. Ø Pushes through own agenda, rather than acting in line with company objectives.

4.3 Situation awareness

Accurately perceives the immediate environment (system or task) and external factors that may have an impact. Understands surroundings and predicts their status in the near future. Develops effective strategies to manage threats.

***Table IX**: Situation awareness behavioural indicators*

Elements	Positive Behavioural indicators	Negative Behavioural indicators
Awareness of Vessel Systems and Crew	★ Monitors, cross-checks and reports changes in vessel system states. ★ Monitors, probes and reports signs of changes in the state or behaviour of other crewmembers ★ Acknowledges entries and changes to vessel systems	∅ Does not ask for updates on different vessel systems and other crewmembers. ∅ Does not signal awareness of changing systems. ∅ Does not look for or signal awareness of crewmembers' deteriorating state or behaviour.
Awareness of External Environment	★ Maintains awareness of the present state of the vessel systems and environment (position, weather, shipping traffic, terrain). ★ Contacts outside resources about the environment when necessary. ★ Shares information about the environment with others.	∅ Does not enquire about environmental changes and their impact on vessel systems. ∅ Unaware of changes in the external environment. ∅ Does not seek regular and timely updates on position, weather, traffic or terrain. ∅ Ignores external reports about changes to the environment or status of other vessels. ∅ Does not interrogate, verify or cross-check external information about the environment against information from internal vessel systems or crewmembers' reports
Awareness of Time	★ Anticipates future states, threats and their consequences. ★ Discusses contingency strategies. ★ Uses all available resources to manage threats. ★ Takes timely and mindful actions.	∅ Unable or unwilling to make predictions of future states and threats. ∅ Does not discuss the relationship between past events and the present/future. \ ∅ Is surprised by outcomes of events, with little or no contingency planning.

4.4 Decision making

Reaches systematic and rational judgements or chooses an option based on relevant information by analysing issues and breaking them down into their discrete parts. Demonstrates readiness to make decisions and take action.

Table X: *Decision making behavioural indicators*

Elements	Positive Behavioural indicators	Negative Behavioural indicators
Problem Definition and Diagnosis	★ Gathers information and identifies the problem. ★ Reviews causal factors. ★ Consults those with specialist expertise or local knowledge when required	Ø Does not clearly state or define the problem. Ø Fails to diagnose the problem correctly. Ø Does not discuss probable causes with crewmembers. Ø Allows commercial pressure (whether real or perceived) to influence course of action. Ø Makes decisions without recognising or acknowledging own limitations or lack of experience
Option Generation	★ Generates multiple responses to a problem. ★ Encourages idea generation and challenges existing norms ★ States alternative courses of action	Ø Focuses on a narrow range of responses to problems Ø Does not search for alternative courses of action
Risk Assessment and Option Selection	★ Assesses and shares the risks and benefits of different courses of action through discussion. ★ Selects the best response to the problem. ★ Confirms selected course of action and implements in a timely manner. ★ Considers options from external advisers, e.g. Pilot, but retains decision-making responsibility and accountability	Ø Evaluation of possible actions is inadequate. Ø Selects a course of action without a clear risk analysis. Ø Fails to inform crew of decisions taken. Ø Has difficulty making decisions when faced with complex or ambiguous data. Ø Constantly changes decisions when not justified by new information. Ø Normalises risk ("This is the way it has always been done here"). Ø Risk assessment of options from external advisers, e.g. Pilot, is inadequate
Outcome Review	★ Checks the outcome of a solution against goal or plan. ★ Reviews the quality of the decision made	Ø Fails to check selected outcome against goal. Ø Shows little consideration for the quality of decisions made

4.5 Results focus

Focuses on achieving desired results and how best to achieve them. Takes conscientious action to get the job done, using initiative and energy, and demonstrating flexibility and emotional toughness.

