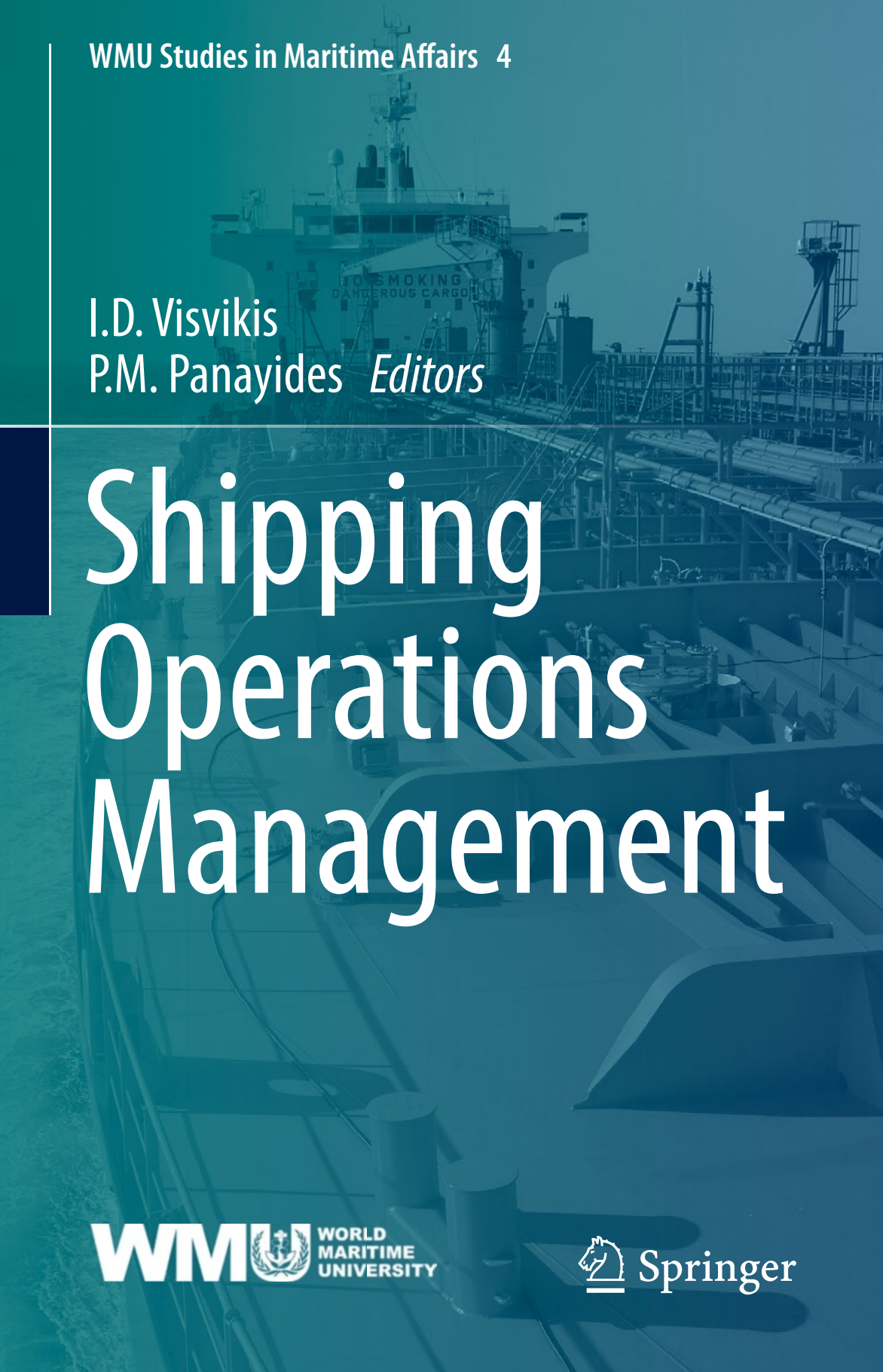
WMU Studies in Maritime Affairs 4



I.D. Visvikis
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Shipping Operations Management

WMU WORLD MARITIME UNIVERSITY

Springer

WMU Studies in Maritime Affairs

Volume 4

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Shipping Operations Management

Springer

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ISSN 2196-8772 ISSN 2196-8780 (electronic)
WMU Studies in Maritime Affairs
ISBN 978-3-319-62364-1 ISBN 978-3-319-62365-8 (eBook)
DOI 10.1007/978-3-319-62365-8

Library of Congress Control Number: 2017954320

Printed on acid-free paper

This Springer imprint is published by Springer Nature
The registered company is Springer International Publishing AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Foreword

As the President of the World Maritime University (WMU), I am pleased to introduce the fourth volume of the WMU Studies in Maritime Affairs book series published by Springer, titled *Shipping Operations Management*. The series was launched in 2013 to encourage academics and practitioners from all areas of specialisation across the field of maritime affairs to contribute to the expansion of knowledge through publications of the highest quality and market relevance. Previous books in the series include Farthing on International Shipping (2013), Piracy at Sea (2013) and Maritime Women: Global Leadership (2015). With this book series, the WMU aims to further develop expertise in maritime education and training, maritime energy management, maritime law and policy, maritime safety and environmental administration, ocean sustainability governance and management, port management, and shipping management and logistics.

WMU is a postgraduate maritime university established by the International Maritime Organization (IMO), a specialised agency of the United Nations, which aims to further enhance the objectives and goals of IMO and IMO member States around the world through education, research and capacity building to ensure safe, secure and efficient shipping on clean oceans. WMU's mission is to provide the best possible education and research facilities for postgraduate studies, professional training and capacity building for a sustainable maritime industry and related oceans fields. We facilitate harmonisation, uniform interpretations and effective implementation of maritime conventions and related instruments.

Shipping Operations Management comes as a response to the market needs to provide a comprehensive coverage of all functions of the modern management of shipping operations. It aspires to become a one-stop read for all interested parties from both the maritime business sector and academia. The chapters are written by world-renowned academics and practitioners, all experts in their subject area. The book covers areas such as fundamentals of shipping management; organisation behavior in shipping; commercial, crew and technical operations management; the MLC 2006 from the perspective of legal jurisdiction and port state control; managing financial resources in shipping; maritime energy management; safety and

security in shipping operations; nationality of ships and marine insurance; and ocean governance and sustainability.

I invite you to read this book, and I am sure that you will find it relevant and responsive to your needs. At WMU, we have a very strong commitment to research at the highest level of academic and professional standards.

Malmö, Sweden Cleopatra Doumbia-Henry

Preface

The management of shipping operations is a fundamental activity for shipowning, ship operating and third party ship management companies and represents an area where companies constantly seek and assign relevant responsibilities to qualified and knowledgeable personnel. It is an area that requires integrative knowledge that spans across disciplines and needs varied experiences. It requires shipping operations personnel to be well versed with aspects of management, economics, engineering, technology and law, including information and communication systems. It requires the ability to identify and neutralise threats and to manage risks and to make decisions that will optimise costs and contribute to performance improvements. Despite the above obvious needs, there is no book or edited volume that has attempted to reconcile and compile a comprehensive body of knowledge in a coherent, structured and systematic approach on the subject matter. This edited volume aims to address this fundamental gap in the extant literature and can be used as a reference point for maritime companies and organisations, and also serve as a teaching and reference textbook in both undergraduate and postgraduate maritime-related programmes of study.

Chapter 1 by Panayides provides a high-level overview of the fundamental principles of ship management, which entails the various activities and operations necessary to manage a ship, as well as a description of company organisation and structures, a review of ship management services and reference to contractual arrangements between ship managers and owners. Key topics in this context include ship registration and flagging, the regulatory environment and issues of environmental performance management, energy efficiency and slow steaming, as well as managing and measuring ship management performance through the use of key performance indicators.

In Chap. 2, Pastra, Gkliatis and Koufopoulos introduce concepts of organisational behavior in shipping, focusing on issues of organisational structure and placing particular emphasis on the top management and governance of maritime organisations. In the contemporary globalised and turbulent maritime industry environment, overseeing the operations and decision-making of top leaders of

shipping companies is critical, especially with the current and prolonged global financial crisis in place. It is therefore important to have a thorough understanding of organisational processes and routines that should be continuously reviewed, redesigned and improved. In this context, the discussion describes the challenges and complexities that company executives have to face when dealing with processes and routines. The basic processes and routines that can be found in a shipping company are presented in addition to how these processes can lead to organisational change. The chapter also advocates the need for shipping companies to change and transform over time, as a means of ensuring longevity and sustainability.

The success of a shipowning organisation depends on the ability of the business to identify, negotiate and execute successful chartering options. The effective hiring of the ship or space on the ship represents the main revenue-earning stream for the shipping company, and the successful negotiation of the hire terms and efficient performance of the fixture will lead to profitability and competitiveness. In Chap. 3, Assimenos discusses in practical terms and in detail the management of commercial operations, including the types of chartering arrangements that can be effected, the chartering negotiation process, issues of payment of freight and hire, laytime, demurrage and despatch, as well as voyage estimation for dry cargo and tanker ships. The chapter also addresses cargo and charter party claims, as well as bunkering operations rendering a comprehensive treatment of the main aspects pertaining to the profit and costs of ships.

Crew management is central to shipping operations, and in Chap. 4 Anastasiou provides a comprehensive and thorough review of crew management operations. The analysis identifies the intricacies and multidimensional nature of crew management operations, referring also to the interface with shipping operations. The chapter achieves the comprehensive understanding of crew management operations and at the same time provides a valuable review of best practices. Specific topics include the identification and recruitment of seagoing labour in the context of economic issues such as the achievement of economies of scale and the all-important issues of training and management of crew performance. In addition, the author provides a comprehensive discussion of the role of marine academies and their relationship with shipping companies.

Technical operations management is one of the most demanding and complex areas of ship management. These characteristics arise from the necessity to integrate ship, shore and other, external to the company, bodies and organisations while operating in the context of strict national and international laws and regulations. Furnival and Crispe in Chap. 5 provide a discussion of the organisational and managerial aspects of technical operations management. The topics include the organisational structure of the team needed to manage the fleet, the relationships with other departments within the organisation and the main areas of concern related to the actual management of the ships, including client relationships, running the ships, emergency response, maintenance and managing expenditure. The chapter concludes with some of the challenges expected to play a role within technical operations management in future years.

In Chap. 6, Doumbia-Henry examines the manner in which the Maritime Labour Convention 2006 (MLC 2006) addresses the legal jurisdiction of the State for foreign ships entering its ports (port State) or legal venue with respect to seafarers' rights. The MLC 2006 is currently ratified by 82 member States of the ILO, representing 91% of the world gross tonnage of ships. The MLC 2006 came about from the consolidation of almost all maritime labour Conventions and Recommendations adopted by the ILO, provides shipowners and governments with a level-playing field and is regarded to be the fourth pillar of the international maritime regulatory regime. The MLC 2006 also further developed the concept of flag State inspection with a certification system to support labour compliance and significantly strengthened port State control procedures for compliance with working and living conditions. It is now an important instrument for international labour law that can ensure that seafarers' rights are protected and that they can enjoy the decent work benefits provided for under the Convention. Still the author believes that the implementation of the Convention and its envisaged provisions need to be closely observed and monitored, and its effectiveness in ensuring the rights of seafarers still needs to be assessed taking into account the stance of judicial decisions.

The cyclical nature of the shipping industry and the volatility of freight rates due to the underlying market characteristics of the demand for commodities and the supply of ships have a direct effect on the asset value of ships. The purchase of ships requires very high capital investments, which also require considerable funding for management and operations. As a result of the industry's cyclical and capital-intensive nature, it is fundamental for the industry's participants and capital providers to determine if the timing is appropriate for investments in shipping. In Chap. 7, Kavussanos, Visvikis and Alexopoulos explain and analyse the different sources of shipping finance in the context of the challenges in the sector. They also explain the techniques and strategies that can be employed to manage business risks in shipping.

Maritime energy management is a multidimensional concept with several key stakeholders, be it shipowners and cargo traders, governments and regulators, as well as the general public. The management of ship-related energy consumption is of vital importance to shipping companies from several perspectives, not least as a means of reducing the cost of ship operation itself but also to comply with the increasingly stringent and varied international regulations set by the IMO and other bodies responsible for setting for national and international energy-related regulations. In Chap. 8, Ölçer, Baumler, Ballini and Kitada address a number of issues with respect to energy management, including key international regulations and their main requirements such as MARPOL and relevant regulations for sea and air emissions. In addition, the chapter addresses issues of energy-efficient ship operations highlighting examples of corporate policies, as well as port energy management, by discussing relevant plans.

It has been mentioned that shipping is a risky business, and a major risk that arises is associated with the physical risk on board ships due to substandard and unsafe practices and operations and also due to security reasons emanating from

external actions by third parties such as terrorists and pirates. In this context, Dalaklis in Chap. 9 notes that considerable strides have been made to improve safety and security on board ships, especially with the advent of technology and with the development of relevant international regulations such as the SOLAS convention. The author discusses the specific regulations and their provisions, focusing on the pivotal role of the SOLAS convention and indicating how they address the challenges in the context of the dangerous maritime environment within which ships operate. The author concludes that it is only with the continuous study and introduction of new and updated regulations that such risks will be effectively managed.

One of the great challenges of being in the shipping business that may also lead to high rewards is the inherent risk associated with operating in this business, particularly physical as well as economic risks. The manifestation of physical risk depends on many factors, like the condition, maintenance and safe navigation of the ship; the encounter of adverse weather conditions; the competency of the seafarers, as well as that of the onshore personnel; and the prevailing market conditions, which dictate the mode of operation and exploitation of the ship. Regardless of all efforts to reduce shipping-related risks, some risks will remain. The risk, which remains, can be transferred to another party, either by transferring the activity to a specialist (e.g., subcontracting) or by transferring the financial consequences. It is the last option, namely transfer of risk by insurance, that Theocharidis and Donner examine in Chap. 10 in the light of the shipowner's unfettered right to elect registry for his ship. The analysis concludes that while there are situations where the law imposes a requirement to have insurance to cover certain liabilities, the choice of registry is not a direct criterion for obtaining insurance but may be, and probably would be, a criterion for assessing the risk and setting the premium. Marine insurance is a business, where decisions to request and offer insurance cover are business oriented and based, primarily, on business criteria and, only secondarily, on reputation criteria.

In Chap. 11, Hildebrand and Bellefontaine examine an area of maritime management that is of fundamental interest to all stakeholders of shipping operations, that of sustainability of the oceans. The key question addressed is whether the existing ocean governance and management laws, policies and institutions are sufficient to face the challenge of maintaining and indeed restoring the natural ocean capital. The authors discuss in detail the issues faced in ocean governance and sustainability and conclude that after several decades of concerted and cooperative effort by the international community, much knowledge has been generated, various issues have been addressed, promising governance and management frameworks and paradigms have been put forward and a plethora of best practices have been identified and disseminated. However, it is also acknowledged that the pace at which governance and management of the ocean is proceeding does not match the pace of degradation of the marine environment and its resources. Shipping will certainly remain a prominent component of the ocean economy, but it must continue to grow in and adapt to a more crowded and competitive ocean space, a worsening ocean environment with greatly diminished capacity to support multiple

and growing social and economic needs and a more integrated ocean governance regime with all of the legal, jurisdictional, social and ecological challenges this implies. The shipping sector needs to think beyond its sectoral focus and embrace its place in an evolving ocean space and cooperative ocean governance regime.

Finally, we would like to sincerely thank the following chapter reviewers (in alphabetical order) for their valuable support and efforts: Assoc. Prof. Michele Acciaro (Kühne Logistics University), Bill Box (Intertanko), Prof. Dr. Wolfgang Drobetz (University of Hamburg), Prof. Ronan Long (World Maritime University), Assoc. Prof. Michael Manuel (World Maritime University), Prof. Moira L McConnell (Dalhousie University), Assoc. Prof. Theodora Nikaki (Swansea University), Dr. Maria Progoulaki (University of the Aegean and The American College of Greece), Prof. Dr. Orestis Schinas (HSBA Hamburg School of Business Administration), Prof. Ernestos Tzannatos (University of Piraeus) and Dr. Malcolm Willingale (Prospect Maritime).

Malmö, Sweden — I.D. Visvikis
Lemesos, Cyprus — P.M. Panayides
May 2017

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Contributors

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Julia Anastasiou has been an active member of the shipping community for the past 20 years. She has gained experience in the ship management sector holding influential roles and partaking as a member of various shipping organizations. Being a Chartered Ship Broker by profession, today Julia holds a global position as Crew Director with the OSM Maritime Group. She effectively drives performance, manages the business and facilitates sustainable profitability and growth. She has overseen several changes since her undertaking of this role in 2014 and continues to enhance her performance through further education, innovative thinking, leadership and networking. Julia was born in Toronto, Canada and is a permanent resident of Cyprus where she resides with her husband and two children.

Nicolas Assimenos is a holder of an M.Sc. in International Transport from the University of Wales, Cardiff, a B.Sc. in Economics from the University of Salford, a Diploma in Shipmanagement and a Diploma in Shipping Finance. He has worked in MCL Metz Container Lines in the Logistics Department undertaking the responsibility of the transshipment and he has worked at Columbia Shipmanagement at the

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Fabio Ballini has Economic and Maritime Transportation background. He obtained his MSc in Maritime Economics and Transport at the Faculty of Economics in Genova (Italy) and holds a Ph.D. Electrical Engineering, awarded a European Ph.D. label, from the University of Genova (Italy), Dept. of Naval, Electrical, Electronic and Telecommunication Engineering (DITEN). Dr. Fabio Ballini previously held the position of Adjunct Professor and Assistant Professor at the Faculty of Maritime Economy in Genova (Italy) where he taught academic courses on topics related to Maritime Economy, including Social Cost-Benefit Analysis, Gaseous Ship Emissions, Emission Evaluation Models, Intellectual Property Rights in Shipbuilding. At WMU, Dr Fabio Ballini is currently a Lecturer in the Maritime Energy Management specialization and is a member of the Maritime Energy Research Group (MarEner) dealing with research topics related to Port Energy Management Planning, Gaseous Emissions from Ships in Harbors, Externality Cost in Transportation, Externality Modeling, Clean-Tech Solutions and Energy Audit Systems in Port. His recent research areas of interest at the WMU in Malmö have focused on Circular Economy in relation to ports and renewable energy and alternative fuels as a marine fuel. Dr. Fabio Ballini has extensive experience in developing research projects and project proposals through lifecycle management. Dr Ballini was involved in numerous EU funded projects: TEN T Programme (TrainMos, Mona Lisa 2.0 projects), ENPI CBC MED Programme (CUSTOM MED project), CIPS Programme (CYSM Project), Europeaid tender (IPSEA project), Marco Polo Programme (OTMW-N project), Interreg IVB Programme (SAIL project), Interreg Baltic Sea Region Programme (GO LNG project), Interreg South Baltic Programme (SBOIL Project). He has published results of his research in leading, internationally peer-reviewed journals such as: Transportation Research Part D Journal and Research in Transportation Business & Management: Energy Efficiency in Maritime Logistics Chains Journal.

Raphael Baumler, primarily educated as a dual officer, spent 21 years in a seafaring career. He ended this occupation as Master on a large container ship. In addition, he completed his experience with a Ph.D. in Risk Management in 2009 and joined WMU in 2010. Since, he has been actively involved in numerous IMO projects as contributor, subject matter expert and project manager. His work mostly relates to Ballast Water Management Convention, MARPOL Annex VI and shiprecyling.

Neil Bellefontaine has held the position of Vice President Academic at the World Maritime University since 2011, and previously held the Canadian Chair in Marine Environmental Management from 2006 to 2012. Prof. Bellefontaine had professional knowledge and research experience in maritime administration, fisheries, aquaculture, and coastal and oceans management fields. He has studied resource economics (B.Com Hons Economics), marine management (MMM), and executive management (EXADM). As Vice President Academic Prof. Bellefontaine maintains active collaborative relationships with governmental leaders, universities, and maritime industry and ocean stakeholders. Prior to WMU, Prof. Bellefontaine was a senior executive (Assistant Deputy Minister level) employed with the Canadian Fisheries and Oceans department for 33 years. In 1998, Prof. Bellefontaine was presented with the Outstanding Public Service Award by the Prime Minister of Canada. From 1993 to 2006, he served as the Regional Director General for the Maritimes Region of Canada, where he was responsible for the administration of science, oceans and habitat, fisheries and aquaculture, small craft harbours, corporate programs, and including the Canadian Coast Guard.

Jonathan Crispe is a Corporate Expert—Technical at Bernhard Schulte Shipmanagement (BSM). Following a seagoing career with BP Shipping and then Dorchester Maritime, Jonathan joined BSM Bermuda (formally Atlantic Marine) in 1989 as Technical Superintendent, before transferring to BSM Isle of Man (formally Dorchester Maritime), in 1991. In 2000, he was promoted to Technical Manager, responsible for a fleet of mainly gas and product/chemical carriers. Additional projects included specification development for new buildings, contract negotiation and plan approval, together with life extension of LNG, LPG, chemical, product and crude carriers. In 2005, he became Operations Manager, and in 2008 Technical Director for the fleet which included a number of LNG carriers. In 2012, following the BSM merger, he was promoted to Corporate Expert—Technical for the group. Responsibilities include oversight of technical aspects of ship management, development of BSM's in-house Planned Maintenance System, new business development, and new building project support.

Dimitrios Dalaklis joined WMU in the summer of 2014, upon completion of a 26 years distinguished career with the Hellenic Navy. His expertise revolves around the extended Maritime Education and Training (MET) domain and especially the conduct of navigation (regulatory framework, techniques-associated best practices and related equipment), as well as maritime safety and security issues. He has

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Patrick Donner received an LLM from the University of Turku and having qualified for the judiciary served on the bench for 5 years. He worked for 14 years in executive positions in shipping companies in Finland after which he had his own law and management consultancy firm for a few years. During all this time, he taught maritime law (part-time) at the Maritime Academy of Åland and also held numerous non-executive positions on boards of directors of shipping and insurance companies as well as elected public office at local level. Patrick Donner joined the World Maritime University (WMU) as Associate Professor in Shipping Management in 1995 and served as Associate Academic Dean from 2006 until February 2017. Mr. Donner also lectures in WMU's MSc programme in International Transport and Logistics at Shanghai Maritime University, is Programme Coordinator of the Postgraduate Diploma course in Marine Insurance and is a visiting Associate Professor in the Maritime MSc and MA/LLM programmes of Frederick University in Cyprus.

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Lawrence P. Hildebrand is Professor and Canadian Chair in Marine Environmental Protection at the World Maritime University in Malmö, Sweden. He heads the University's MSc. specialization in Ocean Sustainability, Governance and Management and is part of a team developing a new Global Ocean Institute at WMU in partnership with the Nippon Foundation. Dr. Hildebrand joined WMU in 2013 from Halifax, Nova Scotia on Canada's east coast where he served for 35 years in a variety of leadership capacities in government and non-government organizations directly related to integrated coastal and ocean governance. Dr. Hildebrand is also an Adjunct Professor of Marine Affairs at Dalhousie University and Visiting Professor at universities in the U.S., Iceland, Uruguay and the U.K. Dr. Hildebrand has also served as evaluation and policy-development consultant and trainer to the United Nations Environment Programme, Convention on Biological Diversity and UN Development Programme in East Asia, Latin America and the Caribbean. He is a Governor of the International Ocean Institute and Senior Research Fellow at IOI-Canada, and an Editorial Board member of the international journal Coastal Management. He is a frequently invited keynote speaker at international conferences on ocean governance and management and is the recipient of the H.B. Nicholls Award for Leadership in Coastal Zone Management in Canada, the Canadian Public Service Award of Excellence, and the Distinguished Service Award with the US-Canada Gulf of Maine Council on the Marine Environment. Dr. Hildebrand has degrees in marine biology (B.Sc. Hons) and environmental

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Momoko Kitada is a former seafarer and her research interests lie in gender issues in shipping, in particular, women seafarers and seafarers' families in terms of identities and welfare issues. She teaches subjects in Maritime Education and Training (MET), including cultural issues, knowledge management, assessment methodology, and contemporary labour issues. Momoko's research expands to the human element and social aspects in energy management. She is engaged internationally as an Associate Researcher at the Seafarers International Research Centre (SIRC)—Cardiff University, as a Guest Lecturer at Open University, Japan, and as an Adjunct Professor at the AMET University, India. Momoko joined WMU in 2011 and serves as an Assistant Professor as well as in the Secretariat of the WMU Women's Association (WMUWA). She leads WMU's collaboration efforts with the IMO in terms of women's integration in the maritime sector and assists WMUWA in connecting with other IMO regional support networks. Her previous work experience includes positions within both the private and public sectors, such as several major Japanese companies and organizations of trading, manufacturing,

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Chapter 1
Fundamentals of Ship Management

P.M. Panayides

1.1 Introduction

Shipping entails the movement of raw materials, commodities, semi-finished products and finished goods from places of low utility to places of high utility by sea. Maritime transport must be economical (low cost), efficient, safe and must fulfil the requirements of shippers (cargo owners), which apart from the above may also require on-time delivery, service reliability, high service frequency and flexibility in the provision of other maritime transportation solutions. To achieve such objectives, the shipping industry has organised itself over the years into a structure of different specialised markets with particular objectives to deliver services that fulfil customer requirements profitably and sustainably.

On this basis of understanding, the global shipping industry is a market of markets, which may be classified into commodity and type of ship design such as dry bulk market, tanker market (both clean products and dirty crude oil), container market, chemical tanker, car carrier market, etc., albeit with a degree of cross-over between market sectors—for example between the container and the general cargo and bulk markets.

For each market, ship-owning companies have also organised themselves in such a way as to manage the ships efficiently and effectively. Organisation entails the formation of different types of company structures and the formation of specialised departments and business units. While these ship-owning organisations tend to be physically located in the major maritime centres, the development of offshore locations has been utilised in order to minimise taxation. Over the years, growth and specialisation led to the formation of third-party ship management

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I.D. Visvikis, P.M. Panayides (eds.), *Shipping Operations Management*,
WMU Studies in Maritime Affairs 4, DOI 10.1007/978-3-319-62365-8_1

companies, thus fulfilling particular market needs of those ship-owning companies that chose not to manage their vessels in-house.

The aim of this chapter is to provide a high-level overview of the fundamental principles of ship management. This will include a description of company organisation and structures, as well as a review of ship management services and contractual arrangements. Particular reference will be made to the various activities required to manage a ship, including regulatory issues, environmental implications and performance management and measurement. Key topics in this respect include ship registration and flagging, the regulatory environment and issues of environmental performance management, energy efficiency and slow steaming, and managing and measuring ship management performance through the use of key performance indicators.

1.2 Ship Owning and Ship Management

1.2.1 Ship Owning

Ship ownership entails the investment by a company or individual in the purchase (or building) of the asset (ship), which will then be operated for a financial benefit (profit). This may also be referred to as 'beneficial' ownership. In contrast, a company may own a ship by virtue of 'nominal' ownership whereby the company is simply a 'brass plate' entity that has the legal ownership of the vessel for tax purposes; that company usually is residing in a flag of convenience country. In some cases, the ship-owning company may wish to confine its engagement to the financial benefit derived from ownership by way of bareboat chartering the ship to a charterer wishing to operate the vessel. This arrangement involves transfer of the operating risk to the charterer.

There is a wide variety of ship-owning entities. Some owners operate a single ship while others larger fleets. Some concentrate on ships of a particular type (fleet specialisation), while others operate a varied collection of vessels (fleet diversification). The type of vessel's employment depends upon the market's circumstances, the shipowner's intentions and expectations, as well as the regulatory and geopolitical forces internationally. While in bulk shipping single-vessel ship-owning companies form the international rule of ship-owning, in liner shipping the need to offer extensive network services of high frequency has led to co-operation among operators, often resulting in pooling of shipping resources typically in alliances, which replaced the now outlawed liner conferences, and, in some cases, common ownership or management of vessels.

1.2.2 Ship Management

Ship management is defined by Willingale (1998) as *the professional supply of a single or range of services by a management company separate from the vessel's ownership*. *Professional supply* means that the ship manager (supplier) provides service(s) to the shipowner (user) according to contracted terms and in return for a management fee. Panayides (2001) defines ship management as the rendering of services in an outsourcing arrangement related to the economic and operational organisation of a ship as a revenue-earning entity. Outsourcing provides the opportunities to ship-owning companies to focus on those functions that will maximise earnings (e.g., chartering or buying/selling a ship), leaving ship managers to deal with cost control and operational tasks. Ship managers ensure that the ship complies with international rules and regulations, that it is seaworthy and always fit to carry cargo with operational reliability, safely and cost-efficiently. A key requirement from shipowners is that the asset (ship) is well preserved.

Third-party ship management involves the separation of ship ownership from the crewing, technical and, in some cases, commercial management of the vessel. A shipowner may manage his entire fleet or subcontract some parts such as crewing, technical or commercial management operations to professional ship managers.

Ship management is undertaken by companies separate from the vessel's ownership and involves tasks such as manning, training and appointment of both ship and shore-based personnel, sourcing of ship's supplies, giving advice on the available options for the ship's registration, trading, ship maintenance, etc. (Branch and Robarts 2014). According to Bjuggren and Palmeberg (2009), third-party ship management denominates the complete separation of ownership and control in maritime transport and illustrates that labour in shipping (the crew) is not tied to the asset (the vessel) to the same extent as in other industries. The merits of outsourcing and ship management have been researched and expounded primarily in the studies by Panayides (2001), Panayides and Cullinane (2002), Mitroussi (2004a) and Cariou and Wolff (2011a, b).

1.3 Company Structures

An organisational structure is the formal pattern of how a company arranges its organisational activities and functions (Gibson et al. 2006). There are numerous variations of ship-owning company structures. Some companies (or owners) may operate a single ship, whereas other companies are shipping conglomerates and may be operating in different markets via different entities and business units. Some companies have specialised fleets and focus on the operation of particular ship types in particular markets. Others may be more diverse in terms of ownership and operation (fleet diversification). The degree of specialisation or diversification depends primarily on the company's strategy, which is formulated on the basis of

external environmental factors and economic circumstances and represents the vision and mission of the company in its attempt to gain a competitive advantage in the market domain.

Over the years, as in other service industries, there has been a gradual shift in focus towards organisational structures that are more customer focused (i.e. structures developed around customer groups) in order for companies to develop and offer coherent customer-oriented solutions. Hence, companies in the shipping industry are nowadays formed to develop and offer transportation and ship management solutions to customers and have become more specialised, more organised and flexible and more innovative in doing so. Even diversified shipping conglomerates operate with predetermined strategic business units in order to achieve the above-mentioned goals. In addition, there is a drive towards reducing the number of levels in typical hierarchical company structures to structures that are flatter and would thus facilitate delegation and decentralisation of authority and faster decision-making.

1.3.1 Shipping Conglomerates

The diversification of shipping companies into other shipping and transportation markets has given rise to shipping conglomerates. A diversified shipping group would be an umbrella structure with business units in various shipping sectors, e.g. dry bulk, tanker, container, etc. Diversification is often driven by a strategy to hedge exposure to cyclical risk in different market sectors (Lorange 2009), although in the shipping industry this practice is not as prevalent as in other industries. A relatively small number of companies or business units have been successful in securing a public listing where shares are owned by institutional investors.

1.3.2 Traditional Shipping Companies

The characteristics of a traditional shipping company are epitomised by the key departments, like operations, technical, crewing and chartering, as well as an administration/management department. The company invests in newbuilding and second-hand ships and is responsible for finding employment for the ships in the spot market and/or the time charter market. In addition, depending on company policy, it may engage in ship sale and purchase. This is typical of dry bulk shipping companies. Ships are normally registered under one-ship-owning companies as a means to achieve tax-related advantages and to limit liability of the group. Single-ship-owning companies are registered offshore that provides higher levels of business confidentiality.

1.3.3 Liner Shipping Companies

A liner shipping company is responsible for operating a fleet of container or other types of dry cargo vessels such as MPPs. Vessels are employed in a liner service with fixed calls for loading and discharging and following a timetable with a pre-fixed and advertised geographical rotation ('itinerary' or 'liner schedule'). Normally this is done via an extensive network of offices that are located at the ports/country of destination. The main office is subdivided into departments that deal with marketing, ship operations, personnel and claims/legal. The operations are much more complex, not least in terms of attracting cargo, designing and operating cost-effective liner shipping routes and networks (Liu et al. 2014), utilising assets and achieving reliability in port calls and satisfying and anticipating the needs of a large number of customers. Notwithstanding the size of ship operations, several people are required to staff such a company properly before it can be fully operational. A liner shipping company is focused on securing bookings of containers (which may be made up of smaller consignments of various commodities) with a view to filling vessels.

Companies in liner shipping have developed various types of alliances and collaborations in order to share resources and assets among themselves and to formulate mutually beneficial strategies and seek operational performance improvements. Liner shipping companies have adopted the hub-and-spoke approach whereby long-haul, high-capacity containerships deployed on the main east-west arterial routes call at a limited number of hub ports that are 'fed' cargo by small feeder vessels that connect with outer or spoke ports. This allows the consortia/alliances to participate in upstream and downstream activities together (Panayides and Wiedmer 2011).

1.3.4 Shipping Divisions

This is a division of a company whereby shipping is not its primary activity, but it has high maritime transport needs and thus has invested in ships. A good example would be the shipping division of an international oil company. International oil companies usually invest in own assets in addition to chartering ships on time and voyage charters. Hence, part of the company's oil shipments is carried in company-owned vessels, and the division is responsible for all activities associated with the acquisition and operation of these vessels. Major investment decisions must pass through the central company board, and the division's management is mainly responsible for day-to-day operations.

1.3.5 Shipping Pools

In order to manage the risk of long off-hire periods during troughs in demand for shipping, shipowners have sought the creation of shipping pools whereby each participant would contribute a certain level of assets (ships) to the pool that will be managed by a specially established entity. The entity may be a newly formed joint venture company or an independent ship manager or an affiliate/subsidiary of a shipowner. The entity assumes the commercial management of the pool-entered ships, whereas technical management may remain with the owner. Commercial management entails the chartering of the ships for a profit with costs and revenues shared among the participants on the basis of their asset contribution to the pool typically measured in terms of pool points based on the attractiveness of the individual vessels.

1.4 Ship Management Activities and Services

Ship management consists of a varied spectrum of services typically grouped into crew management, technical management, commercial management and other ancillary services.

1.4.1 Crew Management

Crew management entails the recruitment and management of a vessel's crew. Crew recruitment includes the selection of competent and qualified crew through liaison with marine agencies and maritime academies. Crew management includes the payment of the crews' wages and other benefits, expenses and insurance; training and career development; crew rotation and travel; and crew performance assessment, among others. It also includes the development of crew related policies and procedures especially with respect to safety, welfare and drugs and alcohol.

1.4.2 Technical Management

The main objective of technical management is to provide safe, environmentally friendly and cost-efficient vessel operations in accordance with international rules and regulations. Technical management entails the compliance with technical specification of equipment and machinery on board ships and the supply and provision of victuals, stores, spares, lubricants and other products required for the day-to-day operation of the ships. Importantly, technical management entails the

planned maintenance of the vessel and the regular inspection of the ship according to a predetermined plan to monitor the vessels' performance, the technical condition of the equipment and the arrangement of dry docking to examine and address any repair and maintenance issues concerning the condition of the ship's structure, as well as its equipment and machinery. With respect to the latter, technical management entails the organisation of pre-docking activities; preparation of work lists of the dry dock; evaluation of repair yards on the basis of given criteria, including quality, price, terms of payment, delivery and redelivery costs; management of dry-docking activities; and approval of the work carried out.

1.4.3 Commercial Management

Commercial management entails services that relate to the commercial employment of the vessel (charter fixture) and include pre-fixture and post-fixture services. The activities begin with the identification and assessment of chartering opportunities, usually via the services of a shipbroker, followed by a chartering negotiation, which leads to the completion of a charter party fixture. The objective is to secure employment of ships from the open market by fixing full or part cargoes on either a voyage basis or a time charter contract engagement for a defined period. It is also possible and, indeed, at times desirable to contract ships on so-called industrial shipping with long-term charterers as in the case of bareboat charters or contracts of affreightment (COAs). In this case, ships may be purpose-built in accordance with the specifications of the long-term charterer (e.g., ships may be of particular dimensions and draft in order to be able to visit specific geographical areas or ports). This may be the case in particular when the ship will be deployed to fulfil supply chain needs of the charterer's distribution chain. In the process of chartering the ship, the main parties involved are the shipowner, the charterer and the broker. The shipowner has the vessel for hire (in order to carry cargoes by sea), the charterer needs that vessel because either he has or he may find cargoes for transport, and the brokers act on behalf of the shipowner and the charterer, bringing together the two parties in order to have a deal.

The shipowner directly or through his broker enters the market with a ship available (free of cargo) by sending electronically a position list to the charterers. The position list presents the availability of the vessel, the technical characteristics of the vessel and the interest of the shipowner for a specific type of charter (or trade). Depending upon his chartering policy and the existing market conditions, the shipowner may be looking for a short charter or a long charter of his vessel. On the other hand, in general terms, the charterer or shipper may be a cargo owner or a third party who acts on behalf of the cargo owner or a third party who seeks to sub-charter the vessel to another party. To put it in a simplified context, the voyage charterer seeks the appropriate vessel for transporting the cargo from one location to another. Therefore, the charterer directly or through his broker enters the market with a cargo available by sending electronically (e.g., by e-mail) a cargo order to the

shipowners. The cargo order presents the availability of the cargo, the characteristics of the cargo and the interest of the charterer for a specific type of charter (or trade). The physical characteristics of the cargo and the state of the market will determine the type of contract required.

If the cargo order of the charterer is firm and ready to trade, the shipowner may choose to make a firm offer right away. This can be done when the trade is well known and the freight level is more or less established and when the ship's size and position fits in well with the conditions given in the order. A firm offer may also be the most suitable when the shipowner expects keen competition, especially in a declining freight market. The offers and counter-offers from each side will follow, and if there is an agreement between the shipowner and the charterer, the contract of carriage is signed. When a ship is chartered and a freight (or hire) rate is agreed, the ship is said to be *fixed*.

The commercial manager then provides fixture-related services by negotiating and finalising the details of the charter party. In post-fixture services, the commercial manager oversees the execution of the charter in terms of undertaking payments and receiving income relating to the fixture (freight, hire and demurrage), maintaining vessel accounts, checking disbursements accounts, etc. Under commercial management, the service provider may be contracted to charter in tonnage on behalf of the principal. This may be the case when the principal is seeking a containership of particular specifications for a long-term charter over a specific period of time or to meet sudden and temporary increases in volumes to be shipped in a liner network.

1.4.4 Operations Management

Operations management is central to ship management services and involves the implementation of operations for the fulfilment of the agreed fixture. They include liaising with the master of the ship and providing relevant instructions for cargo operations, bunker purchasing management, appointment of port agents and all day-to-day decision-making about the employment of the vessel. The appointment of port agents is important as they provide services for monitoring received income (freight, hire, demurrage, etc.), the checking of invoices such as disbursement accounts in port and facilitating the smooth cargo operations in the said ports, including resolution of disputes.

1.4.5 Ancillary Management Services

Ancillary services may involve the arrangement of insurance against damage/loss for ship's hull and equipment (hull and machinery), as well as insurance for claims made against the ship by third parties (protection and indemnity). In addition, it

may entail the provision of financial management services (e.g., advice on credit risk of prospective charterers), as well as on the management of special projects such as consulting or monitoring a newbuilding vessel or a ship conversion. Ship managers also offer services related to newbuilding supervision or the purchase of second-hand ships, scrapping or lay-up and dry-docking services.

1.5 Outsourcing Ship Management

Mitroussi (2003) highlights four elements that lead a shipowner to use third-party ship managers. These factors are company size, company type (private/family or public), company age and technological change. In its investigation of the impact of these attributes, Mitroussi's (2004a, b) survey of 46 Greek and 20 UK shipowners identified distinct profiles based on company characteristics that have an impact on the choice to outsource ship management. Small and large companies outsource in similar proportions. Companies controlled by at least third-generation owners are more likely to outsource. Crew and technical management are the activities that are outsourced most often, while the choice of flag of registry, maintenance and commercial matters often remain the owner's responsibility. Furthermore, the primary reason for outsourcing is flexibility, followed by access to technical expertise. Panayides' (2001) and Panayides and Cullinane's (2002) surveys of 48 ship management companies and 36 Greek and UK owners showed, for instance, that the primary criterion considered by a shipowner in the selection of a third-party ship manager is technical ability, followed by the experience and qualifications of personnel, while price is not a decisive criterion. Another motive is the need to benchmark the shipowner's own vessel management performance. Cariou and Wolff (2011a, b) state that outsourcing provides companies with opportunities to focus on core competencies, to access best management practices and to increase competitiveness in implementing new technologies developed by third-party service providers.

The reasons for subcontracting to professional ship managers vary and range from professionalism and efficiency in crew recruitment and management, as well as technical expertise, to cost savings, especially in crew recruitment, and better responsiveness to challenging new regulations, especially environmental regulations (Willingale 1998). According to Branch and Robarts (2014), there can be many reasons why a shipowner may decide to outsource the ship's management. More specifically:

- cost savings (overheads reduced by an economy of scale);
- flexibility of investment (allows the freedom and provides opportunities to invest, divest or diversify or any combination of them);
- benchmarking (it is easier to evaluate how well and cost-effectively the ship is operated);

- compliance with international maritime laws (reducing the problems of legislative demands and the resources needed to meet them);
- no in-house expertise to operate the ships (this may be because the shipowner has experience in operating dry cargo ships but not tankers);
- settlement of operational matters (the management company provides the ideal method of ensuring that daily operation and maintenance of the vessel are correctly superintended);
- improvement of quality and reliability of services;
- increase of speed and flexibility of services.

Cost-cutting has been identified as a major shipowner outsourcing motive (see Panayides and Gray 1999; Panayides and Cullinane 2002). Many third-party ship management companies have grown extensively and by operating large fleets are able to take advantage of economies of scale and pass benefits to their clients (Panayides 2001). If a shipowner has very few ships, the cost to be allocated against each ship to cover the in-house management function becomes uneconomical, which is not a problem for large fleets. The ship management literature has shown that third-party ship managers can achieve economies of scale due to the large fleets that they manage and have greater bargaining power, especially with regard to the suppliers of the major products and services consumed by the ship on a daily basis as part of the operating budget. This ideally translates to lower costs for shipowners, especially lower operating expenses (OPEX). In addition, shipowner investors may use third-party ship management if they lack sufficient ship-operating expertise but intend to become a maritime transport provider in the long term. Outsourcing of ship management also enables shipowners to focus on their core commercial competencies, such as chartering or finance, and thus ideally allows for more efficient resource allocation (Panayides and Gray 1997). Mitroussi (2004a, b) has also shown how outsourcing of ship management adds flexibility to ship-owning organisations, which is advantageous in highly volatile shipping markets.

Because of shipping depression, some owners go bankrupt, and the receiver in bankruptcy, or the bank, normally has no knowledge of shipping, in which case the commercial activity may be entrusted to a manager for a period of time. Similarly, several shipyards have become important shipowners, when the buyer under a shipbuilding contract has been unable, or has refused, to take delivery of the vessel under construction. Furthermore, investors in some countries have bought new-builds as well as second-hand tonnage without sufficient knowledge of the shipping business and for a period they may entrust the ship to a manager waiting for second-hand prices to go up so that it could later be sold at a profit.

Interestingly, Cariou and Wolff (2011a) showed that the decision to outsource ship management is strongly moderated by shipowner characteristics. In particular, the results of the econometric analysis show that shipowners' decision to outsource are explained by the characteristics of the vessels such as age, type and size and the characteristics of the shipowners such as country of domicile and number of vessels. In addition, a specific country effect is identified for Greek shipowners.

1.6 Ship Registration and Flagging

The flag determines the legal jurisdiction under which a vessel operates. Ship registration has been an integral concept in the management of ships for more than 60 years, especially following the advent of open registries or so-called flags of convenience during the 1950s. Prior to this, most shipowners chose to register ships under a national flag, typically the flag of the country in which they were domiciled.

As defined by Bergstrand (1983), *an FOC is a flag of a state whose government sees registration not as a procedure necessary in order to impose sovereignty and hence control over its shipping but as a service which can be sold to foreign ship owners wishing to escape the fiscal or other consequences of registration under their own flags*. Flags of convenience provide certain fiscal and employment advantages to the registered ships and to the companies to which these ships belong. A company that registers a ship in a particular country is subject to that country's commercial laws. These laws determine the company's liability to pay tax and may impose regulations in such areas as company organisation, auditing of accounts, employment of staff and limitation of liability that affect the economics of the business.

A flag of convenience offers the following facilities or advantages:

- It gives greater freedom and flexibility to the shipowner to man his vessel, in respect of the quantity, quality and nationality of the crew.
- A very small tax is levied against the vessel ownership and no taxation against the earnings of the vessel. The tax is a subscription tax per net registered ton (tonnage tax).
- The shipping company is given considerable freedom over its corporate activities. There are few regulations regarding the appointment of directors and the administration of business.

Nowadays, open registries and second international ship registries (second registry of a sovereign state operating in parallel with the traditional registry but with a different framework placing fewer burdens and providing benefits to owners similar to those of an open registry) exist to offer services to shipowners wishing to take advantage of beneficial taxation and fiscal and employment regulations for the ships registered under the specific flags. Companies chose to flag out due to a combination of different factors, including taxation advantages (Asteris 1993; Vogel 1993), the reduction of crew costs (Bergantino and Marlow 1998) and a number of other factors such as trade union attitudes towards flag states, inspection procedures by national authorities and manning regulations (Marlow and Mitroussi 2012). In addition, ship registration decisions may be influenced by external conditions such as market uncertainty (Kavussanos and Tsekrekos 2011), whereas shipping companies may flag out vessels of high quality in relation to low-quality ones (Luo et al. 2011). Haider (2013) finds that a shipowner's view on choice of flag might be affected by national characteristics and ship types, whereas the distinction between national registration and open registries has been diminishing.

Cariou and Wolff (2011b) find that the flag of registry and classification society are an integral part of the target factors used by Port State Control (PSC) authorities when deciding on vessels to select for inspection. A shipowner may then have an interest in changing the flag of registry (flag hopping) and classification society (class hopping) to avoid future controls. Using data on PSCs collected over 6 years from 7500 vessels, they found that vessels in relatively bad condition are more likely to be subject to flag and class hopping and that these phenomena are more likely among vessels that have changed flag and class in the past.

1.7 The Regulatory Environment

In view of the growing environmental concerns in international trade, there is an urgent need for shipping firms to cope with environmental pressures in a way that does not jeopardise their business growth, while at the same time it produces economic and environmental benefits in the global shipping chain (see Lai et al. 2002, 2011, 2013; Lun 2011; and Lun et al. 2014, among others). The adoption of so-called 'green' management practices by companies engaged in ship management and ship operation is important for a number of reasons (see Lun et al. 2015), not least for achieving optimal performance (Montabon et al. 2007). In an industry, as potentially risky as international shipping, safety has become of paramount importance, particularly after the highly publicised accidents such as the *Titanic*, the *Herald of Free Enterprise* and the *Exxon Valdez*. One of the key roles of the International Maritime Organization (IMO) is to develop and adopt international legislation for safety and pollution prevention. One of the most important international treaties that deal with maritime safety and adopted by the IMO is the International Convention for the Safety of Life at Sea (SOLAS). IMO has also developed and adopted the international regulations for preventing collision at sea, regulations and global standards for seafarers, as well as international conventions and codes relating to search and rescue, the facilitation of international maritime traffic, load lines, the carriage of dangerous goods and tonnage measurement. In recent years, there has been an increasing awareness in both shippers and shipping firms on the environmental impacts resultant of their cargo movement.

The IMO International Convention for the Prevention of Pollution from Ships (MARPOL) is one of the most important conventions that regulate and prevent marine pollution by ships. It has been modified by the Protocol of 1978 related thereto (MARPOL 73/78), which covers accidental and operational oil pollution, as well as pollution by chemicals, goods in packaged form and sewage, garbage and air pollution. In 2008, the IMO revised its standards on sulphur content of marine fuels (contained in MARPOL Annex VI). These standards were later applied in Europe, whereby under EU regulations, since 2015, any ship sailing in Sulphur Emission Control Areas (SECA) cannot use fuel with more than 0.1% of sulphur. European SECAs currently include the Baltic Sea, the North Sea and the English Channel. Internationally, SECA areas are designated coastal areas off the USA and

Canada and the United States Caribbean Sea area (around Puerto Rico and the United States Virgin Islands). Outside the emission control areas, the current limit for sulphur content of fuel oil is 3.50%, falling to 0.50% m/m (mass/mass) on and after 1 January 2020, which may be deferred to 1 January 2025 in accordance with the 70th meeting of the Marine Environment Protection Committee (MEPC).

Under the new requirements, ships of 5000 gross tonnage and above must collect consumption data for each type of fuel oil they use, as well as other, additional, specified data, including proxies for transport work. These ships account for approximately 85% of CO_2 emissions from international shipping. The data collected will provide a firm basis on which future decisions on additional measures, over and above those already adopted by IMO, can be made. The MEPC also approved a roadmap (2017 through to 2023) for developing a 'Comprehensive IMO strategy on reduction of GHG emissions from ships', which foresees an initial GHG strategy to be adopted in 2018.

Shipowners have a number of compliance methods available, including switching to LNG-fueled ships or cut sulphur emissions by fitting engines with scrubbers or other exhaust gas cleaning technologies. Regulations governing sulphur oxide emissions from ships are included in Annex VI to the International Convention for the Prevention of Pollution from Ships (MARPOL Convention). Annex VI sets progressive stricter regulations in order to control emissions from ships, including sulphur oxides (SO_x) and nitrous oxides (NO_x), which present major risks to both the environment and human health.

1.8 Energy Efficiency

A major part of the world fleet of more than 59,000 merchant ships operates under conditions that hamper energy efficiency and efforts to cut CO_2 emissions. A study by Poulsen and Johnson (2016) shows how good energy consumption monitoring practices conflict with common business practices in shipping companies—e.g., through short-term vessel charters and temporary ship organisations—which in turn can explain the slow adoption of energy-efficiency measures in the industry.

The drive towards cost reduction and environmental protection that permeates the shipping industry has led to studies on the potential of fuel-related savings and argued for the cost-effectiveness of such approaches. For example, Buhaug et al. (2009), Eide et al. (2009, 2011) Faber et al. (2011) and Endresen et al. (2003) discussed various measures to reduce shipping's fuel consumption and argue that a wide range of options for increasing energy efficiency and reducing emissions by changing ship design and ship operation can be pursued in a cost-effective manner. The most commonly adopted operating decisions for saving energy costs and reducing the environmental footprint is of course 'slow-steaming' as service speed is the most common influence for fuel consumption. Slow steaming, which became widespread in international shipping once again after the international crisis of 2008 (Cariou 2011), is a highly effective fuel-saving measure. The

effectiveness of the measure lies in the fact that the power required for propulsion is a function of the speed to the power of three to four (Kristensen 2014). Since ships go slower and increase time on route, they also help to reduce the excess capacity in the fleet, leading to an increase in freight rates (Lloyd's List's, 2008, 2010, 2011). Crist (2012) also summarises estimates of fuel-saving potential in ship operations, which included operations-related decisions and such measures as reductions in port turn-around time, optimised voyage planning, trim optimisation, autopilot optimisation and overall energy awareness in shipping organisations.

For energy-efficient voyage execution, good planning that takes into account voyage-estimating principles and assessment of the sea and weather conditions, as well close communication between ship and shore, is important. Reduction of time spent in port, which also allows for speed reduction, has been identified as an additional effective fuel-saving measure (e.g., Buhaug et al. 2009; Eide et al. 2009). Departure time from port will depend on the efficiency of unloading and loading, the availability of bunkers, and tug and pilot services, and these are often beyond the ship manager's direct control. In addition, there is evidence to suggest that vessel speed reduction can be a potentially cost-effective CO_2 mitigation option for ships. Corbett et al. (2009) finds that a fuel tax of about $150/ton fuel will lead to average speed-related CO_2 reductions of about 20–30%. Moreover, a speed reduction mandate targeted to achieve 20% CO_2 reduction in the container fleet costs between $30 and $200 per ton CO_2.

1.9 Measuring and Assessing Ship Management Performance

The performance of a ship manager will depend on its ability to fulfil contractual obligations (as a minimum standard of performance) but also to achieve goals and objectives dictated by contemporary ship management practice and customer expectations. The latter means that apart from the provisions of ship management contracts, managers must have in place a comprehensive framework to measure and manage ship management performance with key performance indicators to provide a quantitative assessment.

1.9.1 Ship Management Contracts

The outsourcing of ship management services manifested by the functional split of the shipowner's traditional ship operations (crewing, technical management, commercial) has given rise to ship management agreements. The agreements are signed between shipowners as the principals and ship managers as their agents and regulate the relationship between them apportioning responsibilities, rights, obligations and

liabilities. Ship management agreements may be developed by the parties involved in the service transaction, or the parties may use a standardised agreement such as the one developed by the Baltic International Maritime Council (BIMCO) with logical amendments thereto.

BIMCO developed the SHIPMAN contract in 1998 to provide a comprehensive agreement covering a spectrum of service activities while achieving the required fair balance in the apportionment of responsibilities and liabilities. In the case of a management agreement, which focuses only on crewing services, BIMCO developed the CREWMAN agreement (CREWMAN A for crew supply under cost-plus basis and CREWMAN B on a lump-sum basis).

The SHIPMAN 2009 contract incorporates provisions that take into consideration the requirements of the ISM Code and other relevant provisions in line with modern ship management practice. SHIPMAN is a contract for the rendering of ship management services such as crewing, technical management, insurance, freight management, accounting chartering, sale or purchase, provisioning, bunkering and operations and is suitable for managers supplying crew on a limited agency basis. The ship manager offers expertise and know-how in return for a fee. A typical contract can then be amended as needed to fit the unique requirements of the parties to the transaction.

The agreement may entail that the manager will maintain, inspect, crew and equip the vessel; keep books; attend to the claims; make calculations; and otherwise attend to the commercial operation of the ship. The detailed design varies, but principally the manager concludes agreements with respect to the vessel in the name of the owner and for the owner's account. The owner will cover the 'manager' for all his expenses and also pay some compensation, which may be determined in various ways. The idea behind this type of agreement is that the principal shall bear the commercial risk.

Obviously, there must be a basis of confidence between the parties. Under SHIPMAN, the liability of the manager is limited unless he has acted with intent to cause the loss. It would be the responsibility of the ship manager to maintain the operational reliability of the ship and to minimise off-hire periods, maximising the days the ship is available and working, thus generating revenue for the owner. This is the main short-term goal and expectation of shipowners. Another expectation from ship managers is that they will be little deviation from a pre-agreed budget with a tolerance level set between 2 and 5%. In the long term, they expect that the ship will be properly maintained to be preserved as an asset over a prolonged lifetime.

1.9.2 Business Performance Management

Bearing in mind the business context within which ship management companies operate, management must develop the capability to measure performance through a comprehensive performance management system that incorporates key

performance indicators. To do so, a top-down approach is required whereby managers would develop a relevant vision, mission and strategic objectives for the organisation. The vision of a company represents a future aspiration, and it has no measurable goals. A company's mission is more focused and specific and makes references to key strategic objectives of the organisation. It is also important for companies to develop and implement specific policies on the environment, safety, quality, human resources and external stakeholders. The vision, mission, strategic goals and policies could be used as a basis for developing best practices and measurable goals and objectives, including Key Performance Indicators (KPIs).

Whether set at the corporate level, i.e. at the level of a holding or parent company responsible for a number of business units or at the lower business level, the objectives of the organisation must be centred on the mission and vision statements and might entail the following:

- satisfaction, confidence and trust of customers;
- long-term customer relationships;
- stability of income, increased revenue and shareholder satisfaction (profitability);
- confidence of financial institutions towards the company (banks, investors, funds);
- quality and efficiency in ship management and shipping operations;
- health, safety and the environment;
- employee competence and satisfaction;
- technology and innovation.

In implementing the performance management system, it is important to develop a thorough understanding of what must be measured and managed. Performance management aims at performance improvement and metrics, and KPIs are not developed for the sake of having a performance management system but are developed in the context of measuring specific goals of the organisation that drive its strategy. It is also important that departments develop their own goals that are aligned to corporate goals and the mission and vision statements.

1.9.3 Key Performance Indicators

Performance indicators are essential tools, which provide fundamental signs as to whether a shipping business is on the right course for achieving its fundamental strategic objectives or not. KPIs represent those vital navigation instruments that can be used by managers to understand whether their shipping business is on a successful voyage or whether it has deviated from its predetermined course. Management in shipping companies and maritime organisations is well aware that using the right key performance indicators will assist significantly in delivering the right results at strategic and operational levels.

One problem that has been identified in the maritime industry is that many companies may not be able to understand and identify the critical management metrics that are fundamental to performance and instead focus on a vast amount of easy-to-retrieve indicators. In consequence, management may be left with too much data but with too little information and insight.

To tackle this fundamental industry problem, the international association of ship managers (Intermanager) and, latterly, the KPI Association (KPIA) and BIMCO developed a performance framework and data repository so that the industry has a common base for measuring and benchmarking performance. This framework aims to gauge aggregate industry performance across seven Shipping Performance Indices (SPIs) that include Environmental Performance, Health and Safety Performance, Human Resource (HR) Management Performance, Navigational Safety Performance, Operational Performance, Security Performance and Technical Performance.

To calculate KPIs and SPIs, the participating companies collect the raw PI (Performance Indicators) on a quarterly period. Due to the nature of the data, a wide range of sources is used for this, including accounting systems, crewing systems, planned maintenance systems and vessel reporting systems. The specific data collection process varies from company to company, but it is largely within the responsibility of the Health, Safety, Quality and Environment (HSQE) department. Some companies have a company-wide business intelligence or data warehouse in place, where the data of all above-mentioned systems are aggregated in a fully automated manner. Many companies use a semi-manual process to extract the information from the above systems, extend it with further information kept in non-structured data sources and pass it to HSQE for internal quality control. The data, once available with HSQE, can be 'transferred' to the Shipping KPI system through manual data entry or excel upload or an existing Web-API.

KPIs are calculated from PIs through a specified formula. Based on industry experience, for each KPI a target value and a minimum accepted value are set. The Shipping KPI System is built up hierarchical with 7 Shipping Performance Indexes (SPIs), 34 Key Performance Indicators and 66 Performance Indicators (PIs). There is a mathematical relation between SPIs (high-level indexes), which are calculated from Key Performance Indicators, and KPIs, which are calculated from Performance Indicators (lowest level).

At KPI level, a form of normalisation takes place. First, based on industry experience for each KPI, a target value and a minimum accepted value are set. Then using the equation below, KPIs are scaled into a range from 0 to 100, where zero indicates poor performance and 100 indicates outstanding performance. This makes it possible to compare vessels with different characteristics:

$$\mathrm{KPI}_{\mathrm{Rating}} = 100 \times \frac{\mathrm{KPI}_{\mathrm{Value}} - \mathrm{KPI}_{\mathrm{MinReq}}}{\mathrm{KPI}_{\mathrm{Target}} - \mathrm{KPI}_{\mathrm{MinReq}}}$$

Finally, on the highest level, the KPIs are combined into Shipping Performance Indexes so as to express performance within specific areas of operation. The

following sub-paragraphs provide examples of KPIs within three important areas, viz., HR performance, environmental performance and safety performance.

1.9.3.1 Human Resource Performance

HR performance may be measured by such KPIs as 'Crew disciplinary frequency', which measures the frequency of disciplinary action against crew members. The KPI that is used in ship management reflects the fact that the industry takes seriously issues related to crew discipline. Disciplinary action may be taken due to several serious offences by the crew member, such as absconded crew, drug and alcohol abuse, criminal offence, dismissal and logged warnings. This is related to the fact that, following a series of serious accidents attributable to human error and the introduction of the International Safety Management (ISM) Code, which has been mandatory for all merchant ships since 1998, companies have not only adopted and implemented crew-behaviour-related policies, but also the industry at large has made inroads in ingraining a safety and quality culture among crew members. In addition, market or customer demands, such as, the requirement by oil majors from tanker owners to adopt the Tanker Management and Self-Assessment (TMSA), help improve quality and the right behaviour between crew members on board ships.

Other HR-related KPIs include the following:

- One is the 'vessel's ability to relieve crew on time' (related to crew planning), as well as to avoid violations of rest hour regulations.
- 'HR deficiencies' represents the company's HR-related performance measured by a number of deficiencies recorded during external inspections and audits.
- 'Cadets per vessel' expresses the ship operator's efforts to take on cadets. The KPI is measured by the 'average number of cadets per vessel operated by the ship operating company'. Specifically, the KPI shows the ratio between the 'total number of cadets under training with the ship management company' over the 'total number of vessels'.
- The 'officer retention rate' shows the company's ability to retain officers within the organisation.
- The 'average officers experience rate' KPI represents the average experience of the officers currently on board the vessel.
- The KPI 'training days per officer' represents the company's commitment to maintain and enhance the abilities and competence of the officers under its employment. The KPI is the ratio between the ship operator's efforts in training over the total number of officer working days.

1.9.3.2 Environmental Performance

Contained spills of bulk liquid and ballast water management violations represent frequent environmental risks for ship operators and are highly relevant in the development of environmental KPIs. The 'ballast water management' KPI measures the degree to which vessels adhere to applicable rules and regulations. The target value for this KPI should be to achieve zero violations. The 'contained spills' KPI demonstrates the ability of the company to avoid bulk liquid spills, which, however, do not reach the environment. The target value for this KPI is zero spills, and this performance is consistent across all types of vessels.

The KPI 'environmental deficiencies' comes to express the company's environmental performance by measuring environmental-related deficiencies recorded during external inspections and audits. The target value for this KPI is zero deficiencies per inspection. The 'releases of substances KPI' demonstrates the ability of the company to avoid releases of substances as defined by MARPOL 73/78 (Annexes I–VI). The target value for this KPI is zero.

1.9.3.3 Safety Performance

The KPI 'Port state control performance' considers the number of PSC inspections with zero deficiencies as a percentage of the total PSC inspections. Consequently, a value of one indicates a perfect score, and a value of zero indicates that all inspections recorded at least one deficiency. The KPI 'Health and Safety deficiencies' expresses the company's ability to avoid health- and safety-related deficiencies recorded during external inspections and audits. The KPI 'Lost Time Injury Frequency' shows the company's ability to protect the crew against injuries and deaths.

1.9.4 Tanker Management and Self-Assessment (TMSA)

Shipping and ship management companies have been required to operate under a set of pre-specified rules for years in order to achieve guided performance targets. Probably the best example of this is the TMSA or Tanker Management and Self-Assessment standard developed by Oil Companies International Marine Forum (OCIMF), which was also accompanied by other initiatives such as crew matrices and SIRE (ship inspection reports). The TMSA was developed by oil majors via OCIMF to incentivise tanker owners to exceed the mandatory standards of performance set out in SOLAS, STCW and MARPOL Conventions. The programme was first introduced in 2004 as a tool to help vessel operators assess, measure and improve their safety management systems. It is a programme based on self-regulation among tanker operators and has become an industry standard that

complements other codes of industry quality. More than 90% of tanker operators use the programme, which requires operators of tankers to assess their safety management system against listed or implied key performance indicators while specifying best practice guidance on how to attain appropriate standards of performance. The programme has gained widespread acceptability and international credibility particularly among the oil majors and potential charterers who require evidence of TMSA performance as part of the vetting process for chartering a tanker vessel.

The TMSA framework is based on 12 elements of management practice, each one associated with a clear objective and a set of supporting KPIs to help operators assess the level of attainment in their company. The 12 elements are (1) Management, leadership and accountability; (2) Recruitment and management of shore-based personnel; (3) Recruitment and management of vessel personnel; (4) Reliability and maintenance standards; (5) Navigational safety; (6) Cargo, ballast and mooring operations; (7) Management of change; (8) Incident investigation analysis; (9) Safety management; (10) Environmental management; (11) Emergency preparedness and contingency planning; (12) Measurement, analysis and improvement.

1.10 Conclusion

Ship management as defined in this chapter has always been challenging, given the risk exposure, but is arguably more demanding and challenging in the contemporary era, which has seen an acceleration in regulatory compliance coinciding with intense commercial pressures. The external environment, in the form of regulation and market demands, has stretched the criteria for success from a focus on price, operational reliability and relationship (Panayides 2003) to achievement of performance targets across the spectrum of environmental, safety, quality and efficiency goals. Jeon et al. (2016) attempted to determine the success factors for shipping management companies and evaluate differences between shipowners and ship managers. The results show that shipping management companies rank quick response to shipowners as the top criterion, followed by price and the efficient management of ship operational costs. Shipowners perceive the latter to be the top criterion filled by the ability to recruit the required manpower and the potential for high-quality management.

This chapter provided a descriptive analysis of the functions and success determinants of ship management and provided a comprehensive backdrop into the specialised subjects to be further analysed in this book. The issues of cost and operational reliability are always high on the agenda for ship management companies. However, what has become extremely important is the way of trying to achieve such goals with companies increasingly looking towards technology, ship design and energy efficiency to fulfil their cost and efficiency targets. In the past, it was more about flagging out and crew recruitment approaches. In addition, the

regulatory environment continues to provide greater challenges for the companies. Safety, pollution prevention from liquid and gas emissions are areas that pose severe demands on ship managers, owners and operators. The drive for continuous improvement began with quality management approaches and continues with the development and implementation of key performance indicators to gauge and improve performance across a wide spectrum of strategic and operational ship management goals.

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Chapter 2
Organisational Behaviour in Shipping

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2.1 Introduction

The aim of this chapter is to provide a discussion of critical aspects of organisational behaviour with particular reference to those that are significantly important in the shipping industry. All these aspects are fundamental as they determine the existence, operation and success of the companies that are being studied for more than half a century. Specifically, the discussion will first focus on issues of organisational structure, placing emphasis on the top management and governance of the organisations. In today's globalised and turbulent maritime industry environment, overseeing the operations and decision-making of top leaders of shipping companies is critical, especially with the current and prolonged global financial crisis in place.

Following this, there will be an in-depth presentation of the organisational processes and routines. In this context, the discussion will provide definitions found in the literature but also description of the challenges and complexities that company executives have to control when dealing with processes and routines. The basic processes and routines that can be found in a shipping company will also be presented. Moreover, a discussion on how these processes can lead to organisational change will follow, explaining the types and the rationale behind

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I.D. Visvikis, P.M. Panayides (eds.), *Shipping Operations Management*,
WMU Studies in Maritime Affairs 4, DOI 10.1007/978-3-319-62365-8_2

change. The chapter also advocates the need for companies, including those from the shipping sector, to change and transform over time, as a means of ensuring longevity and sustainability.

2.2 Organisational Structure and Board Governance

This section focuses on the structure of the organisation and its board governance. Organisational structure is a complex term, and there are many aspects that can be looked at when analysing it. A structure of an organisation, for example, can be tall or flat, which reflects the size of the organisation and the number of levels in the hierarchy. Another element is the extent of centralisation and formalisation that exist—i.e., in decision-making—which describes the extent to which decisions are delegated to many levels or are mainly taken by the senior management of the organisation. As an overall comment, it can be said that the structure in an organisation can explain the levels in the hierarchy but also the distance and the relationship among these levels. Figure 2.1 outlines the structure that is commonly found in shipping companies since the organisational structure is often standardised. Further to the generic structure presented below, depending on the company needs, there may be legal department, sale and purchase, business development, insurance and claims, etc.

The determinants of an organisation's structure are complex and may depend on the overall purpose of the organisation, its people, the tasks that it operates, the technology available, the organisational culture and the external environment (Hsu et al. 1983). This section will describe the levels of management focusing on governance aspects within the organisation. The focal point of discussion is to make a clear differentiation between management and governance of the organisations. While middle-level and top-level management of a company take operational and strategic decisions to run the company, it is the board that has the role of providing the overall direction to the organisation. More specifically, the top management team of the organisation consists of the CEO and other top executives of the organisation, whereas the board of directors comprises executive and independent non-executive directors with the mission of monitoring the organisational activities and the top management team of the organisation (see Fig. 2.2).

The above can be further discussed under the corporate governance agenda, which has gained increased attention over the last two decades, mainly due to various corporate scandals that have occurred globally (e.g., OW Bunker, Enron, etc.). The idea that largely explains the rationale behind these scandals is described by agency theory. Agency theory was proposed by economists in the late 1960s (e.g., Arrow 1971; Wilson 1968), in an attempt to describe the potential conflict of interest that arises when there is separation of ownership and control in an organisation. It is suggested that the manager (i.e., the agent), who is employed to run the business to serve the interests of the owner (i.e., the principal), may take actions that are for his personal benefit and detrimental to shareholder interests.

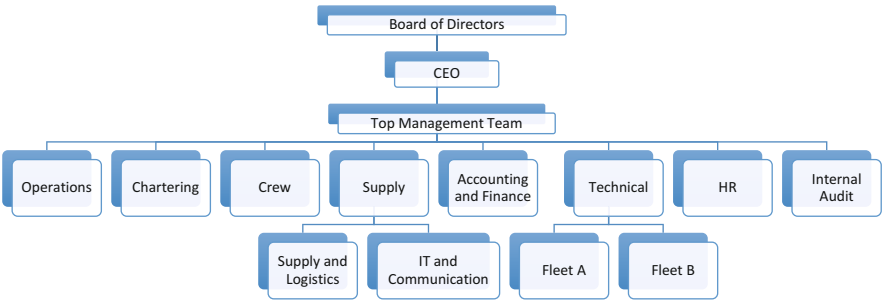

Fig. 2.1 Top management and governance layers of a shipping organisation. **Source**: Authors

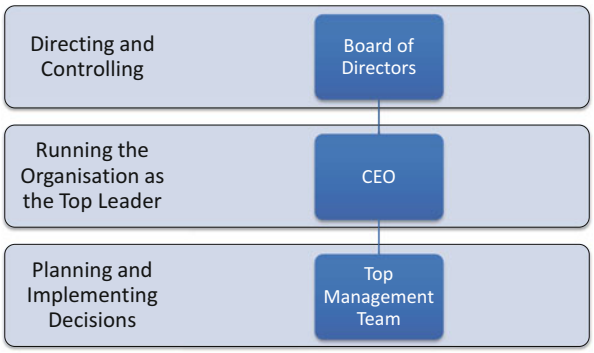

Fig. 2.2 Top management and governance layers and roles of an organisation. **Source**: Authors

In other words, if managers are not well controlled in their decisions, it is possible that their actions will diverge from the interests of owners. Hence, it is argued (Jensen and Meckling 1976; Fama and Jensen 1983) that, to have an effective control mechanism of decisions, the control should be separate from the management of decisions. Thus, considering a decision process that has four broadly agreed steps namely initiation, ratification, implementation and monitoring, it is recommended that these should be allocated to different agents according to their nature. The first and third steps are usually allocated to the agents running the company, and they are *grouped* under the term decision management, while under the term control management, ratification and monitoring are included. The main mechanism that exists to control management is the board of directors.

Thus, it is suggested that agency theory is highly aligned with corporations across industries—including maritime, as by definition there is an existence of agency relationships with ownership and control being delegated in two distinct parties. Furthermore, one of the aims of corporate governance is to manage these relationships that exist in the vast majority of large corporations around the world. As Donaldson (1990, p. 376) argues, corporate governance provides a 'structure

whereby managers at the organisation apex are controlled through the board of directors, its associated structures, executive initiative, and other schemes of monitoring and bonding', thereby narrowing the *scope* and *structure* of the board of directors.

Over the years, there is much discussion among academics, regulators and business professionals about what best practices are to be followed so that the control of the company is more successful. Lists of 'good' practices have been documented in an extensive number of codes and guidelines issued in many countries (e.g., *The UK Corporate Governance Code* 2014). Most of these codes suggest that board characteristics and structure are the main determinants for good governance. Goodstein and Boeker (1991) claim that the composition of a board of directors could motivate management towards the adoption of specific strategies, which reinforces the importance of these practices. These include decisions on board size, board leadership structure, independent members and the establishment of committees.

Firstly, board size is possibly the most debatable attribute of the board as there are valid arguments supporting both sides, i.e. having a small and a large board. A board size can range from very small to very large, consisting of 5 to more than 30 members. On one hand, a small board can be flexible and quicker in decision-making with better ability to control management (Chaganti et al. 1985). Also, increased participation and social cohesion are evident in cases of smaller boards (Muth and Donaldson 1998; O'Reilly et al. 1989), which may also lead to better performance (Koufopoulos et al. 2009). On the other hand, it is anticipated that as the board becomes bigger, expertise and resources available also increase (Pfeffer 1973). Larger boards may also reduce the CEO's power from taking actions against the interests of shareholders because of their spread voices (Singh and Harianto 1989). The fifth annual study of the Hellenic Observatory of Corporate Governance (HOCG 2012) captured the status quo on the Board 's characteristics of Greek-owned maritime shipping companies that are listed in foreign stock exchanges for the period 2001–2012. These maritime companies prefer the size of their boards to be between 6 and 7 members.