Table XI: Results focus behavioural indicators

Elements	Positive Behavioural indicators	Negative Behavioural indicators
Initiative	★ Identifies what needs to be done and initiates appropriate action. ★ Implements new ideas and better ways to do things; finds solutions to problems. • Puts in extra effort to achieve objectives. ★ Challenges accepted risks, processes or measurements	∅ Seldom takes action to improve outcomes, processes or measurements. ∅ Seldom seeks out or accepts additional responsibilities in the context of the role. ∅ Avoids all but what is directly asked of them. ∅ Frequently requires supervision to complete routine tasks.
Determination	★ Pushes self and others to reach milestones. ★ Renews and increases effort to achieve goals, persisting in the face of problems. ★ Has a sense of urgency about solving problems and getting work done. ★ Looks for opportunities to help achieve team objectives. ★ Willingly puts in extra time and effort in crisis situations Seldom seeks out or accepts additional responsibilities in the context of the role. ★ Avoids all but what is directly asked of them. ★ Frequently requires supervision to complete routine tasks.	∅ Fails to sustain pace and progress over a period of time. ∅ Performance suffers substantially when working long hours. ∅ Allows work to drift away from priorities.
Flexibility	★ Responds positively to change, embracing new ideas or practices to accomplish goals and solve problems. ★ Adapts to changing business needs, conditions and responsibilities. \ ★ Adapts approach, goals and methods to achieve solutions and results in a changing environment. ★ Shows others the benefits of change.	∅ Sticks to outdated methods, puts off making changes for as long as possible or finds excuses for not doing things differently. ∅ Does not respond to the changing demands of the situation. ∅ Makes little or no attempt to promote change positively. ∅ external advisers, e.g. Pilot, is inadequate

Table XII: *Results focus behavioural indicators*

Elements	Positive Behavioural indicators	Negative Behavioural indicators
Emotional Toughness	★ Recovers quickly from setbacks and responds with renewed and increased effort. ★ Persists in the face of difficulty and finds alternative ways to complete tasks and goals. ★ Handles high workloads, competing demands, vague assignments, interruptions and distractions with composure Stays calm and maintains focus in emergency situations	∅ Constantly thinks about past disappointments or failures. ∅ Struggles to maintain focus and perseverance in the face of obstacles. ∅ Is unable to perform mentally or physically taxing work effectively. Panics, reacts inappropriately or with hostility to stressful situations
Accountability and Dependability	★ Effectively manages their time and resources to accomplish tasks, prioritizing the most important ones. ★ Takes personal responsibility for the quality and timeliness of work and achieves results with little need for supervision. ★ Shows up to work on time and follows instructions, policies and procedures. ★ Stays focused on tasks and meets productivity standards, deadlines and work schedules. Acknowledges and corrects mistakes, taking personal responsibility when appropriate	∅ Struggles to use time efficiently. ∅ Fails to prioritise or plan ahead; completes least important tasks first. ∅ Often slow to respond or to adjust priorities. • Becomes distracted or unable to complete tasks when confronted with challenges. ∅ Misses deadlines or leaves tasks unfinished. ∅ Defers authority and decision making to others, e.g. terminal staff/pilots, rather than take responsibility,

4.6 Leadership and managerial skills

Inspires, motivates and empowers personnel to perform at their best to achieve goals. Adjusts leadership style to situations, including those that develop suddenly or change rapidly.

Table XIII: *Results focus behavioural indicators*

Elements	Positive Behavioural indicators	Negative Behavioural indicators
Setting Direction	★ Communicates clear expectations. ★ Considers the bigger picture and long-term needs before committing to a course of action. ★ Translates the vision into clear strategies and work programmes.	∅ Fails to create direction for the team. ∅ Demonstrates a lack of knowledge and insight into wider issues, developments and long-term impact.
Empowerment	★ Supports others to have a level of independence in how they do their work. ★ Creates and maintains an environment of open and frequent communication with clear and direct flow of information. ★ Encourages others to acquire new skills and develop themselves. • Recognises, appreciates and supports others' contributions. ★ Develops cooperative and respectful relationships with others. ★ Understands the needs of crewmembers and cares about their welfare. ★ Creates a feeling of achieving results together as one team	∅ Micromanages direct reports. ∅ Does not support crew to develop their own initiative and judgement. ∅ Fails to motivate or support the team or applies inappropriate pressure. ∅ Does not show appreciation for others. ∅ Takes credit for others' achievements. ∅ Delegates without giving responsibility or authority,
Authority and Assertiveness	★ Creates a culture that enables challenge and participation while maintaining command authority. ★ Encourages crewmembers to review, raise concerns or challenge plans of actions. ★ Creates a safe and trusting environment for crewmembers, supporting them to openly share lack of knowledge and to speak up without hesitation. ★ Takes decisive action as required. ★ Takes command if the situation requires. ★ Advocates own position personal responsibility for the quality and timeliness of work and achieves results with little need for supervision.	∅ Avoids challenging inappropriate language or behaviours. ∅ Hinders or withholds crew involvement. ∅ Is passive and waits for others to take the lead or make decisions. ∅ Does not take a clear stand, with own position not recognisable. ∅ Blames the team if things go wrong. ∅ Leaves team members to cope alone in difficult situations. ∅ Tolerates behaviour that negatively affects the performance, development and morale of others.