Secondly, the leadership structure is another critical element of the board, which mainly affects the monitoring role that the board needs to perform. The strong guideline, in this case, is to separate the CEO and chairperson positions as each of the two are supposed to have different and conflicting tasks to operate. As Sir Adrian Cadbury (2002) suggests, *the difference between the authority of chairmen and that of chief executives is that chairmen carry the authority of the board, while chief executives carry the authority delegated to them by the board. Chairmen exercise their authority in line with the terms of their appointment*. The chairperson should ensure that the board meetings run in a constructive way where the monitoring function is efficiently performed. If it is the CEO holding the chairperson position, all power is concentrated in one person, and it is clearly more difficult for a person to monitor and challenge his own actions. Based on HOCG (2012), a concentrated structure of governance is preferred, where the position of the chairman and the CEO is usually held by the same person.

Thirdly, similarly to the leadership structure, the number of independent board members can affect its ability to challenge decision-making. It is thus suggested that a board should have a high participation of independent directors in the board as it is strongly argued that they can bring different attributes to the boardroom, objectivity in strategic decision-making and monitoring of the executives' decisions (Fama and Jensen 1983). In simple terms, executive members are those who are currently managers/employees of the firm, while independent non-executive members of the board are all those who do not work for the company (Hillman and Dalziel 2003). As *The UK Corporate Governance Code* (2014) explains:

> As part of their role as members of a unitary board, non-executive directors should constructively challenge and help develop proposals on strategy. Non-executive directors should scrutinise the performance of management in meeting agreed goals and objectives and monitor the reporting of performance. They should satisfy themselves on the integrity of financial information and that financial controls and systems of risk management are robust and defensible. They are responsible for determining appropriate levels of remuneration of executive directors and have a prime role in appointing and, where necessary, removing executive directors, and in succession planning.

At this point, it is important to also mention that, apart from the increased ability of the board to perform its monitoring function, the independent directors can bring other benefits. Specifically, Zahra and Pearce (1989) claim that boards with a majority of independent directors can provide viable links with different sectors of the external environment. In similar lines, Dalton et al. (1999) state that independent directors may have more access to external information and resources than executive directors, who are mostly employed with their operational responsibilities. Nevertheless, a right balance should be found—depending on the company's needs—as the presence of executives is essential; the executives are the directors who bring important information and knowledge of the company to the board.

The challenge is who appoints the directors to the board. According to Korn/Ferry annual board of director's study, about two-thirds of directors argue that the main influence on the appointment of directors on a board comes from the CEO or chairperson (Kim and Nofsinger 2004). The study shows that 91% of the Fortune-listed companies have a retired executive serving as a director, 83% an executive from another firm, 56% an academic and 52% a government official.

Moreover, while there is generally pressure from various stakeholder groups for higher presence of women in the workplace, the female representation at the top is still very low. However, literature suggests that higher presence of women in the boards can even relate to improved performance in the company (Erhardt et al. 2003; Cambell and Minguez-Vera 2008), which is mainly justified by the advantages of having diversity in teams. As Pastra et al. (2015) state: 'There is a demanding need for maritime companies to consider the diversity in their board and blend talents, knowledge and experiences from the overall labour market.'

Furthermore, another important factor that contributes to the governance of an organisation is the establishment of board subcommittees. The most important committees commonly found in organisations are the audit, the remuneration and

the nomination committees. The audit committee, agreed to be the most critical one, has the role *to review the scope and outcome of the audit and to try to ensure that the objectivity of the auditors is maintained* (Mallin 2016, p. 186). When there is no separate risk management committee, the audit committee also undertakes the role of managing financial and non-financial risks of the company. The committee needs to act independently from the executives of the company to ensure that shareholders' interests are served.

The remuneration committee deals with a very hot topic that attracts a lot of attention from investors and is often discussed in the press and media, especially during the financial crisis. The whole debate is always about the high remuneration of executives that is not in line with the company performance. The committee should recommend to the board the company's approach on executive remuneration and its specific cost; this is why it is also critical to consist of non-executive independent directors.

Furthermore, the nomination committee has another very important role, that is, to propose nominations for new directors. Again, the committee needs to consist of independent directors and has to ensure that there is the right balance between executive and non-executive members in the board. The committee *should throw its net as wide as possible in the search for suitable candidates to ensure that it identifies the best candidates* (Mallin 2016, p. 189). Part of the responsibility may be to arrange succession planning of important executives like the CEO—when there is no separate succession planning committee—by identifying possible gaps in skills and knowledge that may need to be replaced.

2.3 Organisational Processes and Routines

This section discusses what the organisational processes and routines are and how they can lead to organisations' change and potentially improve performance. While the term 'organisational processes' is commonly used in the business literature, it is a term that contains some extent of ambiguity. A logical description of processes has been given by Garvin (1998), stating that processes are collections of tasks and activities that together transform inputs into outputs. These processes may take place formally or informally, systematically or not systematically, in an abstract/intangible or tangible way. For better understanding, it is helpful to look at the processes from different perspectives. As Garvin (1998) suggests, processes can be divided into work, behavioural and change processes. All may take place simultaneously and may be complementary to each other.

The work processes—which seem to be the most formal, systematic and tangible—can largely be described as operational and administrative; they include all these tasks and actions that contribute to outputs like new product development, order fulfilment and strategic planning. Moreover, the behavioural processes can be

viewed as the processes that involve individual actions and interpersonal interaction that determine the way work is conducted. These processes can be depicted—in a more abstract way than work processes—with the aspects of decision-making, communication and organisational learning. Finally, change processes can be seen as those that, building on the previous two categories, result in movement of the organisation by adapting, developing, growing, declining or even terminating operations.

Furthermore, the literature suggests that routines are important to any organisation as they are related to these processes. The processes were earlier broadly defined as collections of tasks and activities, and these activities or actions are essential to organisational routines. Feldman (2000) defines routines as *temporal structures that are often used as a way of accomplishing organisational work*, which shows the relationship and importance of routines in the organisational processes. More specifically, Feldman and Pentland (2003) define routines as repetitive, recognisable patterns of interdependent actions, carried out by multiple actors. As Pentland et al. (2012) claim, a routine can be recognisable only if the steps within each performance follow each other 'like the notes of a song', and they state that a routine is repetitive when these recognisable patterns are retained from one performance to the next. An explanation for the establishment of the routines is that memory reduces the need for new search, by storing the results of previous successful performances that improve efficiency (Paoli and Prencipe 2003; Walsh and Ungson 1991).

Nevertheless, Miller et al. (2012) have made a useful remark, by saying that an organisation that adapts to environmental changes requires unlearning and relearning routines. In other words, while routines are valuable to the organisation when identifying efficient patterns and start repeating them, it is at the same time critical to have some level of flexibility and adaptability facing the changing environment. From a strategic perspective, organisations can become more sustainable when there is a continuous monitoring of the external environment, in which the organisation needs to adapt. Otherwise, the organisation might lose its competitive advantage over time. Hence, it can be argued that the success of a company depends on the ability to diagnose external requirements. The significance of the adaptability depends on the extent of dynamism and complexity of the environment. The more dynamic and complex an environment is, the higher the need to adapt the change.

Furthermore, some researchers (Baum 1996; Zajac and Kraatz 1993) claim that organisational age can affect the ability to implement *strategic change* either positively or negatively. Usually, older companies tend to resist change as their history creates a *barrier* (Nelson and Winter 1982; Hannan and Freeman 1984). Older organisations are more committed to their routines (Levitt and March 1988) and have more formal internal relationships (Stinchcombe 1965). Additionally, organisational age with a subsequent resistance to change may result in strategic inertia (Ginsberg and Buchholtz 1990).

2.3.1 Organisational Processes and Routines in Shipping Companies

Shipping companies have business processes that include all these routines and rituals that are important for improving the decision-making process and creating well-defined responsibilities for each department. During the last decade, there has been an increasing trend of shipping companies to go public and raise large amounts of funding. The listing in a stock exchange alters the way of being organised and managed as a result of being more exposed to the public. Thus, organisations are required to follow formal procedures and routines in their daily activities. For example, shipping companies that are listed in US equity markets, such as New York Stock Exchange (NYSE) or Nasdaq Stock Market, should comply with the Sarbanes-Oxley Act (SOX) legislation. SOX has been the result of some of the highly published financial scandals of the previous decade (e.g., Enron, Tyco International and World Co) that shocked public confidence. Middle- and senior-level managers used creative accounting to present inaccurate financial statements, and as a response to these incidents, the US enacted the Sarbanes-Oxley Act (SOX) in 2002. The overall aim of the Act is to reduce the level of enterprise risk to financial fraud, set procedures and controls to protect against disclosure of confidential data and cultivate a strong ethical culture. Legislation and regulations like SOX have had a tremendous impact on the governance of the organisations and the way of conducting their daily businesses.

Since 2004, it has been noticed that there is an increase in the number of shipping companies that have gone public and consequently transformed their structure, processes and financial reporting to comply with the requirements of the equity market. Especially in Greece, the largest ship-owning nation in recent years, there is a noteworthy listing of Greek-owned shipping companies in New York Stock Exchange (NYSE), London Stock Exchange, Nasdaq Stock Market and Singapore Stock Exchange. A list of all the Greek shipping companies that have gone public since 2001 is shown in Table 2.1 (HOCG 2016). Taking as an example the effect of the Sarbanes-Oxley Act on these companies, we should mention that there is a prerequisite of the various stakeholders of the organisation to cooperate effectively and implement anti-fraud controls in organisational procedures. To this end, the Top Management Team conducts a holistic assessment in order to identify risks relating to fraudulent financial reporting, misappropriation of assets, theft of cash, etc. When the fraud risks are identified, then the Internal Audit Department will set a control activity for every significant risk. For every department, a protocol/procedure is prepared that encompasses the various controls that will be incorporated in the procedures of the department. Additionally, the Audit Committee, which is comprised entirely of independent auditors, will act as an overseeing entity that monitors the Top Management Team from taking unethical decisions. Furthermore, independent internal auditors will be working in parallel with the company's internal auditors to evaluate the reliability of the anti-fraud programmes and controls of the shipping company.

Table 2.1 Greek listed shipping companies, 2001–2016

No	Company name	Stock exchange market
1	Aegean Maritime Petroleum	NYSE
2	Box Ships	NYSE, OTCQX
3	Capital Product Partners L.P.	Nasdaq
4	Costamare	NYSE
5	Crude Carriers	Nasdaq
6	Danaos	NYSE
7	Diana Containeships	Nasdaq
8	Diana Shipping	Nasdaq
9	Dorian Lpg	NYSE
10	Dryships	Nasdaq
11	Eagle Bulk Shipping	Nasdaq GS
12	Euroseas	Nasdaq
13	Excel Maritime Carriers LTD	NYSE
14	Freeseas Inc.	Nasdaq
15	GasLog	NYSE
16	Genco	Nasdaq, NYSE, OTCB, NYSE
17	Gener8 (from General Maritime)	NYSE
18	General Maritime	NYSE
19	Globus Maritime LTD	LSE, Nasdaq
20	Golden Port Holdings	LSE
21	Hellenic Carriers	LSE
22	Navios Maritime Acquisition	NYSE
23	Navios Maritime Holdings	Nasdaq
24	Navios Maritime Partners L.P.	NYSE
25	Navios Midstream Partners	NYSE
26	NewLead (ex Aries Maritime)	Nasdaq, OTC-Grey Market
27	Ocean Rig	Nasdaq, Norwegian, OTC Market
28	Oceanaut	Nasdaq
29	Oceanfreight Inc.	Nasdaq
30	Omega Navigation Enterprises Inc.	Nasdaq, SGX
31	Paragon	Nasdaq
32	Pyxis Tankers Inc.	Nasdaq
33	Quintana	Nasdaq
34	Safe Bulkers	NYSE
35	Seaenergy Maritime	Nasdaq
36	Starbulk Carriers Corp.	Nasdaq
37	StealthGas	Nasdaq
38	Top Ships	Nasdaq
39	Tsakos Energy Navigation	NYSE, Bermuda, Oslo Stock Exchange

Source: Hellenic Observatory of Corporate Governance (HOCG)

In summary, the main responsibilities of the various key players in the control environment of the company are the following:

- senior management: identification of significant fraud risks and design of internal controls;
- audit committee, along with the board of directors: oversight of management when designing and implementing internal controls;
- internal auditors: monitoring and testing of internal controls;
- independent external auditors: evaluation and testing of internal controls.
- employees: implement the procedures and support the anti-fraud programme of the company.

Although SOX is a prerequisite for listed organisations, there are tremendous benefits for shipping executives to understand its main philosophy, the way of identifying significant risks and implementing routines. For this reason, we will present hereto all the basic business processes that could be identified in a shipping company and the potential procedures that could be established in each department.

Medium and large-sized shipping companies have mainly ten major business processes, which are presented below. In these areas, specific routines and rituals could be applied in the daily activities of the off-shore personnel, which will be recorded in the form of a protocol:

1. **purchasing**: covering supplier selection, contracts with suppliers, order placement, delivery, invoice processing, accounting treatment, purchases of goods performed by sub-managers;
2. **revenue**: covering spot voyage and time charter (including fixture, freight, demurrage and hire invoicing, revenue cut-off, monitoring of collections), profit-sharing brokerage commission.
3. **disbursements**: covering all types of payments, including banks and petty cash;
4. **treasury**: opening and monitoring of bank accounts, loans, interest rate swaps, loan covenants, finance fees, transferring of funds, bank reconciliation, foreign currency, dividends, capital markets;
5. **financial reporting**: preparing financial statements and quarterly and annual reports, monitoring of accounting policies;
6. **crewing**: covering seafarers' hiring and evaluation, payroll of seafarers, monthly operational reporting by sub-managers;
7. **bunkering**: covering supplier selection, order placement, bunkers delivery, invoice processing and accounting treatment;
8. **port expenses**: covering agent appointment, advance payment, agent settlement based on the D/A, accounting treatment;
9. **insurance and claims**: covering insurances (P&I, FD&D, H&M), managing claims, claim collection processing;
10. **dry docking**: supplier and shipyard selection, order placement, goods delivery, invoice processing, accounting treatment, including accruals and amortisation;

Table 2.2 Business processes of a shipping company

Main process	Departments mainly affected
Purchasing	Supply Chain Department, Accounting and Finance Department
Revenue	Accounting and Finance Department, Chartering Department
Disbursements	Accounting and Finance Department
Treasury	Accounting and Finance Department, Management
Financial reporting	Accounting and Finance Department, Management
Crewing	Crew Department
Bunkering	Operations Department
Port expenses	Operations Department (Agents)
Insurance and claims	Insurance Department
Dry docking	Technical Department
Vessels	Management, Accounting and Finance Department
Shore personnel payroll	HR Department
Information systems	IT Department
Officers' expenses	Accounting and Finance Department, Management

Source: Authors

11. **vessels**: covering vessel acquisition, vessel under construction, vessel disposal, vessel sale and lease back, impairment, depreciation;
12. **shore personnel payroll**: hiring, terminating, salary increases, Staff Leaving Indemnities (SLI), employee bonus, stock incentive plan, monthly payroll, including monthly wages and social securities;
13. **information systems**: automated processes and controls to implement the financial, operational and compliance business objectives, safeguarding of company's assets;
14. **officers' expenses**: officers' expense policy, invoice processing.

These major business processes affect the various departments (see Table 2.2). For each process, a protocol should be prepared that will include all the relevant steps that the relevant employees should follow.

Taking at this point as an example the purchasing process, stakeholders of the organisation would expect that purchasing officers and relevant parties act in an ethical way and follow well-established routines. The following case describes a procedure that a shipping company could follow in the scenario that the master of the vessel requests for engine spare parts from the Purchasing Department:

1. The Master sends through email to the Purchasing Department a Requisition Form, which describes the item and the requested quantity (control no 1).
2. The Requisition Form is forwarded by the Purchasing Department to the Technical Department for review by the Technical Superintendent (control no 2).
3. After approval by the Superintendent, the Purchasing Department proceeds to supplier selection based on the criteria of cost, quality and delivery date terms. The reason for the selection of a particular supplier is documented on the appropriate Purchasing Form (control no 3).

4. When the spares arrive on the vessel, a delivery receipt is issued and signed by the Master and Chief Engineer (control no 4).
5. Upon arrival of the invoice at the company, the Operation Manager signs it and forwards it, along with the supporting documentation, to the Accounting Department (control no 5).
6. The Accounting Assistant performs the relevant accounting entry, and the Accounting Officer reviews it.
7. The Financial Controller approves the remittance order, and payment is conducted (control no 6).

It is for the benefit of a shipping company to clearly identify its main business processes, establish procedures for each department and implement rituals that support decision-making and performance tracking. In this cyclical and volatile industry, Greek shipping companies need to provide assurance for governance structures that ensure transparency, accountability and superior performance.

2.4 Organisational Change and Typology

The previous sections provided a discussion of organisational structure, processes and organisational rituals. The following sections will analyse the concept of change and will present frameworks for the successful implementation of a change programme. Changes require unlearning and relearning routines, and the process of change encapsulates many challenges and complexities.

Organisations encounter constant pressures to change, and contemporary firms should be flexible enough to change and adapt quickly to their external environment. Organisational change has been conceptualised as *planned alterations of organisational components to improve the effectiveness of the organisation*, Cawsey et al. (2016, p. 2). This definition perceives change as a step-by-step process in which planned adjustments can contribute to organisational effectiveness. However, in reality, there are cases that a groundbreaking change, in response to a significant turmoil, does not allow for planned adjustments but instead calls for immediate alteration of the procedures and routines. In general, we can categorise changes into first order and second order type changes. First order changes are minor changes that do not alter the strategic direction and structure of the organisation. On the other hand, second order changes, such as mergers and acquisitions or downswing, will transform substantially the organisation.

To conceptualise better the term of change, we present four types of change that have been identified by Tushman (1995): tuning, adapting, redirecting and overhauling (re-creating). Tuning and adaptation are incremental types of change, whereas reorientation and re-creation are categorised as strategic or transformational changes:

- **Tuning** refers to incremental changes in response to anticipation of environmental events. This is a proactive response to the external environment, and

examples include improvement of operational process and training of people to possess specific skills and competencies.
- **Adaptation** pertains to incremental changes in response to pressing external demands and moves made by competitors. This type of change is reactive, and a typical example is the reduction in the price of a product/service in response to a competitor's move.
- **Reorientation** is proactive radical change that involves a major modification in anticipation of future environmental events. Typical examples include acquisitions, mergers and joint ventures.
- **Re-creation** involves a radical change in response to a significant turmoil that requires alteration of all the past processes and routines. Examples include divestment of operations from foreign countries or entering a niche market.

The key distinguishing factor between the four types of change is whether the new organisational strategy requires drastic action or evolutionary adaptation. Transformation change redefines the mission, vision, structure and processes of the organisation, whereas evolutionary adaptation refers to the change in the way of doing things.

2.4.1 Why Change?

There are internal and external forces that act upon an organisation and initiate change. Internal pressures for change may come from the need to grow and expand, integration and collaboration of the different business units, power and political reasons, etc. The internal environment of an organisation consists of tangible assets (financial resources, premises and equipment), intangible assets (operational processes, culture, structure) and human resources (competencies and skills). Alteration, in any organisational component, can possibly lead to organisational change.

Apart from the internal factors, there are also external environmental forces that could lead to a possible change in the organisational strategy, structure or processes of the firm. Hyper-competition, market decline, geopolitical pressures thrust upon organisations and force them to change. Think about the challenges of the maritime industry and the external environmental forces that act upon shipping companies. The whole image of the industry has altered in the last decades due to an increasingly high volume of regulations, laws, conventions and guidelines. Environmentally friendly practices, safety policies and security regulations impose a continuous compliance burden on maritime companies. Besides, instability of growth in demand for imports of commodities, the volatility of bunkers and freights and the supply/demand imbalance of vessels put pressure in the shipping companies for further reduction of their costs. Megaships of an extremely large size have been built in an attempt to capture economies of scale in fuel and crew costs. Small players have lost substantial ground, and even some of them have been forced to exit the sector. The industry constantly strives for increased innovation in the ship

design and operational processes. Furthermore, a substantial number of companies have become listed in the stock exchanges in an attempt to raise funds and pursue growth opportunities. Consequently, these companies changed their corporate governance structure in order to comply with the global standards of corporate governance, anti-fraud policies and disclosure of financial data.

SCANSTEP (Pitt and Koufopoulos 2012) is a useful tool that could be utilised by managers so as to identify the social, cultural, authority (legal), natural environment, security, technological, political, and economic features of the external environment. The following external factors could force shipping companies to initiate change:

- **social**: shifts in global demographics, gender diversity in the workforce, population growth rates, new trade patterns;
- **cultural**: inter-societal tensions on board the ships, religious and family values, migrations, language and dialects;
- **authority**: regulative regime and laws that affect the behaviour of enterprises and citizens, legally enforceable financial reporting, consumer laws, antitrust law;
- **natural environment**: pressures for the reduction of greenhouse gas emissions, pollution from ships by oil, noxious liquid substances, sewage and garbage, limits on the energy consumption, recycling of products and ships;
- **security**: piracy and armed robbery, safety at sea and prevention of accidents, malicious attacks on IT systems;
- **technological**: new communication technologies, data-storing advances, R&D activity, automation, advanced ship design, automatisation of processes;
- **political**: lobbies, bureaucracy, informal networks, governmental corruption;
- **economic**: change in freight and bunkers, tax, currency exchange, inflation, unemployment rates, wages.

2.4.2 How to Change

How to change is about managing the process of change, and in the literature, there are various conceptual models of organisational change. In this part, two process models will be presented. The first one is the three-step model of change management strategies developed by Kurt Lewin in the 1940s. The three-step process is commonly referred to as Unfreeze, Change, Freeze (or Refreeze). This model is a planned approach to organisational change that enables the change agent to dismantle the current status quo and implement new processes.

Stage 1—Unfreeze: the change agent dismantles the current mindset, and employees move out from their comfort zone. The organisation departs from current routines and realises the need to implement new processes. A crucial point at this stage is the proper communication and dissemination of information. Leaders should present to the whole organisation the vision of this initiative and

implement an *open door policy* in which employees feel free to raise their concerns. This stage is about the motivation to change attitudes and the empowerment of people to embrace new routines.

Stage 2—Change/Transition: effective communication and empowerment of employees transfer the organisation to new values, attitudes, operations and processes. This is the implementation phase of the change process. Individuals and processes are 'unfrozen', and the organisation is found in a new mindset. This is the stage in which employees take on new tasks and responsibilities, and as a result resistance to change may arise. Leaders should maintain lines of communication and ask for feedback from their followers.

Stage 3—Refreeze: new routines and processes have been crystallised, and the organisation is in the process of establishing stability. Leaders should set up reward systems for employees and performance measurement systems for the whole organisation. Constant monitoring of the new processes is essential so as to ensure that the new routines have been embedded into the organisational culture. Training of employees to acquire new skills and competencies is considered beneficial.

In the last decades, Lewin's model has come under criticism because it has been considered as applicable to stable conditions and not to chaotic environments, like the one in the maritime industry. Many support the argument that the model is simplistic, does not perceive change as an open-ended process (i.e., Kanter et al. 1992; Stacey 1993) and is not relevant to transformational change (i.e., Dunphy and Stace 1992, 1993). Burnes (2004), in support of Lewin's model, responds to all these critics and concludes that the model has beneficial effects in resolving social conflict through behavioural change in organisations or society at large. The model is definitely still theoretically valid and has been the basis of new change management models developed in more recent years.

Furthermore, a very famous management tool for leading and implementing change is the eight-step emergent model of management guru John Kotter (1996), who departs from a planned approach to a continuous process of change. The basic steps of the model are depicted below:

1. **Increase urgency**: at this stage, the change agent challenges the current mindset and inspire people to change. Potential crises and opportunities are identified, and the change agent should convince managers and employees that the current status quo needs modification. Motivation and cooperation of affected individuals are of paramount importance.
2. **Assemble the team**: leaders need to establish a group of people with the right mix of skills and experiences to disseminate the desired outcomes of this change initiative.
3. **Create a vision**: the team creates the vision and develops strategies for achieving the desired outcome.
4. **Communicate the vision and strategies**: change agents involve as many as possible followers and use every vehicle to inspire employees and communicate the vision.

5. **Empower action**: leaders remove obstacles and enable constructive feedback and support for their followers.
6. **Create short-term wins**: feasible short-term objectives and milestones are set. Employees are rewarded and kept motivated until the implementation of the whole change initiative. Every new accomplishment should be promoted and celebrated.
7. **Consolidate improvements and produce still more change**: leaders monitor progress and encourage continuous implementation of change. They promote and develop employees who can implement the vision of the change initiative.
8. **Institutionalise new approaches**: change is embedded into the culture, values and rituals of the organisation, and leaders show how the new processes lead to organisational success.

The model has been criticised for being a unified whole of subsequent steps in which non-implementation of a stage could render the change process incomplete. The integration of all the eight steps is a time-consuming activity, which puts enormous monitoring pressures on managers. However, Appelbaum et al. (2012) support that the model appears to derive a widespread popularity from its direct and usable format. The model may prove an excellent tool for maritime leaders, giving them the flexibility to adapt it accordingly to the requirements and context of their organisation.

2.4.3 Failure in Transformational Efforts and Resistance to Change

Kotter (2007) presented a number of mistakes that leaders make when implementing a change process. For example, leaders and managers do not create a sense of urgency, they are lacking a vision or they do not incorporate changes in the corporation's culture. Apart from the mistakes of leaders and managers, resistance to change on behalf of the followers is a significant factor of change failure.

Besides, Dunphy and Stace (1988) support that successful change strategies are based both on the scale of change and the type of leadership. The style of leadership ranges from collaborative, consultative, directive to coercive style. Each of the following types of change can be equally effective in leading organisations depending on the situation:

- **Type 1**: Change-Participate Evolution—incremental and minor adjustments achieved by employee involvement;
- **Type 2**: Change-Charismatic Transformation—large-scale discontinuous change achieved by employee involvement and collaborative means;
- **Type 3**: Change-Forced Evolution—incremental adjustment achieved by autocratic control; key interest groups oppose to change;

- **Type 4**: Change-Dictatorial Transformation—large-scale discontinuous change achieved by coercive means despite objection and resistance.

Overall, the model implies that every successful change process is dependant entirely on the strategic analysis of the situation and leadership style. Furthermore, failure in transformation efforts comes from resistance to change from employees who are predisposed to resist change in any new initiative. Self-interest motives such as loss of status or loss of job security are important factors of resistance to change. Besides, psychological reasons force individuals to be always in a *comfort zone* in which the fear of the unknown or the fear of failure discourages them from every transformation in their professional or personal life. Cultural bias and deep-rooted values and attitudes are parameters that do not welcome always a new change initiative. Low empowerment and no clear communication and information could also contribute to potential resistance.

In the large volume of change literature, there is evidence that the possibility of failure of change initiative is close to 70%. Transformational change initiatives that involve downsizing, restructuring, application of new technologies and shifts in organisational culture have shown dramatically low success rates. This quite large percentage of failure draws the attention of scholars who challenge the validity and reliability of the empirical evidence that supports it. First of all, this large figure provokes questions about the measurement of success or failure rates of a change programme. Besides, Hughes (2011) supports that here is a plethora of components that have to be examined before drawing conclusions about the 70% rate, and these include the unique context of different change initiatives, the temporal nature of evaluating change outcomes, competing perceptions of evaluators and measurability.

2.4.4 Successful Change Management in the Shipping Sector

To improve the odds of success, change agents need to implement a well-defined change management programme. Pitt and Koufopoulos (2012) present three essential parameters for effective strategy implementation:

- relevant and timely actions to ensure proactive response to environmental threats and maximise the prospects of mission achievement;
- deployment and exploitation of relevant resources and capabilities to perform the actions;
- capable leadership to set, monitor and accomplish objectives and goals.

One of the successful factors of strategy implementation is the integration of diverse strategic initiatives for each one to be consistent and compatible with others. The 7S framework developed by Peters and Waterman (1982) presents seven interrelated internal factors that influence an organisation's ability to change and identify the likely effects of a change on the whole organisation. These factors

are strategy, structure, staff, systems, style and skill and shared values. Effective and efficient performance of a change initiative requires for a mutual reinforcing of these seven organisational elements.

The leaders of the organisation should demonstrate that these seven factors are in line with the corporate goals and identify the elements that need alignment and improvement to increase performance:

- **strategy**: the plan developed for reaching the objective goals and gaining competitive advantage;
- **structure**: the line of reporting and organisation of the firm (i.e., centralised, decentralised, matrix organisational structure);
- **staff**: the personnel, their skills and needs;
- **systems**: business processes and operations;
- **style**: the ethos and cultural style of the organisation;
- **skills**: the capabilities and competencies of employees to reinforce its new strategy;
- **shared values**: values, beliefs and attitudes that exist in the organisation.

Besides, the major task for leaders in every initiative of change is to ensure that these internal resources are in alignment with the external environment of the organisation. Leaders should be vigilant, identify when change is imperative and pave the way for implementation. Besides, they have to cooperate with the whole organisation and enable their followers to overcome predictable reactions to change. Change agents should possess the essential competencies to motivate managers and employees, cultivate a collaborative environment and demonstrate openness, empathic engagement and honesty.

However, a change process is not a 'one-man show' since there are various important roles that have to be taken into consideration. Specifically, Cawsey et al. (2016) present the following roles that should be taken into account when designing a change programme:

- **Change initiators**: these are proactive leaders who challenge the current status quo and stimulate the system to react. Initiators identify the need for change, align internal with external resources and share the vision statement.
- **Change implementers**: these are individuals who will get involved in the implementation phase of the programme and will cooperate with the key stakeholders to achieve the desired results.
- **Change facilitators**: they are skilled individuals who possess the know-how of the organisational processes and assist the organisation and the relevant teams to work through all the change issues.
- **Change recipients**: these are the receivers of the change programme, and they may embrace it or demonstrate resistance to change.

Glave et al. (2014) proposed specifically for the shipping sector five tactics that could help organisations to change their working practices and gain completive advantage:

1. The first step is the formation of cross-functional teams, which are comprised of a small number of individuals who can combine their multiple skills and experiences to work on predefined goals. The members of the team will communicate frequently and coordinate activities on issues facing carriers. For example, the top management team of an organisation could include a few representatives from the operation, technical and commercial department who will combine their knowledge and improve the quality of decision-making. Cross-functional teams can break down the constraints that hinder organisational effectiveness and overcome the rigidness of hierarchical structures.
2. The second step is about challenging the current processes and replacing them with novel ones. Innovation in the logistic services, automation of business processes (i.e., ocean-freight booking and invoicing business), software installation, improvement in the ship design and high-tech coatings are some of the areas that innovation in the shipping sector could thrive.
3. Another step is the introduction of an effective performance-management system. In the change management literature, a large stream of research is focused on the need for measurement of the overall organisational effectiveness so as to gain a better insight of the success or failure of a large-scale change initiative. Traditional accounting and financial measures do not reflect the overall organisational effectiveness of a change programme. A performance management tool that could be utilised by maritime change agents is the Balanced Scorecard (BSC) of Kaplan and Norton (1992). The BSC allows leaders to convert the organisational strategy into operational objectives and understand how well the organisation is executing its strategy. Apart from the financial metrics (e.g., return on investment, growth, profit), there are three additional perspectives to identify what measures to use to track the implementation of strategy: (a) the customer perspective encompasses measures that try to identify what is important to customers, (b) the business process perspective includes measures about the improvement of the company's internal processes, (c) the learning and growth perspective utilises measures related to value creation and innovation. Each metric is comprised of objectives, measures, targets and initiatives.
4. The fourth important step is the implementation of an employee reward and recognition system based on key performance indicators that combine both financial (salary and performance-related pay) and non-monetary rewards. Non-monetary rewards could take the form of flexible working patterns, training, family events and wellness programmes. Shipping leaders should motivate their employees by designing policies that aim to reward people fairly and consistently. A transparent compensation system has tremendous impact on the results produced by employees and will encourage personnel to embrace more efficiently change initiatives.
5. The final step proposed by the authors is the introduction of a data analytics team, which will monitor the technical, environmental and operations business processes with the use of data management. Data analytics is the process of inspecting and transforming the data to business intelligence reports that provide

the basis for the implementation of new ideas and effective decision-making. Organisations can use this type of data to identify new opportunities, achieve significant cost reductions and improve their services. For the shipping sector, a data analytics team could focus on ship design, speed optimisation, port bottlenecks, market trends and forecasts.

2.5 Conclusion

This chapter presented what organisational processes and routines are and the way that companies can change to improve their performance and gain competitive advantage. In addition, a coherent analysis of organisational structures and board governance issues was made. The dynamic and volatile environment of the maritime industry comprises a challenging work setting in which employees and maritime leaders should always be prepared to embrace organisational change. An increasingly high volume of regulations, the instability of growth in demand for commodities, the volatility of bunkers and freights, the supply/demand imbalance of vessels and new governance structures are only some of the factors that require from maritime companies to be flexible enough to adapt to the external environment. Change agents in the maritime companies should manage every initiative of change carefully and examine various conceptual models for successful change implementation. To improve the odds of success, change agents need to implement a well-defined change management programme and focus on the parameters for effective strategy implementation that have been presented in this chapter.

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Chapter 3
Commercial Operations Management

Nicolas Assimenos

3.1 Introduction

Shipowners invest in high-value assets, mainly for purposes of hiring the ships or space on the ships as their main source of earning and profit. For this reason, shipping companies develop and maintain effective commercial and chartering operations. The aim of this chapter is to provide a general overview of the charter markets, chartering practice and post-fixture operations. Content includes the procedures and practices in voyage estimating, chartering of merchant ships under various forms of chartering and the calculation of financial (freight, deadfreight and hire) performance. Post-fixture operations consist of instructions to the vessels, coordination and follow-up between the master, shipowner and agents in respect of loading, discharging and bunkering operations. Finally, the chapter provides an explanation of basic principles in the calculation of laytime and demurrage.

3.2 Commercial Operations

According to the Baltic and International Maritime Council (BIMCO), the 'chartering' of a ship, in its simplest terms, is a rental agreement in which a charterer agrees to hire a ship from its owner. Typically, it is the charterer (or shipper) who will be the owner of the cargo, which he needs to move to some other part of the world, and unless he has ships of his own, he will depend on others to move the cargo for him. The hire money for this transaction is known as 'freight', and it is the earning of the shipowner for the use of his vessel. Chartering a vessel

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I.D. Visvikis, P.M. Panayides (eds.), *Shipping Operations Management*,
WMU Studies in Maritime Affairs 4, DOI 10.1007/978-3-319-62365-8_3

refers to the hiring, rental or lease of a vessel for a period of time and/or a particular voyage. In general terms, the party making his vessel available for hire is the shipowner, while the party hiring the vessel is the charterer.

There are various types of shipping charters. The simplest method of chartering a vessel is a voyage charter, where a charterer hires a vessel to carry his cargo from one port to another. Loading and discharging occasionally may take place at more than one port. Another similar method of charter, which is, however, convenient for fixed large quantities of cargo of a specified type to move over a given period of time and involves many voyages, is called contract of affreightment (COA). Given the long-term nature of the contract, a COA is almost always tailor-made to meet the specific needs of the parties concerned. These parties are the shipper or owner of the cargo (the charterer), who is often motivated by requiring certainty for the costs of transportation, and the shipowner, who is assured of long-term employment and flexibility for his owned or chartered-in tonnage. As a result, COAs contain very few standardised terms, other than the individual voyage charter terms that govern each lifting once the vessel has been tendered for loading (Steamship Mutual).

If a charterer needs even more flexibility than that provided by a COA, the charterer can hire the vessel for a stated period of time. Hence, a time charter undertakes control of all the commercial activities of the vessel, i.e. appointment and payment of agents, payment of canal toll in case of transiting the canals, purchasing the bunkers, etc., whereas the shipowner is responsible for the management of the vessel, i.e. maintenance and repairs, provisions, crewing, insurance, etc. On bareboat charter or demise charter, which is less frequently used in ordinary commercial practice, the owner of the ship delivers it to the charterer for an agreed period without crew, stores, insurance or any other provision, and the charterer is responsible for running the ship as if it was his own for the period of the contract (Curley 2012).