Table XIV: *Results focus behavioural indicators*

Elements	Positive Behavioural indicators	Negative Behavioural indicators
Providing and Maintaining Standards	★ Demonstrates high ethical and moral standards, setting a personal example of what is expected from others. ★ Ensures compliance with policies and procedures and intervenes if crew members deviate. ★ Uses appropriate tools and notifications when dealing with non-routine operations. ★ Challenges current processes to find new and innovative ways to improve the team's work and vessel operations.	∅ Is a poor role model to others in terms of personal ethics and standards, e.g. does not comply with company policies and procedures. ∅ Does not monitor crew for compliance or intervene when crewmembers deviate. ∅ Applies non-standard procedures without thorough risk assessment or communicating with crewmembers. ∅ Sets standards that are unclear, unrealistic or too challenging. ∅ Avoids tackling performance issues or sticks to ineffective ways of working.
Planning and Coordination	★ Organises tasks, activities and resources. ★ Sets achievable goals, makes plans and establishes measurable milestones with timescales and quality standards. ★ Encourages shared understanding and participation among crewmembers of planning and task completion. ★ Monitors plans for achieving targets. ★ Delegates to achieve top performance and to avoid workload peaks and troughs. ★ Reviews and communicates plans and intentions clearly to the whole crew, changing plans if necessary.	❖ Plans only for themselves and does not involve crew. ❖ Changes plans without informing crew. ❖ Follows plans strictly despite circumstances demanding a different approach. ❖ Panics about deadlines. ❖ Makes short-term demands.
Workload Management	★ Defines clear roles and responsibilities for crewmembers for both normal and abnormal situations, including workload assignments. ★ Prioritises and manages primary and secondary operational tasks. ★ Distributes tasks appropriately among the crew, balancing the needs of every team member. ★ Recognizes work overload and signs of stress and fatigue in self and others; acts promptly to deal with it. ★ Uses available external and internal resources to complete tasks on time	★ Inadequate workload planning. ★ Delegates work unequally across the team. ★ Sets unrealistic deadlines. ★ Lacks awareness or consideration of how much pressure team is under.

To conclude this chapter, it is quite clear that soft skills are starting to take over the world by storm. It comes as no surprise as these skills are the underlying factor in building the teams that are equipped to tackle the challenges of the modern, technologically advanced and critical in regard to safety, working environment. Companies that have already taken this step have gained a strong and competitive advantage and the rest should only follow the prime example that they have set to ensure success of their operations and the well-being of their employees.

Shipping companies that attempt to comply with regulatory bodies guidance's and suggestions (TMSA, ISGOTT, etc.) can perceive a competitive market advantage as well as developing soft skills is about changing behavior. The problem stems from the fact that in shipping business human behavior is nuanced. Getting team members to communicate with each other in a more productive and safer way isn't a simple matter of incentivizing that communication, or alternatively, punishing failure to do so. A safety culture should be built or adopted and evaluated in practice.

Further on the next chapters we discuss the needed compliance with existing regulatory schemes and guidance proposed by regulatory bodies. We should stress that TMSA3 introduced a different approach by focusing on the human element and behavioral safety, suggesting that crew competence is the tool for crew retention and development.

CHAPTER 5: Conclusions and future work

This research aimed to assess the importance of the human element in tankers operations, review and enhance the penetration of behavioural management practices focusing on the adoption of **soft skill-oriented processes** in the **safety and quality management systems** of **tankers management companies**. All above chapters are results of our effort **suggesting paths** towards **regulatory compliance**, and propound the **best practices** described **by international associations**, as a tool of **mapping shipping industry's future**.

The main goal of this paper was to examine the importance of soft skills in Terms of promoting a safer and more productive operation and business environment. Therefore, we tried covering the below research questions:

> *Which is the role of* the human element in shipping operations ?
> What soft skills entail?

> Why are soft skills important in the new era?
>Which are the* desired soft skills in demand for onshore & onboard operations?*?

5.1. Conclusions

The shipping industry has been characterized as a high-risk business activity and investment due to the amount of investing capital. During this analysis that we have completed, we have observed that a crucial factor is the human element and the human performance. The industry has focused on human factor, their culture, level of education, abilities, training etc.