3.3 The Charter Market

The charter market is a central aspect in the operational part of the shipping industry. The charter market is the place in which vessels and cargoes converge, often through the efforts of a shipbroker, who serves as a conciliator between the shipowner and the charterer. The shipowner places his vessel in the market (or offers it ‘for hire’), free of cargo, and indicates its characteristics, i.e. cargo capacity, dimensions, speed and consumption, cargo-handling gear, etc. The vessel’s availability for its next voyage will likely be dependent on when it completes its existing chartering arrangement (fixture), which will determine the time and date at which it will become available for its next charter. For his part, the charterer, who has a particular volume of cargo to transport from one location to another, will enter his cargo in the market in order to have it transported. The amount, physical characteristics and time constraints of the cargo will determine the type of shipping contract that is required. The broker serves as the intermediary in bringing the

vessel and the cargo together (with time and location being key conditions for sealing a deal), and if the shipowner and charterer agree on the terms and conditions, the vessel is 'fixed', and a charter party is drawn up.

The freight market is comprised of shipowners, charterers and brokers, and they use four types of contractual arrangements: the voyage charter, the time charter, the COA and the bareboat charter (Stopford 1997). However, the shipowner is responsible for reading the market well enough so as to be able to choose the type of contractual agreement that he will engage in, according to demand and supply elements of the shipping market, i.e. the shipowner contracts to carry cargo for an agreed price per tonne or hires out ships for a certain period. In simple words, negotiations between shipowners and charterers/cargo owners will determine the freight rates, reflecting the balance between vessels and cargoes available in the market. If there is an oversupply of vessels, freight rates are most often low, while freight rates are high when there is a shortage of vessels in the market.

3.4 The Role of the Charter Party

Once the owner of a particular vessel and the charterer of a particular cargo have been brought together, the specific terms and conditions of the commercial transaction they intend to undertake will be incorporated into a charter party (Practical Chartering 2016). A charter party is a documented contractual agreement defining the terms of conditions between the shipowner and charterer, by which a vessel is let or hired for the transportation of goods on a specified voyage or for a defined period. Hire is the consideration paid under time and demise charter parties, whereas freight is the consideration paid under voyage charter parties and bills of lading. The essentials for the conclusion of a binding contract depend on three basic elements:

1. an agreement on terms (consisting of an **offer** made by Party A and the **acceptance** of that offer by Party B)—an offer is an indication by one person that he is willing to contract on specified terms, made with the intention that the offer will become contractually binding if it is accepted by the person to whom it is addressed;
2. the existence of **consideration** (the payment of a price by Party B for the promise made by Party A);
3. an intention by Party A and Party B to enter into binding contractual relations (**legality**)—in commercial or business situations, if both parties consider that the negotiations have been successfully concluded, they are likely to consider themselves legally committed.

3.5 Charter Party Fixtures

Charter party fixtures are generally formed in two stages. First, the most important 'main terms' are negotiated either directly or through a broker. These terms usually include the name of the charterer, the name of the shipowner, the vessel and its characteristics, the time and place of delivery, the duration of the charter, the place of redelivery, the hire rate, commissions, the printed form upon which the contract is based and any other terms that a party deems important. These are considered the essential elements of the contract, and once they have been agreed upon, these essential elements are entitled a 'fixture' (Practical Chartering 2016).

Chartering negotiations are normally initiated when a charterer enters the market to find a suitable vessel to move his cargo or when a shipowner enters the market to find employment (i.e., a suitable cargo) for his vessel. However, before doing so, the charterer must decide whether he is ready to immediately engage in firm negotiations (provided he finds a suitable counterpart) or whether his main objective at this stage is to collect information regarding potential shipping opportunities, with a view to beginning negotiations at a later stage, after he has analysed and evaluated all information he has gathered.

In principle, any order that is circulated on the market by a reputable charterer and/or broker will normally be regarded as 'Firm' if the order does not contain any indication to the contrary. Nevertheless, the charterer may decide to make his intentions even clearer by using terminologies such as 'Firm offers invited' or 'Please offer firm'. In cases where the business has been concluded (i.e., the cargo has been purchased) but the charterer does not want to enter into firm negotiations immediately, he may use terminologies such as 'Indications only' or 'Please indicate'.

On the other hand, if negotiations for purchasing the cargo have not yet been concluded but the charterer yet requires a freight quotation or estimate, the order may open with wordings such as 'Order expected to become definite' or 'Order not yet definite' or similar. If the charterers have not concluded any specific business and only wish to make a general investigation of shipping possibilities, this may be indicated through the use of terminologies such as 'Charterers have a possibility to work up the following business'.

At this stage of the process, the contents of the charterer's order will be limited to the minimum amount of information that the shipowner needs to determine whether he has a potential interest in the business. In the case of a voyage charter, such information will include the charterer's name and domicile, cargo quantity and description, loading and discharging ports, period within which the vessel is to be presented for loading (lay/can), any restrictions or preferences regarding the type or size of the vessel, charter party form on which the charterer wishes to base the terms and conditions, commissions to be paid by the owner. In addition to these items, the charterer may also mention the approximate freight level at which he wishes to begin discussion or negotiation (Practical Chartering 2016).

An order concerning a time charter arrangement is presented on the market in largely the same way as for voyage chartering, except that rather than providing details on cargo, ports and loading/discharging rates and terms, the charterer provides details about the intended trade, the duration of the required time charter period and places for delivery and redelivery of the vessel.

Alternatively, the owner can provide the charterer with a 'freight idea' indicating a freight rate that the owner would use as the basis for further negotiations, with the understanding that the proposed rate could be adjusted either upwards or downwards when the owner is ready to make an eventual offer.

A proposal, a freight idea or an indication all form part of the negotiation stage and provide a basis for the charterer's calculations and evaluations of chartering possibilities. The charterer may go on discussing proposals, ideas and indications with a number of owners until he finds a suitable counterpart for negotiations. The charterer will then revert to the preferred shipowner asking for a firm offer on the basis of the conditions given in the order or in accordance with previous discussions. Since the parties begin by negotiating the main terms and save the details for a later stage, it is important that every offer or counter-offer submitted during the main stage is accompanied by the words 'Subject to details', meaning subject to charter party details to be negotiated at the second stage of the fixture.

3.5.1 Firm Offer

In voyage chartering, the first offer that starts the firm negotiations will contain the following details:

- firm for reply by . . .;
- for account of . . . (charterer's name and domicile);
- name of vessel (enclose vessel's full description);
- cargo quantity and description;
- loading/discharging ports and berths;
- laydays/cancelling day;
- loading and discharging rates and terms or days permitted;
- demurrage/despatch rates;
- freight rate and conditions for payment of freight;
- commissions (brokerage and address);
- owners/charterers to appoint/nominate agents at both ends (delete as applicable);
- clauses covering time counting, ice clause, war risk clause, applicable law and place of arbitration, bunker clause, clauses covering extra insurance premiums, taxes and dues, etc. that the owner considers to be of prime importance;
- charter party form;
- subject to further terms and conditions and any other subjects required.

If the charter is for a tanker voyage, loading and discharging rates will not be provided separately but as a number of total days for loading and discharge (laytime

allowance all purposes), and the freight rate will be provided by reference to Worldscale.

In time chartering, the offer will contain the following details:

– firm for reply by . . .;
– for account of . . . (charterer's name and domicile);
– name of vessel (enclose vessel's full time charter description);
– place of delivery and redelivery;
– laydays/cancelling for the delivery;
– duration of time charter or description of trip;
– intended trade with geographical limits and other trading limits;
– cargo exclusions/permitted cargoes from the owner's side;
– quantity and price for bunkers on board on delivery and redelivery;
– hire and conditions for hire payment;
– commissions (brokerage and address);
– charter party form;
– subject to further terms and conditions and any other subjects required.

When the main terms of the charter are being negotiated, the required vessel details are quite extensive and comprise not only the vessel's name, year of construction and flag but also its deadweight, grain and bale capacities of cargo spaces, number of hatches and holds, cargo gear, speed, bunker consumption and other details of importance for the intended cargo and trade. Since it is not always possible to give these particulars with exact precision, the description of the ship is customarily followed by the words 'All details about', which means 'All details given without guarantee but given in good faith and believed to be correct'.

3.5.2 Chartering Process: Offering and Countering

Firm negotiations officially commence when the shipowner or a charterer relays a message to the other party offering firm terms for response by the other party within a set time limit. If there is a response, i.e. a 'counter-offer', it means that negotiations have been initiated; this process may involve a series of offers and counter-offers between the two parties. Normally, when a firm offer has been communicated to the other party, all subsequent counter-offers will be one of the following:

- We decline Owner's/Charterer's offer and re-offer as follows. . .—this means that the first offer is rejected in its entirely and the counter party will make a full new firm offer for the other party's consideration.
- We decline Owner's/Charterer's offer without counter. . .—this means that the first offer is completely rejected. In this case, negotiations will be terminated.
- We accept Owner's/Charterer's last offer, except. . .—this means that some terms of the owners' offer are acceptable but other terms are subject to further negotiations.

- We repeat our last—this is a restatement of all last terms provided.

Negotiating parties can also make provisions or 'Subjects' in their offers and counter-offers. Subjects can include various conditions such as the following:

- Subject charter party details—even though the main terms have been agreed upon; fixture has not yet fully completed as charter party details are still pending and will be further negotiated until such time as both parties are in agreement on all details that will eventually form the charter party.
- Subject stem—this is subject to confirmation from the shippers or suppliers of the cargo that the negotiated quantities will be ready for loading on the agreed laydays.
- Subject to Board approval—this subject is used when the Board of Directors (BoD) of either shipowners or charterers has to approve the final, but should be viewed with caution, as such approval can be refused without a specific reason being given.

The negotiations will continue in this way until the parties have reached an agreement on the main terms, which most times is 'subject to charter party details'. Once the main terms' negotiations are completed and an agreement is reached, usually the chartering broker will draw up and distribute to shipowners and charterers a Recapitulation of the main terms (Recap).

After the main terms fixture has been reached, the parties continue to negotiate 'charter party details', amending the standard contract specified in the fixture. Charter party detail discussions will be continued until contractual parties are in full agreement.

3.6 Charter Party Forms

Charter parties are most commonly made out on standard forms that have been inspected and approved (and in some cases drafted) by authoritative bodies such as BIMCO, the Federation of National Associations of Ship Brokers and Agents (FONASBA), etc. These can be tailored for a particular trade, or they can be of a more general nature. Some are for time chartering or bareboat purposes only, while others are limited to either dry cargo or tanker trade requirements. The advantages of using standard form charter parties are that they are in common usage, they are convenient and widely available, their wording has often been legally tested in court (and thus lays the groundwork for consistent interpretation for the resolution of disputes) and they are theoretically fair to both parties. Thus, by using one of the standard contracts that has been proven in practice, both the charterer and the shipowner know that the contractual terms will cover most of the eventualities that are likely to arise in that particular trade.

The wording of most charter parties is used only as a basis for negotiation, and, where necessary, the printed text is altered, deleted or added to, to reflect the

specific agreement reached. The amended 'main' form will be supplemented by various additional clauses, also known as 'riders' or 'side clauses', that are tailored to the particular business (ICS 2011/2012). A charter party must be accurate with respect to its material contents, and it should precisely reflect what the parties have agreed.

For practical purposes, it is common in chartering business to base negotiations upon a previous fixture, altering main terms and additional clauses as required. This system saves both time and resources and also provides evidence to both shipowners and charterers that certain charter party clauses have been previously agreed in similar fixtures.

3.7 Bills of Lading

A bill of lading has the following functions:

1. It is a receipt for the goods, signed by the master or agent on behalf of the carrier, with admission as to the condition and quantity of the goods.
2. It is a document of title to the goods, by which the property in the goods may be transferred.
3. It is prima facie evidence of the terms and conditions of carriage.
4. The charter party is the contract between the charterer and the owner. However, the lawful holder of a bill of lading has vested in him all rights and liabilities under the contract of carriage as if such holder had been a party to the contract of carriage.

Usually, the bill of lading contains a suitable clause to incorporate the terms of the charter party pursuant to which it is issued. Should that bill of lading purport to involve the shipowner in a liability greater than that agreed upon in the charter party, it is considered that the charterer indemnifies the shipowner to the extent of this greater liability towards the cargo. If charterers are also the bill of lading holder, then it is the charter party and not the bill of lading that is the contract of carriage (the Baltic Code 2012).

3.8 Voyage Estimating

Voyage estimating is the means to determine the return of a perspective voyage on a voyage charter, after deducting from freight revenue the running costs, any other expenses to be occurred during the voyage and applicable commissions. It provides the shipowner the break-even cost beyond which he negotiates a freight rate for the cargo on the specific voyage. The break-even freight rate can be converted to 'Time Charter Equivalent' so that the shipowner can compare between fixing the vessel on a voyage charter or a time charter. The estimate gives the charterer the estimation of

costs and likely break-even points of various vessels that are being offered by the shipowners so that a charterer can start his negotiations from a lower level and find the most cost-efficient vessel to transport his cargo.

Nowadays, there are many user-friendly and sophisticated voyage-estimating programmes, allowing shipowners and charterers to rapidly model different usage scenarios, matching vessels and cargoes and helping them make the right decisions in utilising their assets. Nonetheless, it is very important that those who would really like to learn how to conduct voyage estimating can start by computing hand-produced calculations.

A voyage estimate consists broadly of revenue minus the expenses, like any profit and loss account. The crucial point is to acquire and use a method to obtain the estimate. This process takes into account the following stages:

1. Duration of the intended voyage, including loading and discharging ports, and the position where the vessel completed its last voyage, if different from the next loading port (any ballast voyage shall be included in the calculation)—passages through canals and other waterways that either prolong the duration of the voyage and/or lead to extra costs also have to be included in the calculation. Time allowance should be made for adverse weather conditions, streams and currents, passages requiring speed reductions, etc.
2. Quantity of cargo that can be loaded—in order to be able to correctly determine the maximum amount of cargo that the vessel can load on full deadweight, the shipowner has to take into consideration the volume or weight measurement of the cargo, which figure must obviously be equal to or less than the actual available space on board and also make sure that its weight does not exceed vessel's deadweight, including bunkers, stores, fresh and ballast water. It is essential to know where, when and how much the vessel will bunker for the intended voyage, given that the ship cannot be loaded deeper than the relevant loadline. Moreover, it is important to know the season of the year and the level of salinity at all ports of call in the intended voyage in order to be able to correctly determine the maximum amount of cargo that the ship can load on full deadweight. Another limitation on the amount of cargo that can be loaded is the maximum draught to which the vessel will be able to transit the canals and enter the ports included in the voyage plan.
3. Tabulating all expenses—the main expenses consist of port disbursements, canal transiting tolls, bunker cost, shipowner's imposed safety margins and extra bunkers for adverse weather conditions. Other cost items that may have to be included in the voyage estimate include extra war risk insurance premiums, ice trading, etc., which normally are not included in the ship's regular insurance cover. Political and labour union regulations in certain ports may cause considerable extra costs for shipowners, as may other items such as cleaning costs and other materials for cargo lashing and securing purposes.
4. Assessing the income against expenditure—Knowing the vessel's cargo quantity, estimated freight rate and total commissions, it is easy to calculate net freight. By deducting total voyage expenses and taking into account the total

number of days from commencement until the completion of the voyage, you can obtain the gross daily rate. From this figure, the vessel's daily running costs are deducted and the net daily rate is computed, which shows whether the voyage is profitable when compared with the vessel's fixed cost elements and whether the voyage gives better revenue than alternative employments available at the same time.

3.9 Freight and Hire

3.9.1 Freight

Freight is the consideration (payment of price) paid to the shipowner or shipping line for the carriage of goods to and their delivery at their destination, and it is applicable to voyage chartering. Freight can be fixed in several different ways. For example, it can be based on the quantity of cargo carried (as in $x per metric ton), or it can be based on a certain amount that is independent of the cargo quantity, in which case it is called 'lump sum freight'.

3.9.1.1 When Is the Freight Earned and Payable?

As a general principle, and unless otherwise specified in the contract of carriage, freight is earned when the shipowner has fulfilled his obligation to carry the cargo and it is ready to be delivered to the receiver. This means that if the shipowner cannot deliver the cargo, he is not entitled to freight. Therefore, should the vessel sink and the cargo be totally lost, the shipowner would not be entitled to freight even if the vessel had almost reached its destination. Similarly, if only part of the cargo is delivered at the port of destination, the shipowner would only be entitled to proportionate freight for the cargo actually delivered, and should the cargo reach the port or place of destination in a damaged condition, the owner would be entitled to freight only if the cargo is in a 'merchantable condition'.

3.9.1.2 Deadfreight

Deadfreight arises when the charterer, with lawful excuse, fails to supply the agreed quantity of cargo to the vessel, in which case the owners will normally be entitled to compensation for their loss of freight. This is calculated by deducting what is saved in costs from the freight that should be paid for that part of the cargo that has not been supplied. In order to secure payment for the deadfreight claim, the shipowner must obtain a declaration from the charterer that no further cargo will be loaded to the vessel.

3.9.1.3 Worldscale

Most of oil industry freight rates are expressed by means of the Worldscale rate schedule.[1] The Worldscale organisations issue an annually revised Scale of Rates and Differentials on the 1st of January each year, covering almost every possible tanker voyage. The figures published are based on a standard-sized vessel described in the Schedule, and market levels of freight are expressed in terms of a percentage of the nominal printed freight rate. Thus, Worldscale 100 means the rate for the voyage in question as calculated and issued by the Associations, while Worldscale 175 means 175% of that rate, and Worldscale 75 means 75% of that rate. Worldscale rates are modelled on a notional tanker of 75,000 metric tons with an average service speed of 14.5 knots on 55 metric tons of bunker consumption for steaming and a fixed port time of 4 days, and aim to produce a universally comparable return for each round trip, with bunker prices based on the monthly average from the previous period of 1 October to 30 September. Port costs, canal transits and other direct costs are taken into account and continually monitored for each new publication, and amendments to flat rates can be made during the year, if considered by the Associations to have considerable effect. Worldscale also encompasses demurrage and various other costs. Ships of different size ranges have differing demurrage rates. These are increased or decreased in line with the negotiated Worldscale freight rate, but today owners and charterers tend to trade on a daily lump sum dollar demurrage rate. Demurrage commences on the expiry of 72 h SHINC total laytime, which is allowed for loading and discharging purposes, but despatch money is not paid in the tanker industry.

3.9.2 Hire

Hire is the income that the shipowner receives for leasing a manned and equipped vessel to a time charterer, and it is usually paid 15 or 30 days in advance. The basic rule is that hire shall be paid from the moment that the ship is delivered to the charterer until it is again redelivered to the shipowner at the termination of the charter period. Hire can be expressed in various ways, for instance $X per 15/30 days, $X per day, etc. The choice depends mainly on the type of vessel and the trade. Under some circumstances—mainly defined in the off-hire (suspension of hire) clauses—the time charterer can be relieved from his obligation to pay hire to the owner. The charterer may make other deductions from the hire, all of which must be specified in the charter party, such as commissions due to the charterer or sums advanced by the charterer to cover the shipowner's expenses at various ports of call.

[1] Worldscale: New Worldwide Tanker Nominal Freight Scale.

3.10 Laytime

Laytime can be defined as the in advance agreed time period between owners and charterers that a vessel under a voyage charter has to load and discharge cargo at a port(s), without additional payment to the freight. However, many of the problems and disputes that arise out of voyage charter agreements are connected with the calculation of laytime, the majority of which could probably have been avoided if the laytime clauses had been worded with more precision. If this agreed time is exceeded, then charterers must pay compensation (called 'demurrage') at a rate also agreed beforehand to the owners for their loss of time. Sometimes it is also agreed that the owners will compensate the charterers if the ship is loaded and/or discharged before the agreed time expires, in which case the compensation paid is called 'despatch'.

3.10.1 Commencement of Laytime

Once the laytime and demurrage clause is triggered, the mere passage of time earns money for the owner. Thus, it is in the interest of the owners that the clause is triggered as early as possible and in the interest of the charterer that the clause is triggered as late as possible. Three conditions must be satisfied before the charterer can be required to start loading and discharging: (1) the vessel must have arrived at the agreed destination, (2) the vessel must be ready to load/discharge its cargo, and (3) the vessel must tender a valid Notice of Readiness (NOR).

The law distinguishes between port and berth charters; in case a berth charter has been agreed upon, it is clear that the vessel is arrived when it is at the berth. Thus, if there is congestion at the port, the owner bears the cost of the delay. On the other hand, when a port charter has been agreed upon, laytime clause is triggered as soon as the vessel has arrived at the port, and the charterer is responsible to pay for the time lost due to unavailability of a free berth.

The best way for the owners to protect themselves is to insert a special 'waiting for berth' clause or to have the words 'whether in berth/port or not' (wibpono) inserted into the laytime clause to make it clear that the time can count when the vessel is in the customary or indicated waiting place. Such clauses also allow time to count when the ship is not an arrived ship with relation to the destination as described in the charter party.

3.10.2 Notice of Readiness

The master usually gives notice of readiness when the vessel has arrived, and the charterers are quite often entitled to notice time (free time, grace time) before

laytime starts to run. The original intent of notice time was to provide the charterers (or the shipper or receiver) with a certain amount of time to arrange for loading or discharging after they had been made aware of the vessel's arrival and readiness.

It is clear that for the NOR to be valid, when the vessel is at the specific destination, it must be in all respects ready to load or discharge its cargo. The vessel shall also be legally ready, for instance it must have all its documents in order. The usual clearances that the vessel must receive are from Customs, Immigration and Health Authorities, i.e. 'free pratique' to be granted.

If the charter party states that the notice must be given within office hours, a notice given after office hours will not be valid and will not come into force until the next period of office hours as office hours are generally understood to mean ordinary office hours in the relevant port.

Once the notice time has started to run, it runs, unless otherwise expressly agreed upon, notwithstanding any exceptions in the laytime clause. The notice time can thus normally be counted during a Sunday or a holiday even though these days are excluded from laytime under 'the laytime clause'. In many cases, the relevant clause will take this problem into consideration. When loading or discharging commences before the notice time expires, the owners are, according to English law, not entitled to count time unless this is agreed upon in the charter party.

3.10.3 Time Allowed

The time allowed for loading and discharging is usually fixed in the charter party, either by a number of days or hours or by a rate per day. Another method is to state a daily rate or a rate per day and hatch, e.g. 'loading at a rate of 500 metric tons per day' or 'loading at rate of 125 metric tons per day and hatch'. In the tanker trades, laytime is often counted until the disconnection of hoses, or until the delivery of the necessary documents.

Unless otherwise agreed, the calculations for demurrage/despatch are drawn up separately for loading and discharging. If more than one loading port or discharging port is involved, one single calculation is made for the loading ports combined, and another calculation is made for the discharging ports combined. If the parties do decide to combine the calculations, a charter party clause using wordings such as 'Time allowed for loading and discharging, eight days altogether' or 'time allowed, eight days all purposes' can be used. Sometimes the words 'reversible' or 'average' are used, as in 'Three days for loading and five for discharging, loading and discharging times to be reversible' or 'three days for loading, five for discharging. Charterers have the right to average loading and discharging times'. In the first case (reversible time), the times are added to a total time for loading and discharging. If all the time is used for loading, the vessel is on demurrage on arrival at the discharging port, and the time will then count immediately (in such cases, a Notice of Readiness, although not necessary, should be delivered in order to avoid disputes). In the second example (average), the loading and discharging calculations

are drawn up separately. Thereafter, the demurrage and despatch times are added or set off (averaged) against each other, and finally the demurrage or despatch amount is calculated on the result.

3.10.4 Time Counting and Disruptions

Laytime will actually begin counting when all its prerequisites needed to start running have been met. The principal rule is that once laytime has started to run, it runs 7 days per week, 24 h per day, notwithstanding hindrances to or disruptions of loading or discharging. Loading and discharging may also be interrupted if cargo is not available, if the receiver cannot take delivery as fast as the ship can deliver, if the weather is too bad, if the loading or discharging equipment breaks down, if strikes or work slowdowns occur, etc.

Laytime and/or demurrage will not run in case there is a delay caused by fault of the shipowner. For example, if the vessel is using its own cargo gear for cargo operations and breaks down, then laytime does not count during the period of breakdown and such time lost being calculated pro rata in relation to the total number of cranes of the vessel.

If ballasting or deballasting are carried out after cargo operations are completed, then laytime and demurrage will not be prolonged thereby. However, if it is necessary for ballasting or deballasting to be carried out for the safety of the vessel or the cargo, then the time lost will not be due to the fault of the shipowner, and time must be counted.

Congestion is probably one of the most common causes of delay. It is usually accepted by reason of a more general phrase such as obstructions of hindrances beyond the control of the shipowner or the charterer.

Periods of adverse weather are often excluded from laytime. The weather must be adverse to cargo operations and not simply prevent other operations, such as shifting into berth, and also the weather must be adverse to the particular type of cargo sought to be loaded or discharged (the latter usually applies to dry cargoes and not to liquid cargoes). Therefore, with respect to weather hindrances, the expressions ‘weather permitting’ (wp) or ‘weather working’ (ww) are used.

As with weather, holidays may either be outside the definition of laytime or thus constitute an interruption to laytime or may even be an exception to laytime—the most common exceptions that will only interrupt time counting, only if they are expressly agreed in a charter party. Therefore, after defining laytime, the phrase ‘Sundays and Holidays Excluded’ (SHEX) may be added when the parties agree that the time will not count during Sundays and holidays. Conversely, when Sundays and holidays will count, the expression ‘Sundays and Holidays Included’ (SHINC) is used. Variations of these expressions are used in countries where Sundays are not the weekly day of rest. For instance, SHEX and SHINC will be FHEX (Fridays and Holidays Excluded) and FHINC (Fridays and Holidays Included) in Arabian countries where Friday is the weekly day of rest. The

expression ‘unless used, but only time actually used to count’ is often used in conjunction with SHEX. The effect is that if loading or discharging, for instance, takes place from 0800 to 1200 and from 1300 hours until 1700 hours on a Sunday, these 8 h shall count as laytime.

To take advantage of a strike clause, it will normally be necessary to prove causation between a strike and any loss of time. A common source of conflict between shipowners and charterers is where delay occurs to a vessel as a result of berth congestion following the end of a strike. Whether such consequential delays are excluded by the terms of a strike clause will depend on the wording of the particular clause.

Shifting may be required from anchorage to berth and from one berth to another. The cost of proceeding from anchorage to berth is traditionally to be part of the cost of the carrying voyage as part of the sea passage to reach destination; therefore, it is at the expense of the shipowner and will not count as laytime, whereas shifting between loading/discharging berth is time risk for charterers and expense, and shifting time involved will normally count as laytime.

3.11 Demurrage and Despatch

3.11.1 Demurrage

When all permitted laytime is used before the completion of cargo operations, then the shipowner is entitled to be compensated by the charterer for the extra time taken. Demurrage is a kind of liquidated damages agreed in advance between the parties, payable to the shipowner in respect of delay to the vessel beyond the agreed laytime, for which the shipowner is not responsible.

The well-known expression ‘once on demurrage, always on demurrage’ means that exception clauses do not apply to demurrage unless they are clearly worded so as to have that effect. In most cases, this means that when laytime expires and the vessel is on demurrage, all the time thereafter (24 h per day, 7 days per week) shall count regardless of hindrances, holidays, etc. Time counting may only be interrupted when such interruption is caused by the owner or owner’s servants or by fault on the vessel’s side.

3.11.2 Despatch

Despatch is the reverse of demurrage. In other words, it is payment by the owners of compensation to the charterers for loading and/or discharging the vessel in a shorter amount of time than the allowed laytime. Despatch is not used as commonly as

demurrage. In cases where the charterer is entitled to despatch, the rate is often 50% of the demurrage rate.

3.11.3 Time Sheets

Calculating laytime requires a familiarity with a time sheet and a statement of facts. The purpose of calculating laytime is not only to calculate the time during which the vessel is made available to the charterer for loading and/or discharging but also to calculate demurrage or despatch if there is time lost or saved. The laytime calculation also provides evidence should a dispute arise, which has to go to arbitration or to a court for solution (Ship Inspection).

An outline will be given to laytime calculation, based on different charter party terms and for dry cargo and oil cargo. A standard method should be used, but it should be mentioned that various parties—owners, charterers, shippers and cargo receivers—may have methods and forms that suit each party. If standard forms were used, perhaps some areas of dispute could be reduced. Accordingly, the BIMCO standard form of Time sheet can be employed in calculations. In the examples below, headings similar to those in the BIMCO format are used, without the 'boxes' above the 'laytime computation' and the columns for 'Hours worked', but in addition to the columns on the standard form, additional columns are used for 'Laytime allowed' and for 'Total time counted', which should add up to the laytime allowed.

Apart from the significance of fixed or calculable laytime, the accuracy of time sheets also depends on a number of other factors. For example, the quantity of cargo is important if laytime is to be calculated. If the charter party states that the cargo to be loaded is '. . . x metric tons plus or minus 5 percent in owners' option . . .' ('x mt 5pct MOLOO – More or less Onwers' Option') when the master gives the Notice of Readiness, he will usually have completed his calculations of deadweight that his vessel can lift, taking into account the fuel, water, stores, etc. on board, and in the notice he may state the quantity of cargo he is prepared to load within the percentage limits. When the charterer or shipper accepts this Notice of Readiness, the cargo quantity is the quantity that will be used for the calculation of laytime allowed.

Other important factors include the following:

- category of laytime—separate calculations for loading and discharging ports or options to the charterer for reversing or averaging laytime; two time sheets may still be required;
- method of calculating laytime—for example, 'per workable hatch per day', 'Sundays and holidays excepted, unless used';
- exceptions to laytime—for example, weather working days, Sundays and holidays excepted, strikes, winch breakdowns;

- commencement of laytime – the laytime clause in the charter party will state the notice period (if any) after the valid Notice of Readiness is given. The charter party clauses stipulating laytime, demurrage and despatch are of extreme importance. Extracts from actual charter parties will be used in the examples, with modifications of quantities and loading and discharging rates in order to round off the calculations as far as possible.

3.12 Post-fixture Operations

Once all terms and conditions of a charter party have been agreed upon with the vessel's operator, the due performance of the charter party has to be followed up. Therefore, vessel operations are included but are not limited to the following functions:

– providing voyage estimates;
– issuing voyage instructions to the master;
– appointing port agents;
– arranging surveys associated with the commercial operations of the vessel;
– monitoring bills of lading;
– calculating hire, freight, demurrage or despatch money due from or due to the charterers of the vessel;
– arranging proper payment to shipowners of all hire or freight revenues or other money of whatsoever nature to which shipowners may be entitled arising out of the employment of the vessel.

Moreover, the vessel operator is also responsible for the correct invoicing and collection of any broker's commission that has been agreed upon in the charter party, deals with cargo and charter party claims and arranges provision of bunkers for the vessel, if required.

3.12.1 Voyage Instructions

It is important that, as soon as a new charter party is agreed upon, the master is provided with proper and comprehensive voyage instructions, together with a complete and legible copy of the charter party as early as possible, before the commencement of the next voyage. If the vessel is fixed for a new time charter, it is the responsibility of the charterers to provide the master upon delivery of the vessel with all necessary information and instructions for the performance of the charter. Nonetheless, the shipowner's vessel operator has to make sure that the master is indeed furnished timely by the time charterers with all necessary instructions and sailing directions at the beginning of the time charter and, if necessary, for each voyage to be performed under this time charter.

If the vessel is fixed for a voyage charter, the vessel operator has to make sure that the master is provided timely with all necessary information and voyage instructions by the charterers in order to secure a correct performance of the charter party. The vessel operator is also responsible for timely and proper voyage instructions to the master concerning owners' matters such as appointment of husbandry agents and/or surveyors, bunkering, use of routing services, special reporting requirements in connection with trading to war risk areas, etc.

3.12.2 Appointment of Agents

If the vessel is fixed for a voyage charter, the vessel operator has to appoint agents at loading and discharging port as per requirements of the charter party, endeavouring regarding agency Disbursement Account (D/A) to obtain the best possible deal with the agents and subsequently endeavouring to normally close agency accounts within 3 months of sailing of the vessel from the port. Even more important it is to keep daily contact with the agents, when the vessel is expected at the port, during the vessel's stay at port and until the vessel sails from the port, and to ensure that all formalities have been completed and all relevant documentation is in good order.

3.12.3 Vessel's Daily Operations

The vessel's operator shall ensure that the vessel is ready to load the nominated cargo and that the vessel reaches the loading port within the allowed time. Moreover, he will ensure that the vessel loads the nominated cargo within the allowed tolerance, he will monitor on a daily basis the vessel's performance at sea or if the vessel at port is loading/discharging, he shall monitor/hold tank cleaning operations prior to loading the next cargo.

3.12.4 Monitoring Bills of Lading

It is important to ensure correctness of bills of lading before they are released. It frequently arises that a vessel arrives at the discharge port ready to discharge its cargo, but the bills of lading in respect of such cargo have not yet been finally negotiated to the ultimate receivers. In this situation, the shipowner is often under pressure to deliver the cargo without the production of the original bills of lading. Apart from acting as a receipt for the cargo into the hands of the carrier and evidencing the terms of the contract of carriage, a bill of lading functions as a document of title operating to transfer ownership in the goods. In this capacity, if the shipowner delivers cargo without production of the relevant bill of lading, he

does so at his peril and thereby exposes himself to claims for misdelivery of the cargo, which can be potentially costly. Because of the risks involved, and owing to the mutual nature of the insurance provided by P&I Clubs, Clubs exclude from the scope of standard P&I cover claims arising out of the delivery of cargo without the production of the relevant bill of lading. However, in recognition of commercial reality, the Clubs have approved a standard form of wording for a Letter of Indemnity (LOI) to be offered to shipowners in return for delivering cargo without production of the original bill of lading. Therefore, the vessel's operator has to ensure that the correct LOI is available at the discharge port, in case the original bill of lading is not available there.

3.12.5 Collection of Freight and Hire

The vessel operator, in co-operation with the accounts department, has to prepare freight/hire debit note and follow up the collection of freight/hire into the shipowner's account. In case freight or hire money is not received on the due date or within the period of time agreed upon in the charter party, the shipowner can adhere to the governing charter party and can proceed with the suspension of service, withdrawal of the vessel, exercise of lien on cargo, etc. so as to secure the outstanding payment and prevent further financial losses. In respect of time charter vessels, the vessel's performance has to be monitored on a regular basis and record any off-hires.

3.12.6 Time Sheets and Laytime Calculations

If the vessel has been fixed on a voyage charter party that includes a demurrage and/or despatch clause, upon completion of discharge at the vessel's last discharge port, the vessel operator has to prepare laytime calculations on the basis of Statements of Facts for the relevant ports and copies of Notice of Readiness that have been rendered by the master at these ports. Thereafter, he has to ensure that demurrage amount has been received in the shipowner's account.

When running laytime calculations, the following stipulations of the charter party have to be taken into account:

- time allowed for loading and/or discharging;
- notice of readiness clause;
- commencement of laytime clause;
- time counting during weekends, holidays, bad weather periods, shifting, awaiting daylight/tide, etc.

If the permitted time for loading and/or discharging has been exceeded, the amount of demurrage due to the owners has to be calculated at the demurrage rate

agreed upon in the charter party. In case despatch money has been agreed upon in the charter party and a part of the time permitted for loading and/or discharging has been saved, the amount of despatch money due to the charterers has to be calculated. Debit or credit notes have to be issued by the person in charge in the accounts department and to be sent to the charterers duly supported by copies of the laytime calculations, Statements of Facts, Notice of Readiness and other documents that may be required according to the charter party.

The vessel operator, in co-operation with the accounts department, has to supervise the timely collection of demurrages due to the owners and/or the timely remittance or settlement by way of deduction from balance of freight of despatch money due to the charterers. Some voyage charter parties, particularly tanker voyage charter parties, include a time limit for the presentation of demurrage claims. The vessel operator is responsible for the timely presentation of demurrage claims to the charterers. Therefore, all documents required for the calculation of laytime have to be collected from the port agents and from the vessel as early as possible in order not to forfeit demurrages that may have arisen in favour of the owners.

3.12.7 Dealing with Cargo and Charter Party Claims

The vessel operator should be able to advise and assist the shipowner in matters of vessel-related dispute, such as the following:

- crew claims,
- speed claims,
- damage to vessel,
- damage to cargo,
- personal injury,
- shortage claims.