The Need for incorporation of a behavioural approach to management system arises due to the fact that people in organizations are possessing satisfactory level of technical competence but still there is a wide performance gap which come in the way of achieving organizational goals due to quite lower understanding on **social (soft) skills** in companies. What is more, the global shipping industry can be a dangerous place. Every day, it loses two ships, pays out US$4 million in claims and radically changes the lives of hundreds of people for ever. Human behaviour is the

source of virtually all such loss. It is also the reason why the loss is not greater. **Aspects of human role** and behaviour, which together constitute what the commercial maritime sector calls 'the **human element'**. It makes clear that the human element is neither peripheral nor optional in the pursuit of a profitable and safe shipping industry. On the contrary, the capabilities and vulnerabilities of human beings are – and always will be – at the centre of the enterprise. In this respect, we highlight the role of the human element in shipping operations, as behavioral competencies are **vital** for **safe** and **efficient** vessel operations. New and different skills and knowledge, especially in relation to information technology, will be required from seafarers in near future, if they are to assume the redefined roles on board and ashore that will be necessary to ensure the safety of vessels and efficiency of operations. **Soft skills** importance has been discussed thoughly on chapter two. Employer's strong soft skills ensure a productive, collaborative, and healthy work environment, in an increasingly competitive shipping industry. To support shipping competitiveness, it's the **human capital** that needs to be strengthened. On-board operations require a very especial soft skills package due to their multifarious nature. There are **at least 18 soft skills** to be adopted by seafarers and on-shore personell with proficiency level required, to be depended accordingly to their lever of authority and occupation.

To execute their goals, companies should align management system with Behavioural approaches to work. In this regards in chapter three we presented a **Behaviour Measurement and rectification** which assesses Competency domains/ categories of behaviour of the: **Team working, Communication** and **influencing, Situation awareness**, **Decision making**, **Results Focus**, **Leadership and managerial skills**. Those are evaluated based on narrower categories of behaviour that form part of the higher-level domains (Elements). Each element has a non-exhaustive list of behavioural indicators, both positive and negative. By following this methodology and assessment a path towards to **behavioural Management system** can be developed. Of course, it should be premeditated and well planned before applied. Haphazard change without knowing the depth of existing management system and its root causes can have severe impact on the organizational operation and also undermine strengths of a business entity.

5.1. Future/ Other Work

Tanker management companies have been moved from technology focused industry to Behavioral markers By this we mean the Observable, non-technical behaviours that shape performance within a work environment. Since industry is extremely regulated, we have to examine if the existing regulatory framework (TMSA requirements, other regulations) are adequate or need enhancement. TMSA new element that is rumoured to be published should be an object of further academic research. The adoption of the existing soft skills practices embodied to TMSA 3 in company's SMS shouldd be studied as well. Finally, the transcendence of the TMSA 3 soft-skill mandates should be included in further research topics.

REFERENCES AND WORKS CITED

A Pantouvakis, M Karakasnaki, *Role of the human talent in total quality management–performance relationship: an investigation in the transport sector*

A Pantouvakis, M Karakasnaki: *The human talent and its role in ISM Code effectiveness and competitiveness in the shipping industry*

DN Koufopoulos, IN Lagoudis, IN Theotokas, TC Syriopoulos *Corporate governance and board practices by Greek shipping management companies*

G Harlaftis, J Theotokas, Grammenos CT: *Hand-book of Maritime Economics and Business*

Kaoru Ishikawa: *Guide to Quality Control*. Asian Productivity Organization.

M. Bowles, Sophie Lanyon: *DEMYSTIFYING CREDENTIALS: GROWING CAPABILITIES FOR THE FUTURE (2016)*

Andrew Russ, Marine Surveyor, Charles Taylor Mutual Management (Asia) PTE Limited, Managers of The Standard Club Asia Ltd.

Cardiff Centre for Occupational and Health Psychology (2006), Seafarer Fatigue: The Cardiff Research Programme, Cardiff University

Catherine Harvey, Research Fellow, Professor Neville Stanton, Chair of Human Factors in Transport, Transportation Research Group, Faculty of Engineering and Environment, University of Southampton & Pengjun Zheng, Professor of Maritime Engineering at Ningbo University, China (published in issue 517 of The Ergonomist, July 2013)

Dickie John Waddell Reeds 21st Century Ship Management [Book]. - London: Adlard Coles Nautical, 2014.

FT's editorial board Stranded crews pose a risk to supply chains [Online] // The Financial Times. - The Financial Times, 28 September 2020. - 3 October 2020. - https://www.ft.com/content/7d8137e4-11f1-4cd5-be89-760b582bb9f9.