This should be done in consultation with the shipowner's insurance underwriters, P&I Clubs and other legal expertise.

3.12.8 Bunker Operations

If the vessel has been fixed on a voyage charter party, the vessel's operator in close contact with the shipowner's chartering broker should arrange stemming of bunkers. To ensure effective, safe and environmentally friendly bunkering, in line with all international rules and regulations, supporting the Master and Chief Engineer in ensuring that the ship, its crew and the company are properly protected, the vessel operator has to monitor bunkering operations.

Bunkering operations are divided into three stages:

1. **Measures Before Bunkering**

   (a) All fuel tanks are to be sounded before bunkering.
   (b) A written bunker program plan is to be prepared and discussed with all officers involved in bunkering.
   (c) Bunkers should not be received in tanks that are in use (i.e., settling tanks, service tanks).
   (d) If no liquidometer is installed, the tanks of the supply vessel should be sounded and figures recorded in the vessel's 'Bunker Book'.
   (e) The bunker manifold connection, as well as the valve settings, must be verified by the Chief Engineer.
   (f) The Chief Engineer must ensure that a reliable method of communication is set up between the Officer in charge of the bunkering operation, the person standing by the manifold and the person sounding the tanks.
   (g) The person sounding the tanks is to be given regular breaks by a backup man if the bunkering operation is a prolonged affair.
   (h) The Master should advise the bunker supplier in advance that bunkers should be delivered according to MARPOL 73/78 Annex VI.
   (i) The Master should request the supplier to take MARPOL sample (min 400cc) besides the regular commercial samples. This MARPOL sample is to be delivered to the Master with the proper label, including all data as per MARPOL 73/78 Annex VI. MARPOL sample should be kept on board for 1 year.

2. **Measures During Bunkering**

   (a) The operation must be supervised by the Chief Engineer or by an officer delegated by him, and people involved with the operation must not be given any other duties.
   (b) During bunkering, the oil levels in each tank being filled should be regularly checked through the sighting ports or ullage stand pipes, if fitted, rather than through sounding pipes, because these can sometimes give erroneous readings during the filling process.
   (c) Constant supervision of all compartments being filled is essential during the entire period that the bunker manifold valve is open.
   (d) Shore staff must be given ample warning prior to a required loading speed reduction or a stoppage in the shipping of bunkers. Where possible, and subject to agreement with the bunkering terminal, bunkering operations should be on a 'ship stop' basis. The loading rate agreed with the bunker supplier must be within the capabilities of the ship. Consideration must be given to the condition of valves, pipelines and fittings, when deciding this flow rate.
   (e) If, for shore requirements, it is necessary to have the bunkering lines cleared by compressed air, all precautions must be taken to prevent overflow. These precautions should include checking that full tanks are isolated and that the

tank receiving the draining has sufficient ullage. Full precautions to avoid any risk of pollution must be of paramount importance.

(f) Samples shall be taken as per the instructions of the approved Fuel Testing Laboratory Instruction Manual. In the event that a fuel testing laboratory has not been appointed, the following should be adhered to.

(g) The samples will be divided into three sealed containers by the supplier. If the supplier delivers a sealed sample to the vessel, which has not been taken during bunkering in the presence of the Chief Engineer or his delegate, a Statement of Facts shall be issued, signed by the Chief Engineer and the supplier's representative. The statement should be sent or faxed to the head office.

(h) When changing over tanks, it must always be ensured that valves for the next tanks are opened before closing the valves of working tanks.

(i) Filled tanks to be sounded after valve is closed to ensure that valve is tightly closed.

(j) The figures of the terminal or barge should never be relied on for the purpose of stopping. A 'Ship Stop' should always be used so that the vessel remains in control of the operation.

3. **Measures After Bunkering**

(a) All ships' fuel tanks must be sounded, including those that have not been bunkered, and a report is to be made in the vessel's 'Bunker Book'.

(b) Bunkered quantities should be recalculated before any receipts are signed.

(c) All necessary figures must be entered in the vessel's 'Oil Record Book'.

(d) Before the new fuel is transferred to settling tanks/service tanks, the fuel purifiers have to be adjusted to the fuel density/specific gravity.

(e) The settling tanks/service tanks should not contain more than about 3 tons before refilling with the new fuel.

(f) The performance of the main engine is to be carefully supervised after the new fuel is introduced. Indicator cards must be taken, at least peak pressures. If there is any indication of poor main engine performance that can be linked with the fuel, a message should be sent immediately to the Technical Function.

After completion of bunkering, the Master should receive a copy of the Bunker Delivery Receipt (BDR), which should be kept on board for 3 years. BDR should be thoroughly reviewed to ensure that it does not contain any rules that could impose a contractual liability on the owners.

Final determination of the quantity on bunkers to be shipped in accordance with the owner's or the charterer's voyage instructions should be based on the amount remaining on board (ROB) immediately before loading. This quantity is normally stemmed and agreed upon by the charterers or the shipowner.

With the quality of residual fuel deteriorating in most areas of the world, it is essential that appropriate measures are taken to minimise the effects of the less desirable characteristics. The Master must track the HFO/MDO/MGO samples

landed to certified laboratories, thus ensuring permanent bunker quality monitoring. The landed samples must be tracked the three following days after landing, ensuring that it is transported to the lab. The fuel quality report is ready after approximately 7 days.

Prior to the commencement of each passage, the Master is to ensure that sufficient quantities of bunkers and lubricants of required type/quality are available on board the vessel, allowing it to safely reach the next port or a place where charterers/owners/managers intend to replenish respective stocks.

When calculating quantities of fuels and lubricants necessary for the forthcoming passage, the Master shall consider all reasonably predictable factors affecting bunkers consumption, including (but not limited to) the following:

- distance to travel along selected route;
- charterers'/owners'/managers' requirements regarding speed, consumption limits, arrival time limits, etc.;
- weather and sea conditions expected during the passage along planned route;
- regular sea currents and tidal streams expected in the areas to be transited during actual time of the transit;
- different characteristics during planned transits through restricted areas, like canals, narrow straits, congested waters, etc.;
- expected waiting time at ports, anchorages, waiting areas, etc.;
- usual unusable (unpumpable) amount of fuels remaining in the vessel's storage tanks;
- time normally required to receive bunker test results to attest the quality of newly received bunkers;
- expected transits through sulphur emission control area (SECA) and port stays where SECA regulations apply;
- expected transits through piracy high-risk areas;
- any other known factor.

The total amount of bunkers required for the passage shall always contain an additional safety margin allowing for the case when passage duration is extended due to circumstances that cannot be reasonably predicted during planning stage. It is required that all ships commence the passage with additional amount of bunkers, normally used for operation of main and auxiliary engines, allowing for steaming with the normal output of the vessel's main propulsion and auxiliary machinery for a period 20% longer than the normally expected duration of the passage. This period shall never be less than 4 days, and unless specific instructions from the charterers/owners/managers have been received, it is not required to be more than 7 days.

The supplier is obliged to give a sample of the bunkers delivered, taken during delivery, this to be witnessed by the Chief Engineer. In the event that samples are presented in advance of the delivery of bunkers, the Chief Engineer shall indicate this fact on the delivery paper work and take his own sample in the presence of the supplier's representative.

3.13 Conclusion

This chapter provided a succinct but comprehensive account of commercial operations management, including the initiation, negotiation and performance of charter parties and post-fixture chartering practice operations. The chapter provided a general overview of charter markets before delving in depth in debunking the negotiation process for fixing a vessel in a voyage or time charter making reference to offers, counter-offers and firm offers, including the phraseology and notation used. Certain charter party forms and terms are reviewed, and particular reference is made to freight, hire, laytime and voyage estimation. In terms of freight and hire, reference is made to when, where and how payments are effected. Charterers of voyage-chartered vessels have a finite time to complete loading and discharging operations, called laytime. In commercial operations management, it is important to know when laytime commences, when it is interrupted and when it ceases; the process as well as the concepts of calculating demurrage and despatch are also well explained in the chapter. Additionally, the chapter describes the concept of voyage estimating as the means to determine the return of a perspective voyage on a voyage charter, after deducting from freight revenue the running costs, any other expenses to be occurred during the voyage and applicable commissions. The outcome of voyage estimating is the break-even cost beyond which he negotiates a freight rate for the cargo on the specific voyage. Post-fixture operations consist of instructions to the vessels, coordination and follow-up between the master, the shipowner and the agents in respect of loading, discharging and bunkering operations, as well as dealing with cargo and charter party claims, which are also well explained in this chapter.

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Chapter 4
Crew Operations Management

Julia Anastasiou

4.1 Introduction

Crew management is an essential element of shipping operations. The aim of this chapter is to provide a comprehensive and thorough understanding of crew management operations. The intricacies and multiple factors associated with crew management will be analysed and discussed in detail whilst identifying what best practices in crew management operations are and their direct interface with shipping operations as a whole. Subsequently, whilst examining the major approaches to this topic, one of essential aspect is the human element. In this context, particular focus will be placed on the various processes from the initial identification stage of supply of seagoing labour whilst understanding economies of scale and statutory requirements to facilitation of shipboard training and management and finally drivers of crew performance management. Lastly, a comprehensive discussion on the imperative role of marine academies and their existing relationship with shipping companies will be scrutinised.

4.2 Crew Management Operations

Crew management includes the attraction, identification, selection, recruitment, training and development, employment, retention and performance management of seafarers in compliance with statutory and international regulations and in accordance with customer requirements. Criteria for the selection of seafarers are based on the applicable vessel (mainly referring to the type of the vessel but could

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I.D. Visvikis, P.M. Panayides (eds.), *Shipping Operations Management*,
WMU Studies in Maritime Affairs 4, DOI 10.1007/978-3-319-62365-8_4

also include her age, size, area of operation and other factors) and external prerequisites so as to ensure the safety of personnel, the safe operations of the cargo and vessel and the prevention of marine pollution. This is achieved through managing vessels in accordance with holistic crew management practices, comprehensive employment conditions (dictated by contract terms, collective bargaining agreements and applicable law) and the utilisation of quality management systems, all of which are audited and controlled by both internal and external bodies.

An external audit is carried out by a third party independent of the shipping company itself such as a classification society, shipowner, charterer or customer. The purpose of an external audit is to assess the ship management company's ability to operate professionally and competently based on their quality management system. The audit is conducted on a sampling basis whereby collective evidence is demonstrated to the auditor verifying that the quality system is implemented and understood at all relevant levels within the organisation.

Requirements of international rules and regulations such as STCW, ISM, ISPS, MLC 2006, among others, along with specific flag requirements where applicable, are examined on a sampling basis. If evidence cannot be presented to the auditor, a more exhaustive analysis may be enforced by the auditor until he or she is satisfied with the presented information. In preparation for an external audit, ship management companies are obligated to carry out internal audits of their quality management system substantiating the application of the defined processes in their daily operations.

The management of seafarers is based on the following: (1) an individual care of duty through high communication levels between experienced ship and shore personnel; establishing a platform for productive interaction with two-way feedback; (2) engaging an established and reputable network of manning agencies; (3) protecting the crew (along with the environment and property) from sea perils; (4) monitoring their welfare by ensuring the availability of adequate insurance covers and a safety conscientious environment both on board and ashore; (5) providing continuous training for the enhancement of shipboard performance and compliance to international standards.

Crew management is a multifaceted and fundamental component within ship management. There is no doubt as to the severity and complexity of this activity, which demands highly qualified, knowledgeable and experienced personnel. Encompassing the most basic mandatory requirements to the development of a strategic training matrix for more sophisticated on-board operations is only one vital undertaking that has a direct impact on the operations of a vessel.

Crew managers could be described as a team responsible and accountable for the activities carried out towards the seafarers. The crew manager ensures proper certification of all seafarers prior to their embarkation and at all times whilst on board with follow-up when they return home ensuring that the minimum recruitment criteria, the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and Maritime Labour Convention (MLC) are met. Crew managers should arrange crew change operations in a timely manner and should also prepare and issue seafarers'

employment agreements in connection with union and flag agreements. Crew managers communicate regularly with technical managers and/or customers, manning agents and vessels and taking on the role of the 'key accounts manager' for all personnel matters. Crew managers monitor crew complements on board against safe manning requirements, customer requirements and budgets and ensures that crew performance management is implemented and followed up. They also perform visits to vessels and visits to customers to facilitate a close working relationship with the seafarers and technical managers of the vessels.

The crew manager's role is one of extreme importance to the overall operation of the vessel. It is a coordinating role that encompasses a liaison between the technical manager/shipowner and the seafarer. Crew management operations are fulfilled by firmly focusing on the delivery of services outlined in the contract between the crew manager and the owner of the ship.

An in-depth assessment of the various activities undertaken in crew management operations comprise a multitude of services included in service schemes. Such schemes may consist of recruitment and selection of seafarers, future leader programmes, training ashore and on board, logistics planning and cadet programmes. Conjointly, environmental risk analysis, flag State support, EBN services (for Brazilian trade), local content and local support, claims management, on-board audits, incident investigation and key performance indicator analysis are value-added services available to the shipowner.

4.3 Crew Management Schemes

Crew management schemes are typically presented through three main categories. Full crew management schemes can provide a complete crewing solution for the shipowner. Consequently, the crew manager is the employer of the seafarer on behalf of the shipowner. Such a scheme may offer full-scale people management services, including an exhaustive seafarer lifecycle. A seafarer lifecycle includes recruitment, selection, placement, retention, payroll activities, logistics, travel, port agency services, catering management, training, development, career planning, industrial relations, seafarer tax management, employee and legal guidance (for nationalisation programmes), all executed by the crew manager. A future leader's programme as referenced above is developed for the purpose of taking enthusiastic, talented seafarers, providing them the opportunities, skills and training to better themselves and advance their careers within the crew management company.

With a full crew management scheme, communication to the vessels and third party entities such as port agents and recruitment offices are undertaken by the crew manager. Audits are fulfilled in line with the company's quality management system and key performance indicators (KPIs). KPI, as defined by Oxford Dictionaries (2016), is 'a quantifiable measure used to evaluate the success of an organisation, employee, etc. in meeting objectives for performance'. An example of a KPI is 'seafarer retention rate'.

Agency and ad hoc agency schemes are a culmination of selective activities undertaken by a crew management company without necessarily providing such services as the employer of the seafarers. The shipowner or appointed party as designated by the shipowner may be the employer of the seafarers, which differs from full crew management. In some circumstances with agency schemes, the crew management company can be nominated as the employer of the seafarer; however, this is not favoured by the crew managers as they take on the responsibility and undertaking of the seafarers without having the full control of the crew operations. As an agency scheme implies, the crew management company providing specific services acts as an agent for and on behalf of the shipowner and does not provide management. Being the employer of the seafarer whilst not being responsible for their management is a precarious undertaking. Such activities may include the recruitment of specific positions, preparation of payroll for the seafarers, use of IT software, training packages or specific services that are provided at cost per position or per activity.

Service schemes that are not encompassed under full crew management or agency schemes are provided at cost. This may include consultancy, third party audit services, use of in-house training facilities, legal and taxation advice. The intention of a service-oriented scheme is beneficial to an operator whether a shipowner or a ship manager, who can take advantage of third party services and not need to make substantial investment in their own infrastructure in order to obtain such services. Having an in-house legal counsel or taxation consultant on a full-time employment basis can be costly, as well as challenging, to recruit and retain. The benefit in engaging such services on a retainer scheme will alleviate this additional administration cost and can be discontinued when no longer required without complication.

Various factors are taken into consideration prior to an agreement as to which crew management scheme will be of the utmost benefit to the shipowner. Cost invariably will be a factor when considering the services commensurate to the respective vessels. Cost in this context does not solely refer to the choice of crew management service provider where ship management companies bid and provide a tender to the shipowner having a decision mainly based on the daily bottom line operational expenses. Shipowners have various organisational establishments often inclusive of an internal crew representation. Organisations may be used mainly for the management of large projects or product development processes, drawing employees from different functional disciplines for assignment to a team. In such cases, full management services may not be the preference as their own organisation has the capacity and employs personnel to oversee specific daily functions provided under a full management scheme.

Global outreach is a factor to consider when reviewing crew management schemes. Global outreach refers to a ship management company's global footprint and office locations. Some shipowners operate globally and would benefit from partnering with a service provider that can assist them locally through their own office facilities. Alternatively, some shipowners operate locally and as such require

only local content. Furthermore, both services may be required and may be beneficial to a shipowner.

For the shipowner who requires a complete diverse and multifaceted operational team, a factor to be considered may be the crew management company's infrastructure and existing customer portfolio. There is benefit to both large-scaled and long-established management companies as there is to small-scaled and newly established companies. For the latter, small-scaled organisations may have rigorous marketing objectives and business development strategies eagerly anticipating to enhance their business together with the shipowner, whereas a more established company may provide the reputation needed for the shipowner to gain further business with their long-standing name in the industry. Both options are equally beneficial and advantageous provided the shipowner's necessities are met.

4.4 Current Situation in Demand and Supply of Seafarers

Accepting the fact that an estimated 90% of global trade is transported by sea[1] signifies the immense impact of the supply of manpower in the transportation of goods by sea. It is therefore imperative to have a fundamental understanding of the various factors and circumstances affecting the demand and supply of seafarers when analysing vessel segmentation. Highly sophisticated vessels and new age engine designs have an increasingly higher demand for specialised crew, resulting in supply constraints and a shortage of trained and educated personnel both ashore and on board. In this section, there will be a discussion and evaluation on market trends, manning sources, challenges for the industry and sustainable growth within these segments, which directly contribute to economies of scale.

Economies of scale are beneficial in many ways to both ship management companies and the labour-supplying States. As there is a cost advantage that arises with increased output of a product, in this case the product is the seafarer, the unit cost per seafarer theoretically is reduced and the seafarers' wages are lowered as the supply increases. The shipowner's operating expenses are reduced and income increased. For the labour-supplying States, which in this case is an external economy of scale or an occurrence outside of a company but within an industry, the benefit is substantially different. As the labour force increases, supplying States see reduced unemployment, an increase in income and thus increasing bank deposits and cashflow, a higher standard of living and the progressive development within the States' infrastructure in terms of training facilities, universities and marine academies. As this is an extensive and complex discussion, similarities and differences pertaining to each segment and its drivers will be discussed.

[1] Sustainable and Quality Manpower Supply for Shipping Industry: The International Association of Maritime Universities (IAMU), December, 2015.

4.4.1 Type of Segment Ship and Specialised Crew

With the introduction of highly specialised, single-purpose ships belonging to niche markets, the demand for such crew is high whilst the supply remains low. For example, within the tanker market, liquid gas tankers, namely liquefied natural gas or LNG and liquefied petroleum gas or LPG, are few in number and global units reached 1770 in 2016[2] according to the ISL Institute of Shipping Economics and Logistics' 2016 market review. With the total world merchant fleet standing at 51,405 units, approximately 2.9% of the capacity is comprised of liquid gas tankers, making this segment highly specialised and demanding. With stringent customer requirements, additional certification and licensing for seafarers and limited berths available for mandatory on-board training and sea service requirements, these factors contribute to a low supply of seafarers in this niche market whilst demand remains high. This challenge will be compiled by the fact that order books for these vessel types are increasing,[3] whilst the demand for seafarers increases yet supply constricts.

4.4.2 Global Supply

The International Chamber of Shipping (ICS) released research depicting the sources of global supply of crew in 2015. The worldwide population of seafarers serving on internationally trading merchant ships is estimated to be in the order of 466,000 officers and 721,000 ratings.[4] The interrelation between the overwhelmingly significant supply of seafarers from developing countries and the population of these countries is no coincidence. The potential of high commitment, high performance and high involvement whilst maintaining marginally lower costs has been the catalyst for the use of quantitative techniques in the development of infrastructures in these regions for the purpose of seafaring.

As depicted in the statistics of the BIMCO Manpower Report (2015),[5] the analysis indicates a number of developing countries such as the Philippines, India and Indonesia among the highest-ranking suppliers of seafarers. The immense population growth of these developing countries has led to innovation both internally by governments and externally through foreign investment exploring alternative labour sources to establish and develop employment opportunities. This is one of the driving forces advancing the development of seagoing labour supplies in these countries.

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[2]ISL Shipping Statistics and Market Review (SSMR), Volume 60—2016: Institutue of Shipping Economies and Logistics, Universitaetsallee 11-13, 28359 Bremen, Germany.

[3]Clarksons Research, 2015. World Fleet Monitor, March 2015.

[4]International Chamber of Shipping, 2015.

[5]BIMCO Manpower Report, 2015, Country Questionnaire.

This approach clearly reduces labour turnover and develops sustainable growth for crew managers. Initial investment in terms of lobbying for local awareness and reforms, introduction of training facilities and the formation of a seafaring nation have developed over a period of several decades, whereas today we realise and benefit from the extent of the results. According to the BIMCO report, the volume of officers estimated to be required by 2025 indicates a deficit of 18.30%.

The statistics indicate a present shortage of officers supplied to the merchant fleet, whilst the gap between supply and demand grows further apart as new tonnage enters the market in the coming years. The demands on supply will steadily increase as the world fleet expands. From a purely academic point of view, training of seafarers and sea time required for the issuance of certificates of competency is a time-consuming process. Delivery of new buildings on the other hand is taking place at a much greater rate, so the supply of vessels in the market is not in line with the supply of seafarers. This creates a shortage of seafarers in the market. To expand this notion, the presence of a well-established infrastructure that has been advancing over the years in developing countries through the provision of a steady and reliable source of manpower is imperative. In addition to the dissemination of the global supply of crew by nation, we can further deconstruct and analyse the distribution as demonstrated by vessel segmentation. According to the UNCTAD Secretariat, based on data supplied by Clarksons Research,[6] a significant increase in the volume of tonnage from 2014 to 2015 respectively, in particular the bulk carrier sector (4.4%), container sector (5.5%) and offshore sector (6.7%), will impact the global demand and supply of seafarers.

In continuation, the data estimate a world fleet growth by 3.5% during the 12 months leading up to 1 January 2015,[7] and according to Drewry's published Manning 2014 Annual Report,[8] the current shortage of officers is forecast to worsen and risks impacting carrier profitability as salaries increase due to higher demand and lower supply. The volume of tonnage per segment gives an indication as to the various additional training requirements and specialisation courses necessary for the safe manning of vessels limiting the available expertise in some niche sectors, which staunchly affects the demand and supply of seafarers.

4.4.3 Shipboard Personnel Structure

The organisation of shipboard manpower has a significant impact on the vessel's daily operating expenses. Inherently, as excessive emphasis is directed towards cost-efficiency, shipboard personnel structures are reduced. Over the years, we have

[6]UNCTADstat—Fleet ownership (see http://stats.unctad.org/fleetownership), Clarksons Research, 2015 and World Fleet Monitor, March 2015.

[7]UNCTAD Review of Maritime Transport, 2015.

[8]Drewry Shipping Consultants Limited, 2016.

seen consistent reduction in manning levels in an effort to combat staggering expenses due to salary increments. Shipowners who have investors financing their projects have from time to time been under pressure to reconsider their operational costs, especially when market rates are poor. Generally, when markets are volatile, all costs are examined in detail in an effort to encourage strategic cost reduction options and safeguard the shipowners' investments and assets.

An alternative approach to understanding how shipboard structure affects demand and supply can be observed when markets are erratic. To best exemplify this concept, the recent unprecedented weakening of the offshore sector has resulted in a number of units being laid up with a number of seafarers unable to seek employment within this particular sector. In essence, this drives the demand for seafarers down and creates an overabundance or oversupply of manpower in this sector.

4.4.4 Market Fluctuations

The dysfunctional offshore sector as compared in 2014–2015 has been bleakly summed up by Clarksons Research[9] as *Annus Horribilis*.[10] A comprehensive overview of the offshore sector is provided looking in depth at activity during 2014 and 2015, respectively. The global demand and supply of oil and gas has had a dramatic effect on the charter rates, order books and activities in various offshore fields.

Activity has reduced dramatically with time charter rates axed and orders cancelled. With a 35–40% reduction on the jack-ups and rig market rates and floaters having seen a devastating 54% reduction on the daily time charter rates, order book numbers have also been considerably reduced as an effect of the market. The industry as a whole has felt the aftershocks of this unfortunate situation, which has further negatively affected the supply of seafarers as a consequence of this chain reaction.

In other segments, 2015 was yet another trying year for the bulker market with freight rates dangerously low as the decline in demand of raw materials from Asia worsened and the oversupply of bulk carriers in the market increased. According to BIMCO,[11] on 10 February 2016, the Baltic dry index (BDI) hit 290 index points. At that point, a bulk carrier, regardless of its size, age and fuel-efficient qualities, earned a time charter average of USD 2417–2776 per day. Owners were left with few alternatives opting to lay up their vessels in an effort to ride out the storm or, in more extreme cases, file for bankruptcy. Such cases lead to significantly reduced manning levels, and when charter rates are hovering in these dangerously

[9]Clarksons Research, Offshore, April 2016.

[10]Annus horribilis—a year of disaster or misfortune. Oxford Dictionaries.

[11]BIMCO, Dry Bulk Shipping: Improved freight rates despite continued fleet growth, May 2016.

low-average time charter levels, other alternatives are sought such as scrapping older tonnage, delayed deliveries and even cancellation of new building projects. This is yet another example of how market fluctuations affect supply and demand of seafarers—as cash stricken, shipowners reduce manning requirements, thus creating a surplus of seafarers.

4.4.5 Cadetship Programmes

Given the current situation vis-à-vis the world supply and demand of seafarers, robust cadetship programmes have been established by individual shipping companies and further endorsed by national governments to boost local seafaring nations. An example is the Norwegian Shipowners' Association (NSA) Philippines Cadet Programme, which is a programme of the Association of Shipowners' Training and Education Project (ASO-ATEP) where the objective is to develop young and competent Filipino seafarers through scholarship grants awarded to qualified seafarers. To meet this objective, the programme has collaborated with four maritime academies, namely the Philippine Merchant Marine Academy; John B. Lacson Colleges Foundation, Bacolod; DMMA College of Southern Philippines; and the University of Cebu, Lapu-Lapu and Mandaue.

The relationship between cadet programmes and crew management companies is one of clearly defined and structured curricula with the expectation to secure the future manning needs of the company. The purpose of this relationship is to promote young talent to the seafaring industry as the world fleet expands, secure future manning for the crew management company and indoctrinate young shipping professionals based on the quality management systems of the crew management company whilst having the berths available for the cadets to carry out their necessary sea service. Scholarships and grants are readily introduced in an effort to attract young adults to the industry and provide incentives for lifetime careers in shipping.

Government intervention has also made the industry more visible in many nations that are not predominantly seafaring nations. An example of this is the Republic of Seychelles, where the government embarked upon a rigorous, long-term cadet programme in line with their new building project consisting of product tankers. A cadetship programme for local Seychellois was devised providing government subsidy for education and training where the long-term strategic vision has been to have fully manned Seychellois tankers and has thus created employment opportunities and awareness or sensitivity towards shipping in a non-traditional shipping country. Furthermore, ILO Member States have themselves looked at developing infrastructures in non-traditional seafaring nations such as Ethiopia. The Ethiopian Government's decision in 2009 to join forces with the Ethiopian Maritime Training Institute EMTI S.C. (2016) to produce engine and electro-technical cadets whereby maritime academies, training facilities and contracts with shipping companies have been made possible due to heavy investment, long-term planning and support by governmental and non-governmental bodies such as flag registries to provide job opportunities in developing countries.

With these incentives, companies are able to invest long term in the education and training of personnel, who will eventually undertake positions on board vessels whilst positively enhancing the quantity and quality of seafarers available for employment. Investments in training allow for customisation of requirements based on the needs of the fleet, thus optimising the quality of the engaged labour force. Quality optimisation is achieved when training is specifically customised for the benefit of the seafarer as set by the company. Such training arrangements may include courses on the use of specific electro-technical equipment such as 'E' type Burmeister and Wain (B&W) engines. These courses provide engineers with hands-on practical and theoretical experience on new generous engine types, ensuring proper operation of technically advanced machinery.

Such incentives are one of the most effective means of investment for long-term security and growth. Without such endeavours and necessary actions to promote careers in shipping, the global expansion of the world fleet will not be supported and the supply will be scarce. Advantages overweigh the disadvantages in that there is a cost implication for shipping companies; however, the benefits of having a young, dynamic workforce trained based on specific customer requirements is an advantage that should not be measured in monetary units.

4.5 Crew Management Operations

In Sect. 4.1, crew management as a fundamental component within ship management operations was defined, which includes—among other tasks—the employment, training, retention, safety and quality standards, and performance management of the seafarers. In this section, an overview of how a seafarer is managed through crew management operations will be provided. Furthermore, a discussion of the distinction between the employer (crew manager) and employee (seafarer) will be made.

4.5.1 Role of Employer and Employee

Two very distinctive yet fundamental (but not limited) roles within crew management operations are those of the manager or employer and the seafarer or employee. As it is suggested, there is a contractual relationship between the two parties outlining individual rights, responsibilities, salary elements and obligations of each stakeholder. For the sake of good order, the terms employer and employee will be utilised throughout this section.

The employer endeavours to provide a safe and healthy working and living environment on board for the employee and in doing so will have the employee's professionalism and dedication in return whilst carrying out his/her duties and defined role. What is imperative is that through this undertaking, each party agrees

to act with due diligence and interact with one another throughout the course of the employee's tenure. The employer has a responsibility towards the employee in that any financial agreement in terms of the transfer of wages is carried out as agreed and without delay and the provision of the employee's terms and conditions of contract fulfilled. Contracts of employment are governed by various international bodies (e.g., ITF[12]) and national bodies (national collective bargaining agreements), as well as in the form of bilateral agreements between states and private companies. The minimum employment terms and conditions are dictated in the international Maritime Labour Convention (MLC, 2006), introduced by the International Labour Organization (ILO) in 2006 and enforced in 20 August 2013.

In today's industry, it is common practice for shipowners to have their vessels covered by a standard ITF agreement, which is also compliant to MLC, 2006, standards. The different schemes of ITF agreements specify the seafarer's employment terms and conditions, such as salary remuneration entitlements, rest and working hours, holidays, repatriation procedures, disciplinary guidance, disability grading and various other conditions. The ITF is represented by local-affiliated union members in various ports globally and, as such, provide a framework for standards of living and employment for seafarers, together with a network of inspectors available to provide assistance when required. The employee has not only rights governed by the contractual agreement signed between himself/herself and his/her employer but also additional rights on an international level.

4.5.2 Documentation and Certification

Statutory, flag and international certification is required for employment on board a merchant ship. Not all seafarers require the same certification with the exception of statuory and flag-specific licensing. Factors associated with the identification of requirements are suggested but not limited to (1) vessel segmentation (vessel's size, type, safe manning standards, company policies), (2) trading area, (3) cargo-handling requirements, (4) vessel's equipment and (5) principal and charterer requirements. Certification varies from basic mandatory qualifications as outlined in the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW)[13] to the very sophisticated and advanced training documentation for niche segments and cargoes, or if obligatory at national level.

[12]International Transport and Workers' Federation, 2016.

[13]International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 was adopted on 7 July 1978 and entered into force on 28 April 1984. The main purpose of the Convention is to promote safety of life and property at sea and the protection of the marine environment by establishing in common agreement international standards of training, certification and watchkeeping for seafarers. International Maritime Organization (IMO).

Seafarers not in compliance with the minimum statutory requirements outlined in STCW and as per the respective flag state administration are not entitled to sail on a seagoing vessel, unless otherwise compliant. Compliance comes in the form of attaining necessary statutory certification in accordance with the requirements outlined for the specific position to be undertaken on board the vessel. Examples of such are licences and their equivalent flag state endorsements. In an earlier discussion, it was identified that crew management operations have their own standard set of criteria that each seafarer is obliged to observe. These are known as principal requirements and vary from organisation to organisation. A typical process could include the following basic steps: (1) a seafarer undergoing a pre-departure briefing in his/her home country conducted by the company's appointed manning agent as a formal and final verification scrutinising and endorsing his/her documentation, certification and qualifications. (2) The seafarer's licence is verified for authenticity through the local governmental issuing authority as required, and (3) once all necessary checks have been completed, the seafarer will be provided a position for employment on the condition that he/she has in his/her possession a valid and 'fit for duty' medical certificate issued by an accredited medical facility. Accreditation is the process in which certification of competency, authority or credibility is presented to the medical facility as provided by a bona fide P&I Club or state-owned authority.

4.5.3 Crew Travel, Planning and Repatriation

For a seafarer who is fully qualified and available for employment on board a seagoing vessel, the employer will, as part of his/her undertaking and obligation, make the necessary arrangements for the seafarer to board the vessel safely. This process entails the application of visas prior to the employee's embarkation, air and/or ground transportation logistics and coordination with the travel agent, manning agent, vessel and port agent. Upon repatriation, the process is recurrent as the employer fulfils his/her contractual responsibility towards the seafarer in providing safe transportation from the day he/she departs home for a vessel and, as in the latter example, departs the vessel for his/her home.

4.5.4 Crew Retention

An essential part of crew management operations is coordinating the employment of seafarers in such a manner that continuity is achieved through the retention of crew. For an organisation to benefit financially from the close cooperation of its seafarers, this requires a succession plan and a relatively high retention ratio. When a vessel has a high retention ratio concerning the crew, she may have a high-calibre safety culture and yield exceptional performance, much to the delight of the vessel's

charterers and owners. For example, planned maintenance systems (PMS)[14] are followed up efficiently, and the seafarers are able to return and complete ongoing projects, routine repair and maintenance, as well as facilitate cohesive bridge or engine resource management. Retention of seagoing staff facilitates such objectives as to minimise medical treatment cases due to injury/accident, near misses, operational incidents, port state deficiencies and condition of class. Performance-driven results are likely to be achieved through the retention of personnel on board, and this is essential for vessel operations to be conducted effectively. Safety is the main factor that supports the necessity of retention of crew.

4.5.5 Managing Claims

As an employer of seafarers, one endeavours to minimise risks that contribute to injuries, accidents and illnesses on board. Inevitably, incidents do occur despite all the necessary risk assessments and safety cultures being encouraged and implemented on board and ashore. Once the crew manager is notified of an incident, responsibility lays with the employer to ascertain the details of the incident, carry out a risk assessment and mobilise an emergency response team depending on the severity of the incident at hand. Arrangements are then coordinated in a timely manner, and the seafarer is provided with assistance as required.

The focus is on the well-being of the seafarer, and in an effort to manage incidents effectively, emphasis is concentrated on training for such incidents. Through regularly programmed ship-to-shore drills, the management of incidents is carried out with professionalism and in a timely manner. With major incidents requiring hospitalisation, repatriation and death-related cases, the employer will alert the services of the vessel's P&I Club[15] for practical and financial assistance and legal representation of the seafarer. The Club's position is to ensure that the seafarer is provided with the necessary assistance and representation, irrespective of location and cost. This undertaking safeguards the seafarer's and manager's interests through local correspondents acting on behalf of the seafarer.

[14]Planned Maintenance System or PMS is a paper/software-based system, which allows shipowners or operators to carry out maintenance in intervals according to manufacturers and Classification society requirements. The maintenance is primarily supervised by the on-board personnel. The planning and scheduling of the maintenance, as well as its documentation, must be made according to a system that is approved by classification societies Having a planned maintenance system on ships is now mandatory as per ISM (International Safety Management Code).

[15]Protection and Indemnity Club or P&I Club is an association providing insurance for shipowners against loss due to legal liability arising from damage to cargo, injury to passengers and crew, and other legal liabilities not assumed under the regular forms of hull insurance. Source—Merriam-Webster Dictionaries (2016).

4.5.6 Quality Standards, Systems and Auditing

Each individual ship management, crew management or manning agency has an obligation to comply with quality principles that act as a framework for the way they carry out their day-to-day activities. The quality system is subject to regular audits by customers and external bodies, as discussed in the first section. The purpose of a quality system is to develop a defined standard for employers to comply with in order to carry out the activities set out by the organisation and maintain a standard that is necessitated within the industry. Operating with a quality mindset defines an organisation as one that selectively and consciously chooses to carry out its activities with accuracy and high performance.

As a result of numerous serious accidents in the 1980s, the introduction of the ISM Code or International Safety Management Code by the IMO facilitated the framework needed for providing an international standard for the safe management and operation of ships and for pollution prevention. The objective was to ensure safety, to prevent human injury or loss of life and to avoid damage to the environment, in particular the marine environment, and to property. The Guidelines were based on general principles and objectives so as to promote evolution of sound management and operating practices within the industry as a whole.[16]

The Code requires a Safety Management System (SMS) to be established by 'the Company', which is defined as the shipowner or any person, such as the manager or bareboat charterer, who has assumed responsibility for operating the ship. Such quality systems may include business process management, flow charts depicting and outlining responsibilities within the organisation, job descriptions, workflows and company policies. Company policies can, for example, provide reference to business practices, including anti-bribery and anti-corruption statements, manning policies, drug and alcohol declarations, company code of conduct, and health, safety and environment policies. Effective health, safety, security and environmental protection management systems enable the seafarers to work in a conducive environment and act as a deterrent to substandard operators who place little emphasis on the importance of quality systems.

4.6 The Human Element

4.6.1 Identification, Selection and Recruitment of Crew

The selection process is driven by various factors, including vessel type and segmentation, preferred nationality, competence levels, trading areas, customer requirements, vessel requirements, time in rank, time with operator, time on vessel

[16]International Maritime Organization (IMO), 2016.

type and salary levels. Vessel type and segmentation are of utmost importance during the selection process. Identifying competencies is initially based on the seafarer's past seagoing experience and the need to align the seafarer's area of expertise with the recommended on-board position.

When considering the trading areas of a vessel, nationality of the seafarer is also a factor taken into consideration. In an industry where operating expenses are scrutinised, the use of local seafarers for local trades, for example Asian crew for Asian trade, would be practical. This would effectively reduce the vessel's operating expenses for crew travel, would employ crew familiar with the climate/culture of the trading areas and can possibly entice seafarers to opt for longer contract durations.

Customer and vessel requirements are equally important during the recruitment and selection process for seafarers. Specific requirements that are crucial to the operation of the vessel are fundamentally included as basic recruitment criteria when a seafarer is identified for a position.

Other factors such as time with operator, time in rank and time on vessel type are of utmost importance for some segments such as the tanker segment. Where customers of the shipowner such as charterers have their own set of requirements when considering a vessel for charter, one of the crucial aspects is the experience of the crew. Certain cargoes demand a greater level of expertise and knowledge of the trade and thus place heavy emphasis on the seafarers' past sea service.

Looking at each factor individually and combining them will define this complicated process and will reveal the necessity of ensuring that the correct factors are established and are in order to deliver the right competence for the right vessel. Cultural diversity and cultural values are major factors that will be examined separately.

Sound and effective recruitment has an indicative impact on the transportation of goods by sea due to the sheer volume of seafarers required. As identified above, the ability to accurately select and recruit the right person for the position will assist in facilitating sound management and operating practices whilst improving the performance of the vessel through the employment of competent seafarers. It is therefore a requirement that identification and selection of seafarers is carried out efficiently.

Furthermore, the demand of seafarers has increased dramatically in the past 10 years and will continue growing as we see the world fleet increase in terms of volume. With these staggering numbers, it is evident that we will be facing a shortage in the supply of officers in the coming years, whilst the demand for seafarers steadily increases, as depicted below.

An analytical approach to the identification and selection of seafarers would entail a comprehensive assessment of the individual's strengths and weaknesses whilst thoroughly measuring their competencies and knowledge. A combination of academic and practical experience needs to be substantiated by the manning agent so that skill sets are identified and the seafarer is recruited for the most suitable position. As an initial, broad-spectrum review of the seafarer's mandatory qualifications is carried out, a more meticulous interview is undertaken to identify the

seafarer's precise field of expertise based on vessel segmentation. This is an essential process undertaken by the manning agent who is assessing the seafarer's skills, behaviour and knowledge and matching these attributes to the available positions on board. Provided the necessary criteria are met, the seafarer will be recruited by the manning agent and introduced to the crew manager for employment. Although there are alternatives to the recruitment of seafarers such as direct hire of a seafarer without the use of a manning agent, a common practice in the industry today is for crew management companies to utilise manning agents.

4.6.2 Cultural Diversity, Values and Multinational Crew

Cross-cultural diversity is prevalent in this industry and has a direct impact on living and working conditions on board ships, as well as during the communication of ships with shore-based personnel and authorities (Progoulaki 2008). A great body of research has examined various aspects of culturally diverse crew, including that of Moreby (1990), Knudsen (2004), MARCOM (1999), Theotokas and Progoulaki (2007), Progoulaki and Theotokas (2010, 2016), and Sampson and Zhao (2003). Evidence suggests that communication challenges inherent in a cross-cultural manning environment can affect the on-board performance due to diverse and vast cultural background and linguistic skills (Progoulaki 2009).

Furthermore, such cultural diversity has been a contributing factor towards miscommunication, thus resulting in minor misunderstandings and frustrations to significant catastrophic perils (MARCOM 1999). In a multicultural work atmosphere, a fundamental understanding and tolerance of cross-cultural diversity must be a key focus to eliminate political persecution, discrimination and racism. It has not traditionally been an area of focus specifically by shore-based personnel; however, in recent years, there has been a concerted conscious effort towards ensuring engagement of seafarers and training in the field of cultural diversity and tolerance. Crew management companies have developed in-house training programmes specifically tailor designed for their organisation. An example of this is the Work Attitude and Values Enhancement Seminar (WAVE) programme facilitated by in-house trainers in an established Cyprus-based crew management organisation. The course objectives are to teach and motivate seafarers and shore staff whilst instilling imperative values and attitudes to help achieve higher engagement levels and teamwork. This will assist in strengthening the ability to reach goals and objectives of the company and those of its customers.

Effective shipboard communication and interaction cannot be harboured by lack of basic training and culture-sensitive awareness or stereotypical behaviour. In today's industry, acceptance and tolerance of diversity are necessary as each culture

has an immense plethora of experience and professionalism to bring to the workplace and as such is an asset for shipping organisations.

Various cultures adopt a value system that is intricate with strong philosophies and principles, whilst others are more liberal and open to interpretation. Personal values instilled from childhood are indoctrinated during the early development stage and contribute to a person's identity. Such values must be respected in a team structure. Awareness and acknowledgement of cultural diversity and values are beneficial and create positive multiplicity, whilst equally important is that of adopting the company's values and operating based on an unbiased set of common ethics when on board. This is also relevant to shore employees.

4.6.3 Training and Education of Crew

Two fundamental aspects of crew management operations encompass education and training of seafarers. Evidently, monumental catastrophes that have marred our industry, such as the Exxon Valdez oil spill in 1989[17] and Erika oil spill in 1999,[18] both attributed to human error, have cast an unnerving spotlight on this subject matter. As a result, various international and mandatory requirements have been consequently sanctioned in an effort to improve the general standard of education and training among seafarers. Human error has been a contributing factor as seen in the above incidents where results of investigations determined a lack of training on the part of the crew. In the aftermath of the Exxon Valdez oil spill, ExxonMobil implemented the following preventive measures for their seafarers: (a) instituted drug and alcohol testing programmes for safety-sensitive positions, (b) restricted safety-sensitive positions to employees with no history of substance abuse and (c) strengthened training programmes for vessel captains and pilots. The devastating commercial and environmental aftermath of high-profile incidents have tarnished the image of the shipping industry. Consequently, they have also been the catalyst for treaties and conventions to be introduced and ratified whilst enforcing that focus primarily on the human element.

It must be noted, however, that the shipping industry as such has amalgamated to define and standardise minimum requirements for seafarers specific to segmentation

[17]Exxon Valdez oil spill—Shortly after midnight on March 24, 1989, in a tragic accident deeply regretted by the company, the Exxon Valdez supertanker ran aground in Alaska's Prince William Sound. Despite the efforts undertaken to stabilise the vessel and prevent further spillage of oil, more than 250,000 barrels of oil were lost in just a short period of time. Exxon Mobil Corporation 2003–2016.

[18]Erika oil spill—The Maltese tanker Erika, carrying some 31,000 tonnes of heavy fuel oil as cargo, broke in two in a severe storm in the Bay of Biscay on 12th December 1999, 60 miles from the coast of Brittany. About 20,000 tonnes of oil were spilled. The bow sank on 12th December and the stern on the following day. **The International Tanker Owners Pollution Federation Limited, 2016**.

and has continuously reviewed these standards over the years in an effort to proactively improve performance. With this significant improvement, basic and familiarisation training included elementary first aid, fire prevention and firefighting, personal survival techniques, and personal safety and social responsibility. Personal safety and social responsibility is a mandatory STCW basic training course providing induction training in safety procedures and accident prevention. It familiarises novice seafarers with employment and working conditions on board. Consequently, these requirements became mandatory due to the imminent need for ensuring that seafarers were aware of basic techniques to combat incidents whilst promoting safety.

It was evident that work was required on an international front to embrace change again in an effort to keep up with an ever-evolving industry of technological developments and shipboard required competencies. Evaluating and acknowledging the obligation to provide new standards, it was decided to raise the bar in 2012, whereby the amended standard would be fully implemented by 2017. This amendment is known as the Manila Amendments and addresses the following fundamental areas, namely, new rest hours for seafarers, new grades of certification of competence for able seamen in both deck and engine departments, new and updated training and refreshing requirements, mandatory security training, additional medical standards and specific alcohol limits in blood or breath.[19]

With these continuous improvement measures, the international shipping community has been able to standardise its performance, and although incidents have not been eradicated entirely, shipping is still by far the safest and most cost-effective method for the carriage of goods.[20] With the 2010 Manila Amendments in force,[21] Member States, recruitment and placement organisations or manning agents, marine academies and universities, together with approved and licensed training facilities, are obliged to operate based on this standard and are subject to audit. Should they not be in a position to demonstrate their ability to operate at this standard, their certification or licence will be revoked, and any such approvals by Member States, oil majors or others will be invalid. In the maritime industry, a group of six companies that control the chartering of the majority of oil tankers worldwide are together referred to as oil majors. These are Royal Dutch Shell, BP, ExxonMobil, Chevron Texaco, Total Fina Elf and Conoco Phillips.

In conclusion, an industry that provides transportation for 90% of the global trade by sea has a responsibility to provide highly educated and trained seafarers to ensure safe practices. As such, the industry has invested heavily through the

[19]IMO Information regarding STCW, 2016 and US Coast Guard information regarding STCW, 2016.

[20]2016 UN-Business Action Hub, United Nations, Developed with the support of Global Hand and the United Nations Global Compact.

[21]STCW '95 as amended and Manila Amendments 2010—In June 2010 a diplomatic conference in Manila adopted a set of far-reaching and comprehensive amendments to the 1978 International Convention on Training, Certification and Watchkeeping for Seafarers—known to us all more conveniently as the STCW Convention—and its associated Code. The 2010 Manila amendments was intended to include all agreed changes since 1995, address new technology, inconsistencies, interpretations and outdated provisions. STCW A guide for seafarers. International Transport Workers' Federation (ITF) May 2017.

implementation of international standards and continuously evolves to improve quality and raise the bar as technological advances are developed.

4.7 Managing Crew and Crew Performance

The management of crew is the proficiency that a shipping company has to effectively and proactively facilitate a system supported by tools and dedicated resources. This system is established to recruit, train, employ, engage, deploy, repatriate and maintain seafarers within their organisation based on a high standard of cooperation, competitive benefits and safety standards. The management of seafarers should entail clear processes that allow the seafarer to effortlessly seek career opportunities within a shipping company and remain in their employment. Essentially, the seafarers' needs are recognised and attended to, along with that of their future development within the company and remuneration benefits conducive of the standards in the market being equally competitive.

Manning policies have been introduced by shipping companies outlining their social responsibility towards their seafarers, which provide equal employment opportunity for their personnel and reiterate their integrity towards the management of seafarers. Such policies embody a no-discrimination tolerance stance where the main objective is to ensure that seafarers are not differentiated from gaining employment due to qualification, national origin, ethnic background, race, gender, religion, disability and age. Moreover, working and living conditions on vessels where seafarers are placed are in conformity with applicable standards such as the MLC, 2006, or collective bargaining agreements to maintain a quality standard of living for all seafarers.

Ship management or crew management companies acting for and on behalf of shipowners shall ultimately be responsible for their seafarers during their employment tenure. This will entail an assumption of obligations as an employer by demonstrating a care of duty towards the seafarer from his/her departure from his/her domicile until his/her return and throughout his/her leave period. Supporting a sound social environment on board in addition to maintaining a responsible attitude for seafarers is paramount when analysing the management of crew.

Tools have been introduced to monitor seafarer satisfaction as a key element in the management of crew. Whilst it is necessary for the crew manager to assertively and proactively correspond, communicate and interact with seafarers, it is equally of great importance that the seafarer is engaged in this process. Tools usually include performance review through an appraisal system, seafarer satisfaction surveys, briefing and debriefing meetings and other face-to-face meetings on board or ashore (company's premises or in the manning offices). Successful management of crew heavily relies on clear and concise cooperation and engagement by the seafarer.

With stringent customer and charterer requirements, international regulatory bodies and various company-imposed competencies, together with limitations in terms of having the right person for the job based on qualification, time in position, time on vessel type and time with operator, performance is without a doubt of utmost significance. Trading of vessels would be challenging if the conditions

outlined above were not in place, and performance inevitably is what becomes a game changer in this equation.

Performance appraisals are a noteworthy aspect of crew management highlighting the significance of monitoring performance on board. This is necessary in order to evaluate a seafarer's capabilities based on his/her performance and position, future career development and assessment for promotion and responsiveness to company values and affirmative attitude towards daily tasks. Likewise, a performance review is utilised in an effort to collaboratively acknowledge strengths and weaknesses alike and provide the seafarer with a structured training programme when deemed necessary by his/her assessors, whereby providing equal opportunity for all and possibilities for improvement.

Competence management system (CMS) is an addditional tool that has been introduced to manage crew performance. CMS specifies complete profiles for every position on board providing seafarers with an efficient development and career planning platform to identify promotional requirements and motivate progression.

4.8 Managing Crew Expectations

Notwithstanding the fact that management and performance of seafarers is testimony to the way in which shipping companies handle the human resource element, equally important is that of managing seafarers' expectations. Expectations come in many forms and are identified in several ways such as pre-departure meetings, on board meetings, debriefing meetings and thorough daily interaction from ship to shore. Many crew management companies carry out a seafarer satisfaction survey that enables the seafarer to provide vital feedback to the company and have a dedicated forum to raise suggestions. Expectations, although personal to each individual seafarer, may include but are not limited to competitive remuneration packages, ITF standard contract terms and conditions or equivalent minimum employment terms and conditions as defined by international conventions, benefits, training, career development/future leader programmes, welfare facilities on board, welfare facilities ashore and company policies.

When discussing competitive remuneration packages, market-level salaries based on vessel segmentation, trading area and type and consideration for a seafarer's seniority in rank and in the company are to be factors influencing the attractiveness and sustainability of a package.

A vessel enrolled with the ITF is one that provides an internationally approved standard for its seafarers in terms of salary scales, hours of rest, leave, payment of salaries, compensation for disability/early repatriation/death, holidays per nationality, on-board complaint procedures and various other conditions. In the absence of an ITF enrolment and where minimum employment terms and conditions prevail as addressed by MLC, vessels are operated based on an internationally recognised standard of measurement ensuring that the conditions on board and within the company are high and favourable for the seafarer.

Aside from the fundamental salary earned by a seafarer, shipping companies may provide benefits in the form of performance-based bonus schemes, return bonuses, standby payments, permanent employment contracts, structured salary increments, scholarships, reimbursement for national licences/endorsements, per diem[22] allowances, facility to have spouses/dependants on board, short contract tenures, forward and long-term employment planning.

Shipping companies develop training schedules for their seafarers as part of the seafarer's ongoing career advancement. This is a benefit as it can be offered in most cases free of charge or subsidised, and expenses can be partly or fully covered, including in some cases basic wages when attending the training courses. The qualification and experience remain with the seafarer throughout their career.

Identifying talent through career development and future leader programmes can be challenging. Such programmes are designed for companies to provide a systematic approach to recognising and developing talent within their respective organisations. According to the Chartered Institute of Personnel Development, talent management is defined as the systematic attraction, identification, development, engagement, retention and deployment of those individuals who are of particular value to an organisation, either in view of their high potential for the future or because they are fulfilling business and/or operation-critical roles.[23] Seafarers benefit from such programmes and have a keen expectation towards career development.

Welfare on board, meaning standard living conditions, is expected to be in line with MLC regulations. Such standards include Internet access, welfare funds, recreational equipment, entertainment systems, social gatherings/celebrations, sufficient daily victualling rates, etc. Welfare ashore is a major part of what shipping companies adhere to do for their seafarers, and that comes in various forms such as extended P&I insurance cover for seafarers and their dependants, social gatherings, family clubs, holiday parties, charity events, outings, social networking forums, family days and various other events/programmes. For seafarers, a shipping company that has a clear directive through policies are typically the companies that operate at a high standard and provide transparency to their seafarers. This is a high-priority expectation as it has a close link to the safety culture of the company.

The crew manager will ensure that the seafarers are briefed accordingly of their obligations and the company requirements. Seafarers are to acknowledge their understanding of the benefits afforded to them and on-board familiarisation procedures during their pre-departure briefing in their home country. As this is not a static process but rather an ongoing one where managers strive to achieve performance excellence through continuous improvement and education, incessant efforts need to be applied in order to ensure that the seafarers' expectations are met and the objectives set out within an organisation are communicated systematically. The benefit gained through this process is the development of a platform for the steady communication of objectives and expectations educating both the seafarer and the manager.

[22]Per diem—an allowance or payment made for each day. Oxford Dictionaries, 2016.

[23]Chartered Institute of Personnel and Development, 2016.

4.9 Marine Academies

4.9.1 Role of Marine Academies

A marine academy is an educational institution either operated by a State or privately, which specifically undertakes the training of seafarers. This training extends to marine engineering, marine navigation, maritime law, ship administration, manufacturer-type-specific training courses, basic training courses based on STCW, MLC and customised training requirements. Marine academies are committed to enhancing seafarers' technical and behavioural competencies whilst focusing on bridging competence gaps and equipping seafarers with the practical knowledge, understanding and proficiency required to perform tasks in alignment with requirements.

Noting that seafarer certification is heavily controlled by various bodies such as the IMO/ILO (STCW/MLC) and the Member State, it is also necessary that regulatory bodies such as classification societies (in connection with flag or IMO/ILO States) ensure that the academies operate at a recognised standard. In doing so, they focus on quality control, assessment of trainers on their competence and experience and systematic audits of the on-site facilities so as to objectively collect evidence supporting the academy's standard of operation. Also, as a process of elevating seafarer competence, international accreditation for courses is pursued. Through this process, academies receive accreditation by Member States to operate and issue certificates of competency to seafarers, as is the case seen earlier with EMTI.

Marine academies are vital to the shipping industry as they are the vehicles facilitating the growth of the global manpower pool by taking people and providing opportunities to them, thereby creating career prospects in shipping through the administration of courses and training. Without marine academies, the seafaring population would be non-existent, and furthermore, with the ratification and implementation of conventions and regulatory bodies ensuring the standardisation of training on a global scale, common objectives are maintained and the standard by which the industry operates is streamlined.

4.9.2 Relationship Between Shipping Companies and Marine Academies

There exists a close and transparent relationship between shipping companies and marine academies as it is in the best interest of both parties to collaborate and ensure alignment and interaction reaffirming the intent to produce quality and competent seafarers. In this section, there will be an examination of the relationship and a discussion on customised training programmes, development of specialised training modules, joint venture (JV) set-ups (distribution of costs, equipment, trainers, etc.),

approved trainers provided by shipping companies, 'Train the Trainer' programmes and audit of academies by shipping companies.

Customised training programmes have been established between the two parties. There is a necessity to cooperate on this level as there is a noted rise in specialised and type-specific training. Through company-sponsored training programmes, the shipping company gains benefits from having a tailor-designed programme initiated for a specific requirement such as dynamic positioning (DP) training and further allows the marine academy to add another course to its syllabus for seafarers interested in those courses.

Through the development of specialised training modules, both organisations are benefiting from having a competitive edge in the market and create a cohesive relationship beneficial to all stakeholders. The marine academies supported by shipping companies are provided with significant investment and have a detailed involvement in the development of such courses. The financial risk is shared, and the quality of the training is overseen by the shipping company requesting the training module. This is advantageous in the sense that a long-term and sustainable relationship is established.

Some shipping companies enter into a joint venture relationship with marine academies. The purpose of this is to strengthen their presence in the market, create value-adding services for their external customers and have an organisation created to train seafarers based on company principles and values. These marine academies are of course still subject to international compliance and as such undergo audits as deemed necessary.

Shipping companies by default employ seafarers at shore-based positions within their organisations as they provide value to a company with their seagoing experience and curricular background. Such personnel are often utilised as lecturers or trainers in marine academies as they are considered qualified trainers. The advantage is twofold whereby they have shipboard and shore experience and can lecture possessing a plethora of information to share. One other positive utilisation of shore resources for marine academies is seen through the success of 'Train the Trainer' programmes. Ideally, certified trainers who are also shore staff employees can be recruited to train other trainers in an effort to share knowledge and increase the number of trainers available within a marine academy. Such trainers can also be utilised elsewhere, especially in cases where strategic growth of marine academies is anticipated and where trainers are in demand.

Such relationships would not exist between shipping companies and marine academies if they were not subject to regular audits. The purpose of an audit is to find objective evidence supporting the correct implementation of processes and procedures as carried out in compliance with quality standards and to provide suggestions on opportunities for improvement. This undertaking strengthens the relationship between the two parties allowing for a close and transparent collaboration.

4.10 Conclusion

This chapter has set out to identify, define and discuss crew management operations through the examination of key elements that are imperative for the successful and sustainable management of seafarers. The role of crew managers in providing service based on best practices, expertise and quality-oriented processes is paramount and a vital component of ship management operations as a whole. The interface between marine academies and shipping companies is given emphasis and importance in this chapter due to the current and future global demand and supply of seafarers and the essential need for a concerted effort to better comprehend the demands of our evolving industry. In conclusion, notwithstanding the fact that crew operations management is not a stand-alone sector within ship management operations, it does play a crucial role in vessel performance management and is a key element to the successful management of vessels.

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Chapter 5
Technical Operations Management

David Furnival and Jonathan Crispe

A ship is always safe at shore, but that is not what it is built for—Albert Einstein

5.1 Introduction

This chapter provides the reader with a basic understanding of technical operations management within a ship management company. This is generally one of the most demanding and broad-reaching disciplines of ship management, involving interaction with not only office and ship board personnel but also a variety of external bodies required for successful ship operation and trading. The topics include the organisational structure of the team needed to manage the fleet, the relationships with other departments within the organisation and the main areas of concern related to the actual management of the ships, including client relationships, running the ships, emergency response, maintenance and managing expenditure. If not properly managed, the ship may at best prove uneconomic to operate and at worst a danger to life and the environment. The chapter concludes with some of the challenges that are expected to play a role within technical operations management in future years. Each of these topics aims to brief the reader with the basic components of technical operations management. By the end, the reader will be able to engage with a technical operations team with a clear understanding of the role that the team plays within the scope of technical operations management.

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I.D. Visvikis, P.M. Panayides (eds.), *Shipping Operations Management*,
WMU Studies in Maritime Affairs 4, DOI 10.1007/978-3-319-62365-8_5

5.2 Defining Technical Operations Management

Technical operations management includes activities required to maintain a ship in a safe, seaworthy and operationally reliable condition, meeting all required international and national legislation, to carry out the prime objective of the safe and efficient carriage of cargo. The main activities are as follows:

- preparation[1] and implementation of the company's Safety Management System (SMS) as required by the International Maritime Organization (IMO)[2] and particularly the International Safety Management Code (ISM Code)[3], International Standards Organisation (ISO)[4] and other key stakeholders such as classification societies,[5] charterers[6] and oil majors;[7]
- establishment and diligent use of a ship asset preservation and maintenance programme that encompasses all ship machinery, equipment and structure;
- implementation of a procurement system that provides ships with provisions, spare parts and stores in accordance with the needs of the crew, the maintenance programme and the ship operations;
- maintaining a team of motivated and professional shore staff, which includes the scope of maritime experience and skills needed to support the master, the officers and the crew in the effective fulfilment of their duties and to provide both direct supervision and independent oversight to ensure quality control and compliance
- provision of a clear and transparent monitoring and reporting system that provides management information covering the key areas of ship operation, including safety performance; ship condition, reliability and maintenance status; budget variance; ship certificate status; oil major vetting[8] and Port State Control[9]

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[1]The technical department's role in developing procedures is to provide process expertise, whereas the overall SMS is generally managed by the Compliance Department.

[2]http://www.imo.org.

[3]http://www.imo.org/en/OurWork/HumanElement/SafetyManagement/Pages/ISMCode.aspx.

[4]http://www.iso.org.

[5]A classification society is a non-governmental organisation that establishes and maintains technical standards for the construction and operation of ships and offshore structures. The society will also validate that construction is according to these standards and carry out regular surveys in service to ensure compliance with the standards. See http://www.iacs.org.uk.

[6]A charterer employs the ship to carry the cargo.

[7]Oil majors are a group of multinational oil companies given this title due to their size, age or market position.

[8]Oil Major Vetting is the process through which oil majors vet and approve ships which are nominated to lift their cargoes.

[9]Port State Control is the inspection of foreign ships in national ports to verify that the condition of the ship and its equipment complies with the requirements of international conventions and that the ship is manned and operated in compliance with these rules.

(PSC) performance; ship emissions, environmental compliance and energy efficiency.

5.2.1 Responsibility of Management

Technical operations management activities can typically be carried out by a shipowner directly or subcontracted to a third-party manager. Traditional shipowners tend to carry out the technical operations management in-house, but owners such as equity investors, banks and commodity traders that do not have the necessary in-house experience, or the desire to diversify their business, routinely utilise third-party managers. Irrespective of whether in-house or subcontracted, the responsibilities and challenges of technical operations management remain the same.

5.2.2 Special Considerations for Oil, Gas and Chemical Tankers

5.2.2.1 Oil Major Vetting

Each time a tanker is nominated to a charterer and considered to lift cargo at a terminal that requires the consent of an oil major, the charterer will refer the nomination to the respective oil major vetting department. The oil major will then 'vet' the ship. This may involve the oil major inspecting the ship. If so, the inspector will usually complete a Vessel Inspection Questionnaire (VIQ), which is uploaded into the Oil Companies International Marine Forum[10] (OCIMF) Ship Inspection Report programme[11] (SIRE) system. If no inspection is required, the oil major may review previous OCIMF-SIRE reports. Owners must also provide and maintain a Vessel Particulars Questionnaire (VPQ) in the SIRE system.

The Intertanko *A Guide to the Vetting Process* (11th edition, 2015) states that 'Ship owners and operators identify and manage risks in their operations on the basis of identifying hazards and then rating the associated risks to manage them through and effective cost/benefit assessment. Oil companies, other charterers and different stakeholders in the industry such as Port Authorities, Flag State, insurance companies, etc, also do the same exercise, albeit from their own perspective within this operation.'

[10] https://www.ocimf.org/.

[11] https://www.ocimf.org/sire/.

5.2.2.2 Standards and Best Practice

In 2004, OCIMF introduced a scheme called Tanker Management and Self Assessment (TMSA) as a tool to help ship operators assess, measure and improve their safety management systems.[12] It complements industry quality codes and is intended to encourage self-regulation and promote continuous improvement among tanker operators. This assists the technical operations department and clients alike by providing clear best-practice guidelines that are fully transparent to both sides.

5.3 Organisational Structure of Technical Operations Department

There are numerous ways to organise a technical operations department, depending on the size and management philosophy of a company; however, they must always comply with the requirements of the ISM Code. The Germanischer Lloyd (GL) Best Practice Ship Management Study (2013), in cooperation with Fraunhofer CML, states that '. . . many managers have moved away from a pure vertical organisation to a more process-based one. The best-known examples are the so-called fleet teams, where technical, purchasing, crewing and/or accounts experts sit together in one organisational unit to serve a certain number of ships.' The description below outlines the main roles within a typical fleet team, including functions, expertise and responsibilities. It is crucial that all members of the team work in close cooperation with clear and transparent communication in order to manage the ships successfully.

5.3.1 Fleet Director

The Fleet Director requires exceptional leadership skills, capable of managing multiple teams and multiple clients and contributing to strategic direction. They are normally a former Master, Chief Engineer, Naval Architect or experienced crewing professional. They ensure that the technical and marine operations are performed in a safe and efficient manner, in accordance with the highest global standards of quality ship management whilst conforming to all relevant legislation and quality standards. This is to achieve and exceed predefined performance levels in ship operations and cost optimisation and operate and maintain the fleet ships to ensure maximum commercial availability of the client's assets whilst striving for better energy efficiency, innovation and environmental compliance in consultation

[12] https://www.ocimf.org/media/8874/TMSA.pdf.

with the client. They provide the right level of leadership, coaching and mentoring to the Fleet Managers and other leaders in the fleet teams to ensure that the correct values and culture are cascaded down and make sure that the resources available are adequate, including succession planning and training effectiveness.

5.3.2 Fleet Manager

The Fleet Manager requires strong leadership skills, capable of managing and motivating a multi-disciplined team to drive compliance, deliver good operational performance and client satisfaction. Normally, they are a former Master, Chief Engineer, Naval Architect or experienced crewing professional. They coordinate and monitor the safe and efficient operation of the fleet in accordance with highest global standards of international ship management, relevant legislation and quality standards. This includes impeccable control and management of the planned maintenance system (PMS), repair and maintenance activities, management of ship inspections/audits, dockings, major projects and sustainable commercial viability of the fleet ship. They also coordinate the various functional aspects of the team configuration, such as technical operations management, marine superintendents, purchasing teams and the right level of leadership to ensure that the fleet team members are trained, coached and mentored as required to evolve a strong cohesive team. They keep abreast of all latest developments in the company and industry and engage actively with the clients' representatives to understand their short- and long-term requirements and ensure compliance.

5.3.3 Technical Superintendent

The Technical Superintendent requires strong engineering and ship construction knowledge, particularly for the ship type under management, with good interpersonal skills and able to support remote management teams on board and to deal effectively with multiple tasks. Normally, they are a former Senior Marine Engineer or Naval Architect. They monitor and control the safe and cost-efficient technical operation of all assigned ships using the available resources, within the defined parameters of cost, commercial viability and operational excellence in line with the client's expectations.

5.3.4 Marine Superintendent

The Marine Superintendent requires strong nautical and cargo knowledge, particularly for the ship type being managed, with good interpersonal skills and able to

support remote management teams on board and to deal effectively with multiple tasks. They are normally an ex-Senior Deck Officer. They monitor and control the smooth operation of all ships assigned and provides the required nautical and commercial support to achieve the desired levels of safe operational performance and commercial effectiveness.

5.3.5 Electrical Superintendent

The Electrical Superintendent requires strong electrical and electronic knowledge with good interpersonal skills, able to support remote management teams on-board and able to deal effectively with multiple tasks. They are normally an ex-Senior Electrical Officer. They monitor and control the implementation, maintenance and safety of electrical and electronic systems of all assigned ships using the available resources, within the defined parameters of cost, commercial viability and operational excellence in line with clients' expectations. They also provide remote assistance with electrical system installation, troubleshooting and repairs, as needed.

5.3.6 Naval Architect

The Naval Architect requires in-depth ship design and construction knowledge, able to support both the new building process and ships in service. Normally, they have a bachelor's degree in naval architecture or related engineering field such as ocean engineering. They are responsible for ship modifications, supervising enhanced or structural surveys, oversight of large-scale steel projects, advising on new building, plan approval and ship design, providing guidance on new legislation relating to construction, advice on building specification and contract negotiation.

5.3.7 Planned Maintenance Officer

The Planned Maintenance Officer requires very good planned and condition-based maintenance knowledge, able to support and maintain advanced IT applications. Normally, they are an ex-Marine Engineer with advanced software training. They ensure the satisfactory implementation and maintenance of the appropriate planned maintenance, purchasing and other associated software on board the technically managed ships and within the office.

5.3.8 Technical Officer

The Technical Officer (purchasing/vetting) require a good knowledge of supply chain management, ship certification, oil major vetting rules and must be able to work effectively in a team environment. Normally they are university graduates. They handle the technical purchasing and technical service activities for ships assigned to them, ensure that materials/services are supplied promptly and efficiently. They support the ships' Technical Superintendent in managing the ship budget and ensure adequate cost optimisation. They assess and report on the performance of ships, suppliers and service providers. They also support the company's procurement strategies to achieve the defined targets and goals.

5.3.9 Additional Functions

In some larger organisational structures, the technical operations department's responsibilities may be supported by centralised teams that provide improved administration and efficiency, such as procurement, maintenance and repair, dry docking, catering, lay-up services.

5.4 Relationship with Other Departments and Ship Management Functions

The technical operations department forms the backbone of the technical operations management. However, it does not work in isolation from the larger company structure. It is essential that the technical operations department maintains an open dialogue with the following departments, each of which affects the efficient running of the ships in their own right. Although the technical operations department is responsible for the activities laid out in this chapter, the crewing, compliance, accounts, commercial, information technology and human resources departments all play key roles in the effective operations of the ship.

5.4.1 Crewing

Effective technical operations management relies, to a very high degree, on competent officers and ratings. It is essential that the on-board management team is effective and can be trusted to deliver the responsibilities of their rank. Maintaining good morale and motivation on board is essential for a safe and efficient working environment. It is therefore important for the technical operations department to

maintain a close working relationship with the crewing department to provide accurate feedback though the appraisal process on individual and team performance. The root cause of incidents most often relates to human factors. To provide effective corrective action, the crewing department must take as much responsibility for loss prevention as the technical operations department.

5.4.2 Compliance/Quality Assurance (QA)

An independent capability to monitor operational compliance with the SMS and to provide the necessary quality control for consistent high performance is an intrinsic part of ship management best practice. The Designated Person Ashore (DPA)[13] forms the core of the compliance/QA team or department and is a key requirement of the ISM Code. It is important that all members of the operational staff, including the on-board management team, understand that the objective of the compliance/QA department is not to apportion blame. Their remit is to determine the root cause of procedural lapses, incidents, customer complaints or negative performance trends to drive continual improvement for the benefit of the clients and the company reputation. By its nature, the relationship between the technical department and compliance/QA department will be somewhat at arm's length to ensure impartiality and avoid conflict of interest, but it should be one of mutual respect, trust and cooperation.

5.4.3 Accounts

The technical department is responsible for producing operating expenses (OPEX) budgets, procurement, budget control and variance reporting. However, it relies on the accounts department to provide the appropriate financial framework and oversight to ensure accuracy of financial reports, effect invoice payments and manage funding and liquidity. The technical staff and the accounting staff need to cooperate, particularly when preparing financial reports for the client, approving payments and managing funding.

5.4.4 Commercial

The technical department is not directly responsible for commercial operations, such as cargo fixtures; however, it plays a key role in ship availability and

[13] As defined in the ISM Code.

preparedness and in ensuring that the ship complies with any charter party[14] (time charter or voyage charter), which has a direct effect on commercial performance. Therefore, good communication between the two departments is essential. From the technical department, this is principally the responsibility of the Marine Superintendent, who supports the Master and Chief Officer with the loading, carriage and discharge of cargoes; voyage planning; and external vetting approval. There may also need to be some oversight of the commercial reporting by the ship, particularly if commercial operations are managed by a third-party external to the technical managers.

5.4.5 Information Technology

Modern technical operations management relies heavily on the use of reliable hardware systems and functional software applications to provide transparency and management information for data-backed decision-making and reporting. To achieve this, there must be a strong collaboration between the technical and IT staff to ensure that the software design meets the operational requirements and that upgrades are made in alignment with technical operations management strategies. The data to be transmitted, and when this is done, are defined by the technical operations management, whilst the IT staff provides solutions to providing reliable and economic transmission.

5.4.6 Human Resources (HR)

For a technical department to be effective, it must be staffed with the right combination of skills, experience and attitude—people with a strong service mentality, client focus and empathy for the crew on board. This is a challenging task, especially when recruiting from a seafarer pool, where strong leadership characteristics on board may not be appropriate for the respective positions ashore. It is often the case that sea staff with only a short period in an on-board senior role is more suited to management positions ashore as they can better adapt to an office environment. Therefore, good interaction with the HR department is essential to provide the necessary expertise for accurate appraisals, recruitment, talent pipeline development and succession planning, as well as for the departments' staff professional development.

[14]The contract between the charterer and the shipowner by which the ship is hired for the conveyance of goods on a specified voyage or for a defined period.