Human Factors in Ship Design and Operation: Experiential Learning-January 2016 / Thesis for PhD – Advisor: Bjørn Egil Asbjørnslett

Institute of Chartered Shipbrokers 1.2.6 Operations [Book Section] // Ship Operations and Management / book auth. Addison Tony [et al.]. - London: Institute of Chartered Shipbrokers, 2017.

International Maritime Organization (IMO) Human Element: Vision, Principles and Goals [Online] // International Maritime Organization (IMO). http://www.imo.org/en/OurWork/HumanElement/VisionPrinciplesGoals/Pages/Default.aspx.

Progoulaki, M. and Roe, M. (2011) Dealing with multicultural human resources in a socially responsible manner: a focus on the maritime industry

The Human Element in Shipping Michael L. Barnett and Claire H. Pekcan Southampton Solent University, Southampton, UK

The Nautical Institute Navigation Accidents and their Causes [Book]. - London: The Nautical Institute, 2015.

Visvikis I. D. and Panayides P. M. Ship Operations Management [Book]. - Malmo: Springer, 2017.

David J. Deming. The Growing Importance of social skills in the Labor Market.

Deloitte. Analysis of Soft skills for business success.

Deloitte Millennial Survey Millennials disappointed in business, unprepared for Industry 4.0. 2018

ECSA. 2019. EU Maritime Growth Plan for Sustainable Maritime Jobs.

LinkedIn. Global Talent trends report by LinkedIn.

OCIMF. Behavioural-Competency-Assessment-and-Verification.

Skills Framework for Sea Transport. A Guide to Occupations and Skills. Skillsfuture Singapore

The Future of the Modern Seafarers? Profession. ECSA, The Maritime Executive.

The Value of Soft Skills to the UK Economy. 2015.

A guide for practitioners, DEG Studies

BBS Course, DNV-GL

EVALUATING MARITIME EDUCATION AND TRAINING NEEDS FOR TANKER SHIPPING COMPANIES, E. Bal Besikci1,2, J.U. Schröder-Hinrichs2, A. Sıhmantepe3, D. Dalaklis2, J. Larsson2 (paper)

Shipping KPI structure, Source –BIMCO Shipping KPI

TMSA and KPI Systems - Challenges in Business Performance Measurement, by Jan Hemmelskamp B.A.

TMSA 3, Best Practice Guide 3rd Edition 2017, OCIMF

Cornalli Federica Training and developing soft skills in higher education [Report]. - Turin : University of Turin, 2018.

Dickie John Waddell Reeds 21st Century Ship Management [Book]. - London : Adlard Coles Nautical, 2014.

FT's editorial board Stranded crews pose a risk to supply chains [Online] // The Financial Times. - The Financial Times, 28 September 2020. - 3 October 2020. - https://www.ft.com/content/7d8137e4-11f1-4cd5-be89-760b582bb9f9.

Gregory Dik and Shanahan Paul The Human Element: a guide to human behaviour in the shipping industry [Report]. - Southampton : Maritime and Coastguard Agency, 2010.

Hemmendinger David Operating system [Online] // Encyclopædia Britannica. - Encyclopædia Britannica, inc., 14 November 2019. - 1 September 2020. - https://www.britannica.com/technology/operating-system.

Institute of Chartered Shipbrokers 1.2.6 Operations [Book Section] // Ship Operations and Management / book auth. Addison Tony [et al.]. - London : Institute of Chartered Shipbrokers, 2017.

Institute of Chartered Shipbrokers Ship Operations and Management [Book]. - London : Institute of Chartered Shibrokers, 2017.

International Maritime Organization (IMO) Human Element: Vision, Principles and Goals [Online] // International Maritime Organization (IMO). - http://www.imo.org/en/OurWork/HumanElement/VisionPrinciplesGoals/Pages/Default.aspx.

Majid Shaheen [et al.] Importance of Soft Skills for Education and Career Success [Journal]. - Singapore : International Journal for Cross-Disciplinary Subjects in Education (IJCDSE), 2012. - 2 : Vol. 2.

Marsh Henry Can man ever build a mind? [Journal]. - [s.l.] : The Financial Times, 2019.

Nilsson Patricia What top employers want from MBA graduates [Article]. - London : The Financial Times, 2018.

Riggio Ronald E. and Tan J. Sherylle Leader Interpersonal and Influence Skills: the Soft Skills of Leaderships [Book]. - New York : Routledge, 2014.

The Nautical Institute Navigation Accidents and their Causes [Book]. - London : The Nautical Institute , 2015.

Visvikis I. D. and Panayides P. M. Ship Operations Management [Book]. - Malmo : Springer, 2017.