5.5 Technical Operations Management Functions

The five pillars of technical operations management are client relationships, running the ship, emergency response, maintaining the ship and managing expenditure. Each of these topics is covered below and will ensure an understanding of the daily processes covered by the technical operations department.

Within client relationships, the management functions include submission of quotations, contracts and addenda, ship budgets, accounting, and providing added value.

The running of the ship requires management when accepting new ships into management, and transferring out of management, an understanding of how to assign ships to superintendents, how to manage and monitor ships and the importance of ship certification and readiness for trading.

Office emergency response is a key part of the technical operations management and requires a high degree of attention. The remote and isolated working environment of the ship means that fully effective emergency response is essential when aiding the ship from the office during an emergency.

Maintaining the ship covers planned maintenance, identifying critical equipment, managing modifications and upgrades, and dry docking and afloat repairs. Ensuring that each of these is adequately managed means that the ship is available to trade and also ensures the preservation of the most important asset—the ship.

Finally, with respect to managing expenditure in relation to the operating budget, key considerations include purchasing and invoicing, stock control, and selection and maintenance of supplier contracts. It is important to remember that the ships operate within a commercial environment, and although there are essential costs relating to the management of the ship, the technical operations department should maintain an awareness of the income that the client is deriving from the ship in order to fully understand the external pressures that the client is facing. This understanding of the customers' needs sets the technical operations management above the competition as through understanding comes the ability to adapt and change according to market forces.

5.5.1 Client Relationships

There are a number of areas that require interaction and management between the technical operations department and the client. This involves managing customer expectations, providing quotations for services, drafting and concluding contracts, drafting and adhering to operating expenditure, detailed reporting and offering the client additional services and structure that add value to the transaction.

5.5.1.1 Ships/Clients Coming into Management: Submission of Quotations

For a third-party manager, it is customary for a client, or a prospective client, to request a quote for the management of the ship. The manager will be expected to provide an indicative budget and crew complement, together with ship management experience and services that may encourage the client to award the business. It is important that the manager conduct some research into the prospective client to ensure that the partnership will be beneficial.

The managers must assess the risk of the new business, considering the condition of the ship, its commercial viability and the financial strength of the client. For this reason, it is recommended that a ship inspection is conducted in advance of finalising any agreement with a new client. This will allow more accurate budget preparation and ensure identification of any issues that may require correction following takeover. Any deficiencies are to be raised with the client, remedial action planned and budget revised. As a worst case, there may be findings that prevent the manager from continuing with this business.

5.5.1.2 Contracts and Addenda

Often an industry standard management contract is used as the basis of the agreement between client and technical manager, such as the Baltic and International Maritime Council[15] (BIMCO) Shipman and Crewman, with appropriate modifications to satisfy both parties. Alternatively, a contract specific to the project may be provided by the client.

Whatever the case, the scope of the managers' and client responsibilities should be clearly defined in this document, such as the method of funding, procedure for approval of extraordinary expenditure, number of management days on board, compensation for additional days, compensation for early termination, level of liabilities and reporting requirements. Before signing the contract, it is usual for the manager's legal representatives to review the final document.

5.5.1.3 Annual Operating Expense (OPEX) Budget

The annual budget, and sometimes a projected budget for up to 5 years, will form an addendum to the management contract. This will be broken down into several groups covering categories of technical expenditure required for the normal operation of the ship, together with an explanation of how these costs are calculated. It is important to explain the assumptions made in the budget, for example, what

[15] https://www.bimco.org/.

exchange rates are used, what rates of inflation apply, how many sea days are used calculating consumptions. Consideration is given to the following:

- the ship's complement required to operate the ship in compliance with safe manning,[16] their employment and travel costs;
- ship age;
- equipment type and cost of maintenance;
- trading area and contracted supplier costs in this area;
- ease of access to ship and associated transportation costs of parts and material.

The initial budget is normally indicative and should be reviewed and adjusted after a short period of management experience.

Cost-Plus Budget

For a cost-plus agreement, a client will be expected to pay for all expenditure incurred in the management of the ship during the year, whether budgeted or unbudgeted, plus a management fee. The budget must include all reasonably foreseeable expenditure for consumables, maintenance, service costs and insurance so that the client can rely on it for financial planning. With the agreement of the client, the budget may also include a margin for unforeseen costs such as damage repairs and insurance deductible. In this option, the risk for budget overrun is with the client.

Fixed Cost Budget

Alternatively, a client may ask a manager to bid on a fixed cost basis, where all management costs are covered by a lump sum. In this case, the risk for budget overrun rests with the technical operations department. This is common for crew management but less so for technical operations management. Whilst it may represent an increase of annual OPEX for the client compared with a cost-plus arrangement, it offers greater certainty of expenditure and is more efficient to administer for both parties.

Allocating Account Codes

The allocation of accounting categories/codes is agreed between the manager and client before ship takeover. The client may be satisfied with the coding provided by the manager; alternatively, he may wish his own coding to be used for budget and variance reporting. If so, there is generally a 'mapping' process, where the

[16] As outlined by IMO Resolution A.1047(27).

manager's account codes are mapped to the client's own system of coding. The technical operations department must ensure that there is a mechanism for limiting approval of expenditure based upon seniority of the technical operations management team. Approval in advance of commitment should be obtained from the client for expenditure over budget or in case of spending that has not been budgeted.

Customer Focus

To encourage a client to use their services, a manager may provide 'value added services'. For example, for newly built ships, this may consist of support before and during the building process. Other examples include access to group purchasing discounts, reporting tailored to client requirements, supporting commercial operations. The use of a key performance indicator (KPI) system between the client and the third-party ship manager is a structured way to reward good performance and to penalise poor management. Usually this takes the form of a percentage bonus or penalty to the annual management fee. Typical KPIs can include ship off-hire, Port State inspection performance, budget control, vetting performance etc. It is important that they are quantifiable and the bonus/penalty reasonably balanced.

5.5.2 Running the Ship

Once a contract is signed with the client, the technical operations department is legally responsible for running the ship as per the contract terms. Before this happens, it is important for the technical operations department to have a full understanding of the ship by conducting a risk assessment and condition assessment. Once the evaluation is complete, the budget is often adjusted. Then the ship can be assigned to a technical superintendent supported by a fleet team. Whilst in management there is a comprehensive set of procedures to ensure effective management and monitoring of the ship, including management of ship certification and trading readiness. There should also be procedures to plan for the vessel eventually being transferred out of management.

5.5.2.1 Accepting a Ship into Management

Before accepting a ship into management, an assessment of the ship will be conducted by the prospective manager—usually including a physical inspection—to assess condition and identify issues that may need to be addressed after takeover. The technical operations department performs a review of the documentation that allows the ship to trade, such as statutory certificates, classification society reports and commercial documentation in advance of inspection to assess any areas that require close examination when on board.

It is customary for the manager to have a standard checklist for takeover of a ship. This will act as an aide memoir for the many and varied actions that must be taken by the manager before, during and after takeover. In addition to the manager's own requirements, there may also be procedures that must be followed as part of the sale. Often a standard industry document such as the Norwegian Ship Sale Form (NSF) or Singapore Ship Sale Form (SSF) will be used for this purpose. Change of owner, classification society and flag may need to be performed in addition to changes to statutory documentation, ship's crew, ship management system and contracted suppliers.

For a well-planned transfer of management, it is advisable for two of the manager's senior officers to join the ship a few weeks before takeover to start familiarisation. In addition to familiarising themselves with the ship, they will start completing the tasks required in the takeover checklist. This will include witnessing the testing of safety equipment, assessing the operation of ship equipment and machinery, reviewing maintenance and testing records, inspecting tanks and spaces, checking ship documentation and reporting any issues to managers that may affect handover or future operation. The manager's personnel must only act as observers and must not operate or interfere with the ship's equipment. They will normally be expected to sign a waiver for any claim against the present owner/manager and be insured by the new manager.

5.5.2.2 Assigning Ships to Superintendents

The key point of contact for the ship will be the Technical Superintendent. They are assigned primarily based on ship type experience, together with current workload and ship types currently under their management. The number of ships allocated to a Technical Superintendent will depend upon the workload needed to manage the ship. This depends upon ship type, age and quality of build, current condition, trading pattern, voyage length, planned projects, etc. A newer ship on a dedicated trade of long, ocean voyages will normally take less management time than an older ship on single voyage charter with many port calls in obscure locations.

There are different schools of thought concerning the allocation of sister ships, or types, within a management office. Some may allocate all to one superintendent; others divide them among superintendents. It may seem the obvious choice to keep the sisters with one superintendent; however, by dividing them, experience of this class of ship is spread among several management staff. This has benefits during periods of absence when cover is required.

In a similar manner, Marine Superintendents are assigned to certain ships. Their duties generally cover marine and cargo operations, together with safety and compliance matters. In larger companies, the day-to-day operations and the safety and compliance may be separated. Again, allocation of ships will be dependent on the complexity of the marine and cargo operations. A container ship on a dedicated run requires far less shore management than a chemical carrier transporting multiple and varying grades of aggressive chemicals with frequent port calls.

5.5.2.3 Ship Management/Monitoring

The company SMS, which is a statutory requirement of the ISM Code, forms the basis of how the manager operates their ships. This defines the policies and procedures that the manager and the ships' staff follow to comply with the requirements of the ISM Code. The key to ISM is identifying where management does not comply with policies and procedures (non-conformities), defining corrective action and following up to close out. The Intertanko *Safety Management Initiatives in Shipping* (2016) states that 'In the shipping business, there is a moral, legal and financial imperative to implement an effective safety management system. In the international maritime industry, there is a legal requirement to have in place a safety management system under the ISM code.'

The reporting and monitoring requirements are contained within the company SMS; however it is common for the manager to use propriety software covering routine management functions, such as planner maintenance, purchasing, safety and compliance, certificate/document management, voyage planning and reporting. This software, together with satellite email and voice communication, forms the basis of day-to-day management of the fleet.

The communication procedures between office, ships and wider world are clearly defined in the company SMS. The office email system should be configured to avoid overloading the users with messages that do not immediately concern them. It is customary for those dealing with specific ships or functions to have defined email groups. However, a method of accessing communication histories by other staff in case of absence or for oversight by managers is required.

In conjunction with office-based management, the Technical Superintendent will be expected to perform physical inspections on board at defined intervals. Wherever possible, these visits should include a short voyage to assess the ship at sea, as well as during a port call. The inspection will follow a structured company format, which should define the minimum scope for inspection, can produce trending as to condition/performance and should generate a list of action items for follow-up after inspection. The visits are also an ideal opportunity to work with the ships' staff and promote a professional working relationship.

5.5.2.4 Ship Certification and Trading Readiness

For the ship to trade, she must have valid statutory and class documentation, as defined by IMO, flag and class, plus any local trading requirements (such as those required to trade to the USA). It is the responsibility of the managers to ensure that this is maintained. IMO and the ship's flag state define the requirements for statutory surveys and who will perform them. Additionally, there will be requirements specific to ship types and their particular design. The flag state may use its own surveyors to conduct these surveys or, in some cases, may use the services of class on its behalf. Class also have their own requirements for survey, and this will

usually depend upon the ship type and the survey notation for the ship—continuous, planned maintenance, condition-based maintenance. The flag and class rules will also instruct the managers on the reporting requirements. For example, formal reporting will be required for Port State detentions, pollution incidents, collision with other ships, damages related to classified machinery, etc. Depending upon the nature of the incident, attendance may be requested on board by representatives of flag or class.

In addition to statutory requirements, several ship types have specific commercial survey requirements in order that they can trade. This generally takes the form of vetting and self-assessment and is most common in the oil and gas shipping industries. For tankers or gas carriers to be accepted for spot, or longer charter, the ship will normally need to have been physically inspected and received vetting approval by an oil major. Similarly, the management office will need to have conducted a self-assessment of their management processes and have been audited by an oil major. This process can be time-consuming for those involved, and often the administration of the process is managed by the Marine Superintendent of the technical department.

Ships at a certain age must undergo physical inspections and thickness gauging to comply with oil major requirements, usually referred to as a Condition Assessment Programme (CAP) Survey. Although often performed by class in conjunction with docking surveys, they are in addition to statutory or class requirements and provide a rating for the ship in a number of categories. The requirements of the oil major may differ slightly, and it should be established if the ship needs to undergo CAP Survey and the oil major requirements for ship acceptance. It may be necessary to increase the scope of dry-dock work following the results of the CAP Survey.

5.5.2.5 Delivering Ships Out of Management

A similar checklist is used when transferring the ship out of management as that used when it entered management. If the ship is to be sold, it is important that the manager receives clear instruction from their client regarding the level of access to the ship and her documentation that may be provided to the prospective buyers. It is probable that there will be an inspection by the prospective buyer, and clear guidance should also be provided to the ship's staff regarding spaces that may be inspected and documentation that may be viewed by the inspector/s.

5.5.3 Office Emergency Response

In the event of a serious on-board incident, the technical operations department will take key roles in the company's emergency response team (ERT). Typically, the Fleet Manager will take the role of ERT Leader to communicate with the ship,

client and senior management and coordinate resources in accordance with the Emergency Response Manual. The Technical Superintendent/Officer will contact salvage, repair and service companies; classification society; and ship insurers. The Marine Superintendents will contact port and coastal states, maritime rescue centres, charterers and oil majors and provide guidance on cargo and navigational matters. These key ERT members are supported by the following:

- Compliance: will take responsibility for media response, provide guidance on safety, security and environmental matters and contacting the designated Qualified Individual and legal advisors;
- Crewing: will take responsibility for aspects such as drug and alcohol testing, communicating with the families and welfare/medical support services ashore.

The manager will have prepared an emergency response room or area within their office containing items such as the following:

- communication equipment,
- reference material,
- contact lists,
- ship documentation,
- recording equipment
- material that may be needed by a Superintendent travelling to an emergency.

Contingency documents must be available listing actions to be taken in the event of a variety of potential incidents, such as collision, grounding, flooding, injury to personnel, breach of security, oil spill, loss of propulsion, etc. This will assist with providing a structured response to the incident.

There are numerous ways to ensure adequate emergency response. OCIMF-TMSA best practice identifies the following standards for emergency preparedness and contingency planning. The company should have detailed shore and ship contingency plans that cover all credible emergency scenarios, emergency procedures that include effective notification procedures and communication links for rapidly alerting the emergency response team, and ship and shore-based contingency plans that have clearly defined roles, responsibilities and record-keeping procedures.

The company should also provide adequate emergency response facilities, ensure that individuals are trained in their designated emergency response roles, and promulgate lessons learnt from exercises and actual incidents and ensure they are incorporated into the emergency response plans when they are updated.

The company should ensure that the alternative members for key positions in the emergency response teams have been identified and trained and ensure that alternative members are included in the planned exercises and drills. The company should have in place necessary arrangements to use external resources in an emergency and ensure that external or additional resources are used to provide more realistic drills and exercises.

5.5.4 Maintaining the Ship

Ship maintenance is the most time-consuming and demanding aspect of the technical operations management. SOLAS Part B Surveys and Certificates Reg 11 requires that 'The condition of the ship and its equipment shall be maintained to conform with the provisions of the present regulations to ensure that the ship in all respects will remain fit to proceed to sea without danger to the ship or persons on board'. Key functions include maintaining the planned maintenance system, identifying critical equipment, managing modifications and upgrades, and managing dry docking and afloat repairs. Each of these requires in-depth technical knowledge from both the technical operations department and the seafarers on board. These teams work together to ensure efficient operation of the ship, which results in the ship being commercially available.

5.5.4.1 Planning Maintenance System (PMS)/Condition Monitoring

The Germanischer Lloyd (GL) Best Practice Ship Management Study (2013), in cooperation with Fraunhofer CML, states that '. . . a PMS is much more than just an on-board documentation of jobs. The use of the PMS as a central communication platform for all the technical matters and tasks in a shipping company is a first best practice.' The ship's maintenance requirements for equipment and space are defined by a combination of equipment makers' service plans, classification survey requirements, statutory rules and clients'/managers' own specific requirements. A planner is used on board to programme surveys, inspections, testing and maintenance and report on findings and work done. It is a statutory requirement that there are maintenance plans for firefighting and life-saving appliances. In addition to routine maintenance, unplanned maintenance is also recorded in this planner. A management company will generally use propriety software or its own specific programs to manage ship maintenance—often linked to purchasing and other modules. Maintenance and/or inspection intervals are usually defined by calendar or running hours of the equipment.

The ship as a minimum standard should follow a planned maintenance regime when maintaining the ship's equipment. If the ship has a computerised planned maintenance system, incorporating an approved maintenance plan for all the class items that require survey, it may be able to obtain PMS survey notation from the ships' classification society. The system will need to document maintenance, spare parts usage, overdue and unplanned work. This requires approval by the classification society, initial audit on board and then approval during the annual surveys. The main advantage of this notation is that, with some exceptions, the ship only needs to follow the approved maintenance plan; there is no need for additional surveys by class and the opening of machinery unnecessarily between maintenance intervals. Additionally, the number of class visits to the ship may be reduced. Macleod (1991) states that 'A common practise at sea today is break down maintenance which I

consider to be a short-sighted, expensive and dangerous way of maintaining anything, especially a complex mobile unit such as a modern seagoing vessel'.

A further development beyond planned maintenance is condition-based maintenance (CBM), which incorporates the planning aspects of PMS, together with condition assessment tools. Many of the manufacturers' maintenance plans are based upon worse case and not necessarily for a marine environment. Therefore, there may be a considerable amount of margin in the time between overhauls (TBOs), particularly if equipment is run under optimum conditions or infrequently. By using equipment to assess the condition of machinery when in operation—vibration, shock pulse and thermal monitoring, for example—together with traditional fuel, oil, water, insulation testing, the maintenance intervals of some machinery can be adjusted based upon condition and failures pre-empted. If the machinery is operated well, then TBOs can be extended, resulting in savings in parts and crew man-hours.

It is essential that the Superintendent regularly reviews the system so he is fully aware of defects, overdue work, ongoing and future maintenance requirements. He must also ensure that the standard of reporting is acceptable and that work done is properly documented, spare parts usage recorded, stock updated and reordered if required. If there are maker or company forms related to the job, include these in the report.

Each technical operations department will develop procedures over time based on their experiences and external factors, such as client requirements and international standards. The OCIMF-TMSA best practice identifies the following standards with regard to reliability and maintenance standards to ensure sufficient quality of operations.

In this, each ship in the fleet should be covered by a planned maintenance and defect reporting system. The company management should regularly review the ship and fleet maintenance activity system and ensure that condition-of-class (CoC), or equivalent, items are monitored and closed out as soon as possible.

The company should ensure that there is a verification process in place to monitor the accuracy of all ship certificates, in addition to the monitoring system on board the ship. The company should ensure that all cargo, void and ballast spaces are regularly inspected to ensure that their integrity is maintained. They should maintain records that are tank specific and made on a standardised format, which may include photographs as evidence of the tank's condition.

The company Superintendents should follow up on all required maintenance, visit ships to audit maintenance and defect correction plans, and ensure that a maintenance and defect reporting system alerts the staff responsible for fleet maintenance on board and ashore when it becomes due.

The company should have a common, computer-based maintenance system on board each ship that records all planned maintenance. Maintain a formal shipyard repair list on board and/or ashore for reference. The company should also have a policy to maintain an optimum spare parts inventory or system redundancy for all ships. The company should ensure that the maintenance and defect reporting system also monitors the ship's spares inventory and highlights any shortages; that the

ship's maintenance and defect reporting system tracks all outstanding repair items, including dry-dock work list; that there is a company system that tracks ALL fleet-wide outstanding maintenance and defect items; and that the maintenance plan includes proactive measures.

5.5.4.2 Identifying Critical Equipment

As part of the ISM Code, critical equipment or systems ('the sudden operational failure of which may result in hazardous situations'[17]) must be identified and measures taken to promote the reliability of such equipment. These are often safety-related equipment and may be specific to that ship. It is usual for equipment with multiple systems on board not to be included in the critical listing. The managers must assess which equipment is applicable on each ship and take measures to ensure reliability, usually by regular testing, carefully planned routine maintenance and retention of stocks of essential spare parts. Stock levels are to be carefully assessed based on requirements for maintenance, likelihood of damage and importance for operation of the equipment.

When taking critical equipment out of operation, the company SMS will require this to be fully risk assessed, contingencies planned for and operations restricted where appropriate. If a critical item of equipment fails or is out of operation for an extended period, measures need to be taken to supplement this equipment until returned to service. In order to provide technical operations departments with guidance on the management of critical equipment, OCIMF-TMSA best practice identifies the following standards for reliability and maintenance standards (critical equipment).

The company should ensure that critical equipment and systems are defined and identified within the safety management system and in the ship's planned maintenance system. There should be clear reporting requirements when critical systems, alarms or equipment become defective or require planned or unplanned maintenance.

The company should ensure that maintenance on critical equipment follows defined procedures that include a risk assessment, which requires approvals at the appropriate levels of management before the equipment is shut down. The company should ensure that if the agreed shutdown period for critical equipment or systems is to be exceeded, any extension or alternative actions will require review by shore management. The company should give special attention to recording test and performance data for all critical equipment and systems. The company should identify and document competency standards with regard to critical equipment and systems.

The company should aim for no incidents or out-of-service times that are attributable to a failure in managing the maintenance of critical equipment or

[17]ISM Code Section 10.3.

systems and associated alarms. The company should ensure that critical equipment and systems are treated as priority items in the fleet's planned maintenance systems.

5.5.4.3 Modifications and Upgrades to the Ship

Usually, only routine planned maintenance and the repair of minor structural or machinery defects are considered part of the day-to-day maintenance of the ship. For major projects, such as ballast tank coating upgrades, modifications to ship structure or change-out of large machinery items a ship project should be started. It is probable that additional funding, manpower, technical expertise and, importantly, class or statutory approval will be required for such work. The work may be done by a contractor/riding squad, the ship's staff or additions to the ship's crew.

It is important that senior ship staff is involved in the planning process as they may be conducting some of the work, or at least supervising others. They should be fully briefed regarding the project and what they will be expected to do in terms of supervision and level of reporting to the managers. Consideration must also be given to issues such as supplementing the ship's equipment during the job, size of accommodation, compliance with the requirements for life-saving/safety equipment and ILO Maritime Labour Convention (MLC), 2006, requirements.

The work may be proposed by the manager or the client, but whoever initiates a project, it is important that the manager carefully defines all requirements to complete the job, including approvals, materials, manpower, testing, ship off-hire and expected costs. A funding request is to be presented to the client for their approval and at least partial funding received before making any commitments to the project.

5.5.4.4 Dry Docking and Afloat Repairs

Dry docking is one of the most demanding routine operations that the Technical Superintendent will need to plan for, particularly if performed without much notice, and can also put a strain on management resources—this is also the case with larger afloat repairs. The managers will have documentation or software to assist with the process of planning and preparing for major repair periods. It also represents a large percentage of the maintenance budget and for this reason has to be carefully managed. The Germanischer Lloyd (GL) Best Practice Ship Management Study (2013), in cooperation with Fraunhofer CML, states that '. . . special and dedicated (teams of) superintendents take care of all dry docks across the fleet. This allows a better building up of competencies for that field', although this approach is only really used by managers with large fleets who are able to keep them permanently employed.

Jobs for the 'docking list' usually consist of standard services, surveys, and maintenance performed at each dry docking, together with specific defects allocated to the repair period. It is important that the dry-dock specification is compiled

on an ongoing basis and regularly reviewed by the Technical Superintendent to ensure that an up-to-date specification is available in case an emergency docking is needed. The ships' staff must be encouraged to submit their defect jobs on a regular basis. Clients and commercial operators should be asked if they wish to add anything to the specification, such as upgrades or modifications for specific trade.

The managers may have a number of approved or contracted shipyards at various locations worldwide with agreed basic tariffs and terms and conditions. The shipyards should have passed audit by the manager and be of acceptable safety, technical and commercial standards. By using such an arrangement, it avoids the often-contentious issue of negotiating terms each docking. However, there should be some flexibility in negotiating a discount to the tariff since it is usual for shipyards to reduce their fees during quiet periods to encourage business. Multi-ship deals with one shipyard are another way of encouraging competitive tendering by the yard. The client must be kept informed of progress during the tending process and be fully involved in the yard selection.

During the repair period, the Technical Superintendent will also need to plan the attendance of a variety of contractors for specific jobs. Often this is for work that the shipyard is not able to do, but it is important that they are accepted by the shipyard and are appropriately insured for work in the yard. A shipyard may be reluctant to agree to a manager's contractor for work that they are also able to perform. It is important that the contractors attend at the most appropriate times during the repairs and they (and the shipyard) are updated regarding timing. In addition to contractors, there will also be classification surveyors, insurance representatives (in case of damage repairs) and possibly flag surveyors to consider.

The timing of delivery of spare parts needs to be properly managed, particularly as there may be long lead times for some items. Where possible, it is advisable to have the parts delivered to the ship in advance of docking so that they can be checked for condition and to ensure that they are the correct parts. It is usual to order up spare parts for equipment that can be only inspected in dry dock but may be needed. If they are not required, they can be retained for another ship or returned with a restock charge.

During the repair period, the work is to be closely supervised, and the Technical Superintendent will normally allocate the ship's staff to monitor and document work for specific jobs. It is also common practice on larger projects for additional ship staff to be employed to assist the Technical Superintendent or specialists used to supervise specific work such as steel renewals or cargo tank coating. The work performed during the docking must be carefully documented to assist with invoice negotiation and ensure that the ships planned maintenance system is up to date. Daily operational and regular financial reports are submitted to the management office and client, which will highlight any issues affecting the docking and planning of work. Duffy (1991) states that 'It is vital that the superintendent and senior officers work together as a team, where each member's responsibilities are clearly defined and understood'.

Negotiating the invoice at the end of the docking can be one of the more contentious aspects of a docking. To avoid surprises, the original specification

needs to be detailed and cover all requirements for the job. The shipyard should be encouraged to quote an all-in price for jobs. Changes to work done need to be monitored and costings adjusted appropriately. As jobs are completed, the shipyard must confirm final prices. New work needs to be authorised by the Technical Superintendent, and they should come well prepared to the invoice negotiation. It is recommended that this meeting be held after the ship has departed following payment of an agreed figure to release the ship, which allows time for the Technical Superintendent to prepare.

On completion of docking, a concise report is produced. As the work performed is documented in the ship's planned maintenance system, the report should contain adequate information for third parties who, in some cases, review the report years later. The report should contain the following:

- summary of tender process;
- chronology of ship movements from last discharge port to departure from the shipyard;
- summary of main docking work;
- summary of client's subcontractor work;
- complete docking costing, including deviation costs, contractor's expenses, agency fees, etc.;
- yard invoice;
- yard calibration reports and other protocols;
- subcontractor reports;
- class survey reports;
- photographs;
- assessment of shipyard and contractor performance;
- summary of work expected next docking and added to next docking plan.

5.5.5 Managing Expenditure

It is essential that the ship expenditure is closely managed and routinely compared with budget. It is important to ensure that all expenditure is properly captured or accruals made for expected costs. This is particularly important for services that may not be directly invoiced to the manager—for example, agency costs not received directly but through a charterer or delivery costs arranged by an agent. In these cases, it is important that an estimate be accrued for the expected cost and the final invoices for accruals chased up. There can be a tendency by the ships' staff to requisition more than is immediately required, and it is the Technical Superintendent's responsibility to manage their expectations. Ship senior staff needs to have access to budget variance updates as this will allow them to appreciate the ship's financial status and assist the Technical Superintendent in planning future purchases.

Traditionally, it is the technical manager's function to review and manage the crew overtime. This is submitted with the ship's monthly reporting and is assessed against budget, ship's trade pattern and any ongoing projects on board. The ship is required to provide a brief explanation of overtime worked and address any time in excess of budget.

Reporting to clients is usually performed on a quarterly, or in some cases monthly, basis, and this may be used as a further opportunity by the managers to assess the ship's technical expenditure. When reporting over-expenditure, and possibly dramatic under-expenditure, the reasons for these deviations should be explained and any expenditure not budgeted highlighted. The client should also be forewarned if it is expected that the ship will be over its budget at year end. There will usually be a mechanism for requesting funding outside budget, which will take the form of an 'extraordinary funds request', and these are to be submitted to the client in advance of making any commitment to purchase. A full explanation of why the purchase is needed, together with breakdown of costs, should be provided.

It is particularly important before year end to conduct a review of the year's expenditure and identify potential further expenditure, accruals to be invoiced and commitments that are not yet accruals. This gives the managers an indication of the ship's budget at year end. If there is a surplus expected, consult the client as to how to manage this. It may be prudent to use the committed funds for the purchasing of material/spare parts that will be needed in the new year; alternatively, the client may not wish to use the funds if not needed immediately.

The review of the ship's financial status forms the basis for the preparation of next year's budget. Budget preparation usually starts early in the fourth quarter and should consider planned maintenance for the year, planned projects, changes in trading pattern/sea days and changes in vendor tariffs. It is important to involve the ship's senior staff in assessing the requirements for the budget.

5.5.5.1 Purchasing and Invoicing

Purchasing for the ship is normally handled by a Purchasing or Technical Officer working closely with the Technical Superintendent. The bulk of purchases will be from makers' or licensees' supplying spare parts, from providers of lubricating oil, paint, chemicals and gases; and general consumables from ship chandlers. Using vendors that are company contracted or approved ensures that they supply parts and material of acceptable standard.

It is usual for purchasing to be performed using management software that is integrated with maintenance and accounting modules, although smaller operations may still utilise emailed requisitions. The majority of purchases will be generated from a requisition sent by the ship by one method or another; however, many will also be generated in the office for things such as class and flag fees, agency costs, Qualified Individual and clean-up services, etc. The Technical Officer will review and process the enquiry, obtaining advice from the Superintendent where necessary. The requisition should be checked for content, accuracy of account coding

and, possibly, quantities revised. Unless the purchase will be from a contracted supplier (lub oil, paint, main engine spares, etc.), it is customary to obtain a number of competitive quotations from approved vendors. It is important to also confirm from all vendors the cost at the location where the item will be supplied, as there may be variations in tariff worldwide, and cost based upon the vendors' different supply locations or 'cost centres'. When evaluating the tenders, the cost of delivery must also be considered, as well as who will arrange and pay for this, whether transport can be consolidated, how it can be physically delivered on board, etc.

Any purchases need to be in line with the ship's budget. There should be an escalating level of purchase approval within the management office based upon cost. Usually, the Technical Superintendent will have the lowest level of approval, followed by the Technical Manager and then a company Director. If expenditure would result in the ship being over-budget, then the client is consulted to approve the purchase. In addition to the manager's internal purchasing requirements, the client may also require that they approve purchases over specified limits. They may also require the manager to formally issue Extraordinary Fund Requests for expenditure outside budget. It is important that those involved in purchasing for the ship are aware of any such requirements, particularly since they may differ from client to client.

A purchase order is to be issued for the most competitive tender having followed appropriate procedures. This may be for the full requested quantity or revised by the Technical Superintended based upon cost, maintenance planning, etc. It is important, particularly if there is some delay before expected delivery, that the Technical Officer check on the status of delivery on a regular basis to ensure that there are no changes to the plan. This is particularly important if a number of items are being consolidated for delivery, or the parts are required for a job that is time sensitive. Again, this requires good communication between the Technical Superintendent and the Technical Officer—not forgetting to inform the ship's staff. When placing the order, it is important to specify delivery instruction, or follow-up before delivery, and ensure that a confirmation is received from the vendor.

Delivery may be arranged directly from vendor to the ship, or more often first consolidated with a freight forwarded, coordinated by the Technical Officer. Upon delivery, on-board the ship confirms receipt and inform the managers of any damage or variations in quantity ordered, which will then be followed-up by the Technical Officer.

The vendor will normally submit his invoice upon dispatch of the order, although for certain purchases—particularly higher cost items requiring manufacture—an upfront payment may be required. In such cases, a 'pro forma' invoice will normally be logged into the purchasing system. Terms are usually 30 days from receipt of invoice by the managers, and it is important to process payments promptly, particularly if senior personnel may need to approve payment. The invoices are normally logged and distributed by the managers' accounts department but processed by the Technical Officer. Generally, if the invoice and purchase order match within a reasonable tolerance, then the payment can be progressed by the account department. Where there is a larger variation, or there are issues with

delivered qualities or condition, then the Technical Superintendent approves the invoice.

For service purchase orders, where service personnel attend the ship or equipment is landed for maintenance, there is more involvement in the planning processes from the Technical Superintendent, ensuring that they are appropriately qualified for the job, specifying the scope of work, the level of reporting and the certification required. For service purchase orders involving investigation or fault finding on board, the Superintendent may need to provide detailed instructions to the contractor and assess their findings, during or after attendance. The Technical Superintendent should therefore review and approve the contractor's invoice.

There may be occasions where it is necessary to purchase from a supplier not normally used by the managers. In such cases, and particularly if the material, parts or service supplied is sensitive to ship safe operation, the background of the supplier is to be researched by the Technical Superintendent and reported to senior management. The suppliers' website, makers' approval, quality certification and the previous customers may all be considered when assessing the company.

Based upon the manager's or client's policies, a proportion of the general consumable may be allocated to ship, or cash-based, purchases. These are normally purchases of small items that are most economically obtained by local purchase rather than using the normal process. It is important that these are reported on a regular basis, usually monthly, and budget carefully managed.

5.5.5.2 Stock Control

In parallel with management of ship expenditure, the stock of spares and consumables must be properly controlled. Use of stock is to be recorded and remaining on board adjusted accordingly within the ship purchasing/stock control software. This will be supported by a system of stock checks where actual stock may be compared with that recorded. It is usual for stores that are regularly consumed to be checked on a monthly basis (lub oils, chemicals, etc.) and compared with reported consumptions, whereas spare parts may be checked, say every 6 months. In case of deviations during stock check, an explanation should be provided to the managers. During these checks, the opportunity can be taken to assess the condition of the material, adequacy of storage and upgrade where necessary. It may be considered prudent to check spare parts for critical equipment more often.

For larger, more expensive parts, it is common practice to pool these parts among a number of ships that may need them. It is usual to store these items with the company freight forwarder where it is available to transport at short notice. Another alternative is for a manufacturer to guarantee availability of parts at short notice. The advantage of this arrangement being that parts are less likely to deteriorate and/or the part will be recently manufactured. It is not uncommon for used parts considered reusable—often referred to as 'used but good'—to be

returned to the store. This is a practice that should be discouraged, and these parts should certainly not be recorded as stock.

A development of stock control is valuation of the stock on board and takes the form of a valuation of spares and material based upon the purchase price, or last price paid for that part. In the case of bulk lubricants, where large quantities are stored on board, stemmed at different ports and with varying unit prices, a different mechanism of valuation is required. The so-called first in, first out system is often used, where the value of the oldest stock is used first and stock value adjusted accordingly.

5.5.5.3 Selection of Supplier and Contractors

A manager will normally agree to preferred terms with their major suppliers and service providers. This usually takes the form of discounts to their standard tariffs and the size of the discount generally based on the annual expenditure by the group of ships under management. In order to maximise the discount, it is customary to limit the number of consumable suppliers—for example, lubricating oil or paint suppliers—to two or three. This helps maximise discount whilst still having some flexibility of supply. Coverage in certain areas of the world can vary dramatically from supplier to supplier, so it is wise to choose suppliers strong in different zones.

There should be similar agreements with makers of the ship's main machinery—again based upon expenditure. However, when the purchase is made, and how many transactions there are, may affect the discounts obtained. By consolidating all purchases for that maker for all ships at, say, the beginning of the year, or by at least making a commitment to purchase, may improve discounts obtained for all ships.

A prudent manager will have a strict purchasing policy regarding material and equipment essential to the operation of the ship. It should be provided only from the maker, licensee, approved contractor or sometimes known as an original equipment manufacturer (OEM). Suppliers not in this category may also be assessed and included as approved suppliers if they are able to show acceptable quality standards.

5.5.5.4 Review of Suppliers and Subcontractors

Managers need to have procedures for assessing the performance of suppliers and contractors in order to ensure that they are performing well and the quality of service is maintained at an acceptable standard. This may take the form of a simple questionnaire that can be completed by the ship's staff, the Technical Officer, the Superintendent or others planning services for the ship. There should be a scoring part to the process so that trending for a supplier can be made or the performance of multiple suppliers compared with each other.

It is usual to conduct regular reviews of the suppliers and renegotiate term and conditions if considered appropriate. For example, the number of ships using that

supplier may increase and positively affect turnover; it is reasonable for the manager to expect some compensation by the supplier. Changes in commodity prices and exchange rates may also influence the cost of material or services; the managers should ensure that adjustments by the supplier are appropriate and ensure continued competitive pricing.

5.6 Future Challenges in Technical Ship Management

Shipping is a fairly conservative industry by nature, and ships have a relatively long service life, normally over 20 years if they can maintain their commercial viability. Therefore, changes tend to occur relatively slowly, and, from a ship design, construction and technology perspective, individual aspects can be planned in a controlled manner. Duffy (1991) stated that 'The technology exists today to send an unmanned ship around the world. For the present, international regulations make this impossible' It is incredible to think that this technology has been around for over 25 years, yet it is still considered a 'pipe-dream'.

The serious challenge comes from the complicated multiple international and national legislative changes that are occurring simultaneously and for which clear, unambiguous technological solutions are not necessarily available or are difficult to afford in the current economic climate. This requires a disciplined management of change process to be established and an effective supply chain management engaged to ensure that adequate budgets are provided; equipment, services and facilities are secured; and implementation deadlines are not missed.

Sourcing competent seafarers is likely to remain challenging in the future as the world fleet size continues to expand and going to sea remains relatively low in the career aspirations of many young people. Individual shipowners, managers and the shipping community as a whole have a responsibility to help make the industry more visible and attractive so that the intrinsic pride that seafarers of the past had in their chosen profession is re-established.

The increasingly complex and expansive volumes of procedures and checklists that dictate how ships are operated have become unmanageable in many organisations, reducing their usefulness on board to occasional reference and for audit purposes. Their use as daily working documents to promote effective teamwork and help avoid the consequences of human error has become diminished. The shipping industry must learn the lessons from aviation and produce concise, clearly understood procedures that have been written for competent professionals and are appropriately valued and utilised.

Maritime Pollution (MARPOL) violation risk management is an ongoing challenge, and the financial penalty for failure can be catastrophic for a shipowner or manager.[18] Despite the adoption of clear policies for zero tolerance and speaking

[18]IMO's International Convention for the Prevention of Pollution from Ships (MARPOL).

up, increased training, physical barriers and enhanced monitoring, violations still occur on occasions, and the industry needs to develop more robust countermeasures.

The drive towards further emission reduction is inevitable, and various solutions are available to shipowners, including the use of liquid natural gas as a marine fuel. This is very likely to be adopted with increasing frequency in the coming years as the LNG bunkering infrastructure is developed, and economies of scale reduce the price of the specialist storage and handling technology. The SGMF *Gas as a Marine Fuel—An Introductory Guide* (2016) states that 'While industry commentators do not seem to be able to agree on how much LNG will be used as bunker fuel, they all agree it will be a substantial amount'. However, LNG as a fuel comes with a unique set of risks for crews that have never handled cryogenic liquid before, and the challenge of developing fail-safe systems and adequate crew training will be significant. Other 'alternative' fuel systems and emission-suppressing equipment are also becoming available that adds to the complexity and variation in ship design. This too requires management and training of both ship and shore staff.

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Chapter 6
The Maritime Labour Convention, 2006, Legal Jurisdiction and Port State Control

Cleopatra Doumbia-Henry

6.1 Introduction

This chapter seeks to examine the manner in which the Maritime Labour Convention, 2006 (MLC, 2006), addresses the legal jurisdiction of the State over foreign ships entering its ports (port State) or legal venue with respect to seafarers' rights. The MLC, 2006, was adopted by the International Labour Conference (ILC) of the International Labour Organization (ILO) in 2006, following six years of intensive and extensive consultations and international meetings of the ILO tripartite constituents.[1] This resulted in the consolidation of almost all maritime labor Conventions and Recommendations adopted by the ILO since 1920 covering all aspects of working and living conditions of seafarers.[2] The MLC, 2006, often referred to as the Seafarers' Bill of Rights, also provides shipowners and governments with a level playing field in the most global and one of the most competitive of industries. The MLC, 2006, is also considered to be the "fourth pillar" of the international maritime regulatory regime alongside the International Maritime Organization's (IMO) International Convention for Safety of Life at Sea (SOLAS) 1974, as amended; the International Convention for the Prevention of Pollution from Ships, 1973, as amended by the Protocol of 1978 and by the Protocol of 1997

[1]See http://www.ilo.org/global/standards/maritime-labour-convention/lang--en/index.htm, which contains comprehensive information on MLC 2006. For a comprehensive discussion on the MLC, 2006 and a history of the negotiations see McConnell et al. (2011) and also McConnell (2016).

[2]Four Conventions were not consolidated by the MLC, 2006, namely the Seafarers' Identity Documents Convention, 1958 (No. 108), the Seafarers' Identity Documents Convention (Revised), 2003 (No. 185), the Seafarers' Pension Convention, 1946 (No. 71), and one Convention which is no longer relevant to the sector—the Minimum Age (Trimmers and Stokers) Convention, 1921 (No. 15).

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I.D. Visvikis, P.M. Panayides (eds.), *Shipping Operations Management*,
WMU Studies in Maritime Affairs 4, DOI 10.1007/978-3-319-62365-8_6

(MARPOL); and the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), as amended, including the 1995 Amendments and 2010 Manila Amendments.[3]

The MLC, 2006, also further developed the concept of flag State inspection with a certification system to support labor compliance and significantly strengthened port State control procedures for compliance with working and living conditions. The MLC, 2006, is currently ratified by 84 member States of the ILO, representing 91% of the world gross tonnage of ships.[4]

The MLC, 2006, is set in the wider context of international Law of the Sea as is evidenced by the provisions in its Preamble relating to the United Nations Convention on the Law of the Sea, 1982 (UNCLOS), Article 94 of which provides with respect to labor and social conditions as follows:

> 1. Every State shall effectively exercise its jurisdiction and control in administrative, technical and social matters over ships flying its flag.
>
> 2. In particular every State shall: . . .
>
> b) assume jurisdiction under its internal law over each ship flying its flag and its master, officers and crew in respect of administrative, technical and social matters concerning the ship.
>
> 3. Every State shall take such measures for ships flying its flag as are necessary to ensure safety at sea with regard, inter alia, to: . . .
>
> b) the manning of ships, labour conditions and the training of crews, taking into account the applicable international instruments; . . .

The MLC, 2006, covers fundamental principles and rights at work, a right to a fair and secure workplace, fair terms of employment, decent working and living conditions on board ship, health protection, medical care, welfare measures and social protection. These substantive rights are set out in the first four titles of the Convention (Titles 1 to 4), while the inspection and enforcement provisions of the Convention are set out in Title 5.

When the MLC, 2006, was adopted, it was described as a "historic event," the "charter of rights" that will help ensure "Decent Work" for seafarers no matter what the flag the ship flies or where the ship sails or the ports where the ship docks, loads, or unloads. Two key provisions are set out in paragraphs 6 and 7 of Article V. Article V paragraph 6 provides:

> 6. Each Member shall prohibit violations of the requirements of this Convention and shall, in accordance with international law, establish sanctions or require the adoption of corrective measures under its laws which are adequate to discourage such violations.

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[3]For a list of IMO Conventions see http://www.imo.org/en/About/Conventions/ListOfConventions/Documents/Convention%20titles%202016.pdf.

[4]See http://www.ilo.org/global/standards/maritime-labour-convention/lang--en/index.htm. This reflects ratification data at 12 July 2017. The MLC, 2006 has already been the subject of amendments and proposed amendments twice since its adoption, in 2014 and 2016. The 2014 Amendments include specific provisions relating to abandonment and claims for death and injury. They entered into force on 18 January 2017. The proposed 2016 Amendments, dealing with shipboard bullying and harassment and a technical matter regarding the extension of the on board maritime labor certificate after a satisfactory renewal inspection, have not yet entered into force.

Article V paragraph 7 provides for the *no more favorable treatment clause* as follows:

> Each Member shall implement its responsibilities under this Convention in such a way as to ensure that the ships that fly the flag of any State that has not ratified this Convention do not receive more favourable treatment than the ships that fly the flag of any State that has ratified it.

The no more favorable treatment clause, which is also found in IMO Conventions, is intended to help establish the level playing field for shipowners and governments also with respect to labor and social conditions. This reflects the important role played by port States and the overall concern of ILO member States to ensure the widest possible ratification of the MLC, 2006, and at a more practical level for seafarers and shipowners ensuring, in the global industry, on-board compliance with the minimum standards set by the MLC, 2006.

As shipping is the most globalized of industries, it is understandable that it is also an industry in which complex questions relating to the legal jurisdiction can arise. Today, seafarers come from a multiplicity of countries, working side by side on board ships that often fly the flag of another country and employed by shipowners/employers who may be based in yet another country or from more than one country. The MLC, 2006, contains provisions relating to the responsibilities of the flag State, the port State, and the labor-supplying State. But there are other jurisdictions that may also be involved, namely, that of the shipowner, which may be different from the flag State; a seafarer recruitment and placement service (such as a manning agent); the charterer; or insurance companies.[5] In addition, and this is the focus of this chapter, it is particularly in the context of port State control (PSC) that the question of legal jurisdiction and the related questions of extraterritoriality could more often arise in the context of the MLC, 2006.

Extraterritoriality or extraterritorial jurisdiction refers to a court's ability to exercise power beyond a State's territorial limits. According to the International Law Commission, "the notion of extraterritorial jurisdiction may be understood as referring to the exercise of sovereign power or authority by a State outside of its territory.[6] . . . With respect to the applicable law, the notion of extraterritorial jurisdiction may be understood as the exercise of jurisdiction by a State with respect to its national law in its own national interest rather than the application of foreign law or international law . . . The effects doctrine may be understood as referring to the jurisdiction asserted with regard to the conduct of a foreign national occurring outside the territory of a State which has a substantial effect within that territory. This basis, while closely related to the objective territoriality principle, does not require that an element of the conduct take place in the territory of the regulating State."[7]

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[5] See Carballo Pineiro (2015) and Dimitrova and Blanpain (2010), p. 69.

[6] See Annual Report, International Law Commission, 58th Session, 2006, Annex E, Extraterritorial Jurisdiction, para. 4: http://legal.un.org/docs/?path=../ilc/reports/2006/english/annexes.pdf&lang=EFSRAC.

[7] Ibid. para. 12.

Based on the above, PSC is a narrower concept than port State jurisdiction. PSC involves the inspection of foreign flagged ships entering a port for compliance with a range of internationally agreed standards on matters such as safety, environmental, and training standards[8] as provided for by SOLAS, MARPOL, and STCW, as well as labor standards as provided for by the ILO's Merchant Shipping (Minimum Standards) Convention, 1976 (No. 147),[9] and now the MLC, 2006.

The ILO's Convention No. 147 opened the way, for the first time under international law, for verification by a port State of compliance with labor conditions of ships entering its ports. It followed on from SOLAS 1974, which had introduced PSC for ship compliance with safety standards. Convention No. 147 contains a single article (Article 4) dealing with port State control.[10] It provides that the port State may only take measures to rectify any conditions on board that are clearly hazardous to safety or health. In connection with PSC and the exercise of port State jurisdiction over social and labor conditions on foreign flagged ships, the MLC, 2006, made a very important leap forward with respect to the scope of PSC, going beyond matters relating to safety and health.

In this context, a question may be asked as to whether these activities, particularly in connection with the no more favourable treatment clause[11] and also the port State onshore seafarer complaint procedures, may constitute actions that can be described as an exercise of "extraterritoriality" by the port State.

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[8]See Bevan Marten, Port State Jurisdiction in New Zealand: The Problem with Sellers: http://www.victoria.ac.nz/law/research/publications/vuwlr/prev-issues/volume-44,-issue-34/11-Marten.pdf.

[9]Convention No. 147 is still an important instrument for countries that have not yet ratified the MLC, 2006, such as the United States which has ratified Convention No. 147.

[10]Article 4 of Convention No. 147 provides as follows:

> 1. If a Member which has ratified this Convention and in whose port a ship calls in the normal course of its business or for operational reasons receives a complaint or obtains evidence that the ship does not conform to the standards of this Convention, after it has come into force, it may prepare a report addressed to the government of the country in which the ship is registered, with a copy to the Director-General of the International Labour Office, and may take measures necessary to rectify any conditions on board which are clearly hazardous to safety or health.
>
> 2. In taking such measures, the Member shall forthwith notify the nearest maritime, consular or diplomatic representative of the flag State and shall, if possible, have such representative present. It shall not unreasonably detain or delay the ship.
>
> 3. For the purpose of this Article, complaint means information submitted by a member of the crew, a professional body, an association, a trade union or, generally, any person with an interest in the safety of the ship, including an interest in safety or health hazards to its crew.

[11]The no more favorable treatment clause in Article V, para. 7 of the MLC, 2006, referred to above, ensured buy in by major flag States and port States. It is one of the reasons for broad consensus when the MLC, 2006 was adopted, with no votes against and the high level of ratifications to date. See McConnell et al. (2011) op.cit., pp. 211–214.

This chapter explores the question of the role of the port State under the MLC, 2006, and argues that (1) the MLC, 2006, does not go beyond existing international law relating to ships for other matters under IMO Conventions and (2) the onshore complaints procedures are a careful balance respecting the role of the flag State and at the same time recognizing the important role that port States can play in securing the protection of seafarers in this globalized sector.

Although the MLC, 2006, does not per se address questions of legal jurisdiction and venue, many of the provisions, such as those relating to payment of wages, are also among the terms of employment that would be set out in a Seafarers' Employment Agreement (SEA) and could possibly be the basis for a legal action in a port State. These matters are also recognized in other international maritime conventions and in maritime law as maritime liens and could provide a basis for legal action in a port through ship arrest/in rem actions. From a legal perspective, the overlap between the MLC, 2006, with its compliance and enforcement system and these other private and public international remedies with their related questions of jurisdiction are complex, particularly in the port State context.

6.2 Legal Jurisdiction of Port States and the MLC, 2006

Using the above-noted International Law Commission's definition of extraterritoriality,[12] it is clear that the MLC, 2006, does not *per se* provide extraterritorial powers—since the port State authorities act within their national territorial jurisdiction with respect to situations that are still in existence when the foreign ship visits their ports. Even though the situation will normally have started outside the port State's territory, if all is put in order before the ship arrives in port during the voyage to the port or during the ship's stay in the port, no further action by the port State is authorized or required by the Convention.[13] In addition, under the Convention, the port State is required to take into account the flag State law implementing the Convention (though not if the law fails to implement it properly) and to respect the flag State's responsibility to exercise effective jurisdiction in social matters under Article 94 of UNCLOS. In particular, the port State is required under Regulation 5.2.2 of the MLC, 2006, to receive an onshore complaint and, where appropriate, to promote a shipboard settlement. In the case of failure to reach a settlement, it has to hand the matter over to the flag State. If the flag State fails to promptly deal with the complaint, the port State can take action, not at the national level but at the international level, calling upon the flag State to implement its responsibilities and reporting to the ILO's Director General if it fails to do so. In

[12] Op.cit., fn. 3.

[13] It is important to note that port state control is largely governed by Regional Port State Control Memoranda of Understanding. See the link to the various MOUs: http://www.imo.org/en/ourwork/msas/pages/portstatecontrol.aspx.

addition, if the complaint concerns a matter of wider concern on board a ship, it may also result in some cases (under Regulation 5.2.1)[14] in the detention of a ship until the issue is rectified.

However, there is an important relationship between Article 1 paragraph 2 of the MLC, 2006, and the Purpose clause of Regulation 5.2 concerning port State responsibilities. Article 1 paragraph 2 of the MLC, 2006, states: 'Members shall cooperate with each other for the purpose of ensuring the effective implementation and enforcement of this Convention.' The Purpose clause of Regulation 5.2 states: "Purpose: To enable each Member to implement its responsibilities under the Convention regarding international cooperation in the implementation and enforcement of the Convention standards on foreign ships."

These two sets of provisions show the drafters' intention with respect to the implementation of Article 1 paragraph 2, particularly in the context of PSC under Regulation 5.2. If one studies the Standard relating to Regulation 5.2, such as Standard A5.2.1, which deals with all the modalities for inspections in ports, and Standard A5.2.2, which deals with onshore seafarer complaint-handling procedures, one can see that the requirement to "cooperate with each other for the purpose of ensuring the effective implementation and enforcement of this Convention" was understood as envisaging cooperation between the port State and the flag State in ensuring continuous implementation on board ships. In several provisions of the MLC, 2006, as with similar provisions in the IMO Conventions, the port State authority has an obligation to seek clarification first from the flag State before taking enforcement action. However, the port State is authorized, and sometimes required, in accordance with Standard A5.2.1, paragraph 6 of the MLC, 2006, to require a ship to rectify the situation before leaving port when, and for so long as, it constitutes a serious or repeated breach of the Convention (including seafarers' rights) or represent a significant danger to seafarers' safety, health, or security, to prohibit the ship from leaving the port until the necessary corrective action is taken. Guideline B5.2.1 paragraph 2 of the MLC, 2006, and the Guidelines for Port State Control Officers provide detailed guidance on circumstances that may require the detention of a ship.[15] Guideline B5.2.1 paragraph 2 provides as follows:

> When developing a policy relating to the circumstances warranting a detention of the ship under Standard A5.2.1, paragraph 6, the competent authority should consider that, with respect to the breaches referred to in Standard A5.2.1, paragraph 6(b), the seriousness could be due to the nature of the deficiency concerned. This would be particularly relevant in the case of the violation of fundamental rights and principles or seafarers' employment and

[14]Regulation 5.2.1, paragraph 1 relating to inspections in port provides as follows: "*Every foreign ship calling, in the normal course of its business or for operational reasons, in the port of a Member may be the subject of inspection in accordance with paragraph 4 of Article V for the purpose of reviewing compliance with the requirements of this Convention (including seafarers' rights) relating to the working and living conditions of seafarers on the ship*".

[15]See http://www.ilo.org/global/standards/maritime-labour-convention/monitoring-implementation-tools/WCMS_101787/lang--en/index.htm. The Guidelines for Port State Control Officers were adopted by the ILO in 2008.

> social rights under Articles III and IV. For example, the employment of a person who is under age should be considered as a serious breach even if there is only one such person on board. In other cases, the number of different defects found during a particular inspection should be taken into account: for example, several instances of defects relating to accommodation or food and catering which do not threaten safety or health might be needed before they should be considered as constituting a serious breach.

Title 5 of the MLC, 2006, has an introductory section relating to compliance and enforcement. Paragraph 4 of that section provides as follows:

> The provisions of this Title shall be implemented bearing in mind that seafarers and shipowners, like other persons, are equal before the law and are entitled to the equal protection of the law and shall not be subject to discrimination in their access to courts, tribunals or other dispute resolution mechanisms. The provisions of this Title do not determine legal jurisdiction or legal venue.

The Workers' (Seafarers' international representatives) Group proposed the abovementioned provision at the ILC, in February 2006, which adopted the MLC, 2006.[16] The reason given by the Seafarers' representative was to ensure *the right of seafarers to exercise their rights before the law and to take their complaints ashore, for example to a Port State Control Officer (PSCO), since some ships never returned to their home port*.[17] They noted that the proposed text under discussion contained provisions giving shipowners the right to redress in case of unjustified seizure of their ships and that seafarers should also have such an equal right of redress.

In this context, it should be noted that Standard A.5.2.1 paragraph 8 provides that "When implementing their responsibilities under this Standard, each Member shall make all possible efforts to avoid a ship being unduly detained or delayed. If a ship is found to be unduly detained or delayed, compensation shall be paid for any loss or damage suffered. The burden of proof shall be on the complainant." This provision, which reflects provisions in other international maritime conventions, grants to a shipowner a right to take legal action if he or she considers that a ship has been unduly delayed or detained while in port. A few governments raised concerns about Title 5 paragraph 4 referred to above relating to potential confusion with questions of jurisdiction or legal venue. As a result, the last sentence of paragraph 4 of Title 5 was added providing that "[t]he provisions of this Title do not determine legal jurisdiction or a legal venue."[18]

From the above elements, it is clear that, while the question of legal jurisdiction or legal venue relating to any complaint that may be lodged alleging violation of seafarers' rights is not addressed by the Convention, the provision does not exclude the legal jurisdiction of the port State. A court in a port State is therefore not empowered to adjudicate a complaint alleging noncompliance with the Convention

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[16]Committee of the Whole Report, paras. 903–934 e.g., *Report of the Committee of the Whole*, International Labour Conference, 94th (Maritime) Session, Geneva, 2006, ILO Doc. No. PR 7(Part I): http://www.ilo.org/public/english/standards/relm/ilc/ilc94/pr-i.pdf.

[17]See ILC, 94th ILC (Maritime Session) 2006, Provisional Record 7, Part I, para. 904.

[18]Ibid, see paras. 903–936.

by a foreign ship, and also it is not prohibited from taking such action if it had jurisdiction under contract law if the matter deals with a question of the breach of a contract, for example the seafarers' employment agreement under Regulation 2.1 and Standard 2.1 of the MLC, 2006. Some examples of issues that can give rise to legal action being taken in a port State under the MLC, 2006, are examined below.

The following areas are examined by reference to the legislation of specific countries and how the issue of legal jurisdiction can arise, namely with respect to seafarers' onshore complaints, nonpayment of wages, failure to repatriate, abandonment, and claims for death and injury. Examples are given of certain countries' legislation as appropriate.

6.3 Seafarers' Onshore Complaints

Regulation 5.2 of the MLC, 2006, addresses port State responsibilities with its related Standards and Guidelines, thereby covering matters that might be considered to have little connection with the State's own territory, such as the payment of wages and seafarers' employment agreements. Regulation 5.2.2 is dedicated to "Onshore seafarer complaint-handling procedures."[19]

The provisions relating to onshore seafarer complaint-handling procedures are unprecedented by reference to ILO instruments, including Convention No. 147, and far-reaching in their objective to ensure that the MLC, 2006, has real and effective impact. Seafarer complaint provisions put in place obligations for flag States, labor-supplying States, shipowners (on-board ship provisions), and port States and are part of the overall system of enforcement and compliance in the MLC, 2006. In addition to provisions relating to on-board complaint procedures enabling seafarers to file complaints on board their ships concerning their terms and conditions of employment in the context of Regulation 5.2.1 and Standard A5.2.1 of the MLC, 2006,[20] the Convention also includes provisions relating to onshore seafarer complaint procedures in port States.

Onshore seafarer complaint-handling procedures are provided for in Regulation 5.2.2 of the MLC, 2006, paragraph 1, which reads as follows:

> Each Member shall ensure that seafarers on ships calling at a port in the Member's territory who allege a breach of the requirements of this Convention (including seafarers' rights) have the right to report such a complaint in order to facilitate a prompt and practical means of redress.

[19]Regulation 5.2 and its related Standard and Guideline provides for on-board complaint procedures for seafarers alleging breaches of the Convention without prejudice to their right to seek redress through whatever legal means they consider appropriate.

[20]Standard A5.2.1 provides, *inter alia*, for a more detailed inspection to be carried out to ascertain the working and living conditions on board a ship if there is a complaint alleging that specific working and living conditions on the ship do not conform to the requirements of the Convention.

Standard A5.2.2.1 relates to onshore seafarer complaint-handling procedures enabling an authorized officer to undertake an initial investigation.[21] Standard A5.2.2 paragraph 2 provides:

> Where appropriate, given the nature of the complaint, the initial investigation shall include consideration of whether the on-board complaint procedures provided under Regulation 5.1.5 have been explored. The authorized officer may also conduct a more detailed inspection in accordance with Standard A5.2.1.

If the complaint cannot be resolved at the shipboard level, the port State officer must then notify the flag State, seeking within a prescribed deadline, advice, and a corrective plan of action. Where a more detailed inspection has found the ship not to conform to the requirements of the Convention as provided for by Standard 5.2.1.6, the ship can be detained pending the rectification of the nonconformities.[22] Where the complaint is not resolved by the flag State and it is not demonstrated that the flag State is in a position to deal with the matter, the port State is required to transmit a copy of the report concerning the deficiencies to the ILO Director-General. The Guidelines for Port State Control Officers provides a five-step approach to the handling of onshore complaints.[23] What the MLC, 2006, has in fact accomplished as an international treaty is to enlarge the inspection and supervisory powers of the port State.

The provisions relating to on-board complaint procedures (Regulation 5.1.5) and onshore seafarer complaint-handling procedures (Regulation 5.2.2) were among the controversial issues discussed during the years of development of the MLC, 2006. They raised, in particular, issues of conflict of laws. The Seafarers' Group, during the discussions, did not consider it appropriate for the Convention to contain a provision that dictated the choice of forum for seafarers. In their view, seafarers

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[21] Standard A5.2.2.1 provides as follows: "*A complaint by a seafarer alleging a breach of the requirements of this Convention (including seafarers' rights) may be reported to an authorized officer in the port at which the seafarer's ship has called. In such cases, the authorized officer shall undertake an initial investigation*".

[22] Standard A5.2.1.6 of the MLC, 2006 provides as follows: "*Where, following a more detailed inspection by an authorized officer, the ship is found not to conform to the requirements of this Convention and:*

(a) the conditions on board are clearly hazardous to the safety, health or security of seafarers; or

(b) the non-conformity constitutes a serious or repeated breach of the requirements of this Convention (including seafarers' rights);

the authorized officer shall take steps to ensure that the ship shall not proceed to sea until any non-conformities that fall within the scope of subparagraph (a) or (b) of this paragraph have been rectified, or until the authorized officer has accepted a plan of action to rectify such non-conformities and is satisfied that the plan will be implemented in an expeditious manner. If the ship is prevented from sailing, the authorized officer shall forthwith notify the flag State accordingly and invite a representative of the flag State to be present, if possible, requesting the flag State to reply within a prescribed deadline. The authorized officer shall also inform forthwith the appropriate shipowners' and seafarers' organizations in the port State in which the inspection was carried out".

[23] Op.cit. pp. 75–77, which sets out the steps to be undertaken in the onshore complaints process.

should be able to bring a complaint about a breach of the national law of the flag State in whatever forum they choose if the issue is not resolved by the on-board complaint procedures under Regulation 5.1.5, subject to the national rules and practices regarding the exercise of jurisdiction by the particular forum.[24] Like the provisions for on-board complaints for assuring ongoing compliance, these provisions place the concept of a complaint under Article 4 of Convention No. 147 in a wider context.[25]

The onshore handling procedures set out new responsibilities for port States. It provides for what a port State can do in addition to verifying compliance with international rules through PSC. During the preparatory work on the Convention, the issue appeared to be linked to concerns about courts or adjudication of one State potentially interpreting legislation and passing judgment on another State.[26] One country expressed concern that, depending on the wording of the provision in question, it might allow for legal action in each ratifying member State. The seafarers' representatives were of the view that to require that seafarers pursue their rights only through the flag State would in effect bar them from seeking other forums, would result in treating them differently from other people, and would be contrary to the principle of equality before the law.[27]

For the Shipowners' Group, it was the flag State that should be responsible for handling and settling complaints, and it should have in place laws and regulations for expeditious and fair procedures for the handling and settlement of seafarers' complaints. In their view, where the flag State's laws and regulations do not provide for handling and settling complaints overseas, the appropriate forum should be the seafarers' State of residence.[28]

For some governments, their concerns related to expectations that they may have to provide services to address complaints by individuals concerning breach of another State's laws or that the flag State may not be given the information or opportunity to fulfill its international responsibility to address the breach of its laws by a ship under its flag.[29] One government was, for instance, concerned that there were diverging national rules, which were not globally recognized through international Conventions.[30] They considered that the provision might allow for legal action in each ratifying member State, which could mean that each port was a potential legal venue. They wanted the issue of legal venue for lawsuits to be

[24]See PTMC/2005/1, Tripartite Intersessional Meeting on the Follow-up of the Preparatory Technical Maritime Conference, Note 18, paragraph 3, p. 31.

[25]See Report 1 (1A), Adoption of an instrument to consolidate maritime labor standards, ILC, 94th ILC (Maritime Session) 2006, p. 59.

[26]See Tripartite Intersessional Meeting on the Follow-up of the Preparatory Technical Maritime Conference, PTMC/2005/1, Note 18, para. 2 p. 31.

[27]Ibid. Note 18, para. 3.

[28]Ibid., Note 18, para. 4.

[29]Ibid, p. 31, para. 5.

[30]Report of the Discussion, Tripartite Intersessional Meeting on the Follow-up to the PTMC, Geneva, 21–27 April 2005, ILO Doc. No. PTMC/2005/23, para. 107.

addressed directly rather than implicitly. They were ready to agree that the State of incorporation of the company owning the ship or country of legal residence of the respective seafarers be included among possible legal venues. They could not agree that the mere fact of a ship calling into any port created a venue for all legal suits. These provisions were among the most difficult ones to resolve as to the forum for the handling and settling of complaints relating to working and living conditions on board ships.

The objective of the new provisions relating to both the on-board and onshore seafarers' complaint-handling procedures was the strengthening of the enforcement system. In so doing, it can be said that it did not create new obligations on the port State that did not already exist, but rather it consolidated the action that governments were already taking or were prepared to take with respect to onshore complaints. The provisions in Regulation 5.2.1 paragraph 4 and Standard 5.2.2 of the MLC, 2006, allow for the normal rules on jurisdiction and conflict of law principles in each ratifying member State to take their course.[31] The final provisions adopted, Regulation 5.2.1 paragraph 4 of the MLC, 2006, read as follows:

> Inspections that may be carried out in accordance with this Regulation shall be based on an effective port State inspection and monitoring system to help ensure that the working and living conditions for seafarers on ships entering a port of the Member concerned meet the requirements of this Convention (including seafarers' rights).

The explanations provided by the International Labour Office on the proposed text, which was subsequently adopted, concerning the design of these provisions are instructive. The commentary stated as follows:

> The provisions might thus allow the normal rules on jurisdiction and conflict-of-law principles in each ratifying Member to take their course. For example, the Convention could, in the Regulation, contain a provision recognizing the right of a seafarer on a ship calling at a port in a ratifying Member's territory to file a complaint alleging a breach of the requirement relating to his or her working and living conditions on the ship. The complaint would then be dealt with by the courts or other competent authorities of each Member in accordance with the country's national law and practice. The Convention could then provide for certain obligations on the port State that would essentially be of a practical nature, to make sure that seafarers are able to properly exercise their right of complaint and are certainly not inhibited from doing so. In particular, it is presumably accepted that the officer receiving a complaint must take some action, such as channeling the complaint to the competent authorities of the flag State. It might also be helpful to have an obligation on each Member to identify and designate an officer in its ports who could receive such complaints and to provide advice to the complainants of a procedural nature. Other action, such as actually considering the complaint, could be left to the national law and practice of the ratifying Member. The Standard would also have to lay down certain minimum requirements to protect the fundamental rights of the seafarer – in particular, a duty to take reasonable steps to protect the confidentiality of the complaint.[32]

This explanation helped resolve the issues raised concerning legal jurisdiction for complaints made by seafarers. In the final consideration of this issue at the final

[31] Ibid. p. 32.

[32] Ibid.

Session of the International Labour Conference, the Seafarers' Group, as noted earlier, raised the matter and, in particular, the right of a seafarer to "file a complaint in a port State or to other organizations," again stressing the provision that "[s] eafarers were equal to any other persons before the law and should not be hindered in their access to the law."[33]

In this respect, it is important to recall that the provisions of Article 1 of the 1999 International Convention on Arrest of Ships include in its definition of "maritime claim" in Article 1(1)(o) the following:

> wages and other sums due to the master, officers and other members of the ship's complement in respect of their employment on the ship, including costs of repatriation and social insurance contributions payable on their behalf.[34]

The following sections provide examples of relevant legislation of certain countries in circumstances that could give rise to a complaint by a seafarer or others, relating to a term or condition of employment that is a requirement under the MLC, 2006. The complaint could be made by a seafarer or interested person during port State control either to a PSCO or through the onshore seafarer complaint procedures and, in addition to the usual remedies provided for in connection with PSC and the provisions implementing Regulation 5.2.2 of the MLC, 2006, may also, possibly, lead to a legal action being taken in a port State. They may relate to nonpayment of wages, failure to repatriate a seafarer, abandonment of seafarers in a port, and claims for death and injury. In this regard, it is important to note the connection with the possibility for legal action that may be possible in the context of the International Convention relating to the Arrest of Seagoing Ships, 1952,[35] or the common maritime right *in rem of* arrest and liens. The provisions overlap with some MLC, 2006, issues, as well as conflict of laws/contract or complaints for breach of the provisions of applicable collective bargaining agreements.

6.3.1 Onshore Seafarer Complaint Handling

6.3.1.1 United Kingdom

The United Kingdom ratified the MLC, 2006, on August 7, 2013.[36] According to UK legislation, in the event that the *on-board complaint procedure* fails to resolve a

[33] ILC, 94, PR7 (Part 1), 2006, para. 836. See also p. 8 above.

[34] http://unctad.org/en/PublicationsLibrary/aconf188d6_en.pdf. It is to be noted that very few States (11) have ratified the 1999 Arrest of Ships Convention as of 14 February 2017, which means that it may have little impact, while 71 countries have ratified the 1952 Convention. See https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XII-8&chapter=12&clang=_en.

[35] https://treaties.un.org/pages/showDetails.aspx?objid=08000002801338ba.

[36] http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:11300:0::NO::P11300_INSTRUMENT_ID:312331.

complaint, the seafarer may raise it with an authorized officer in the port where the ship is moored or anchored. A Marine Guidance Notice (MGN) sets out the action to be taken where a ship is in a port in the UK. MGN 487 states that the complaint should be reported to the nearest MCA Marine Office.[37] Reference should also be made to another MGN 477, which addresses enforcement of Seafarer Employment Agreements (SEAs) under Regulation 2.1 of the MLC, 2006. It provides that should on-board procedures fail to resolve the complaint or, for any other reason, action in the courts becomes necessary, while UK ships are subject to UK law, powers to determine a matter under a SEA are not restricted to the UK courts. A seafarer or shipowner may undertake proceedings in a court in another country with respect to a SEA, although such proceedings would normally take account of the relevant flag State (UK) law.[38] The following section examines some of the issues that could give rise to onshore complaints and could lead to legal action being taken in a port State.

6.3.2 Nonpayment of Wages

Nonpayment of wages could be one such issue that could give rise to seafarers' complaints in a port of a country that has ratified the MLC, 2006. Regulation 2.2 of the MLC, 2006, provides that "all seafarers shall be paid for their work regularly and in full in accordance with their employment agreements," while Standard A2.2.1 provides that such payment shall be made "no greater than monthly intervals. . . ." The question arises as to whether a ship could be detained for breach of the requirements of the Convention relating to wages.[39] The Seafarers' Group sought clarification as to whether the text of Standard A.5.2.1 paragraph 6 subparagraph (b) permitted the detention of a ship for noncompliance with Regulation 2.2 and Standard A2.2 on wages. The text of Standard A.5.2.1 paragraph 6 provides that "the ship shall not proceed to sea until any non-conformities that fall within the scope of subparagraph (a) or (b) of this paragraph have been rectified." The text provides for a detailed inspection where a ship is found not to conform to the requirements of the Convention and

> 6. Where, following a more detailed inspection by an authorized officer, the ship is found not to conform to the requirements of this Convention and:
>
> (a) the conditions on board are clearly hazardous to the safety, health or security of seafarers; or

[37] See MGM 487, MLC, 2006, Onshore complaints: https://www.gov.uk/government/publications/mgn-487-maritime-labour-convention-2006-on-shore-complaints.

[38] See MGM 477 (M), July 2014: https://www.gov.uk/government/publications/mgn-477m-maritime-labour-convention-2006-seafarers-employment-agreements. See also, McConnell (2016), op.cit., p. 1, which refers to this MGN.

[39] It is to be noted that the words "serious material hardship and to wages" had been removed from the text of Standard A5.2.1 during the discussions of the MLC, 2006.

(b) the non-conformity constitutes a serious or repeated breach of the requirements of this Convention (including seafarers' rights);

the authorized officer shall take steps to ensure that the ship shall not proceed to sea until any non-conformities that fall within the scope of subparagraph (a) or (b) of this paragraph have been rectified, or until the authorized officer has accepted a plan of action to rectify such non-conformities and is satisfied that the plan will be implemented in an expeditious manner. If the ship is prevented from sailing, the authorized officer shall forthwith notify the flag State accordingly and invite a representative of the flag State to be present, if possible, requesting the flag State to reply within a prescribed deadline. The authorized officer shall also inform forthwith the appropriate shipowners' and seafarers' organizations in the port State in which the inspection was carried out.

Nonpayment of wages is included as one of the certifiable and inspectable items in Appendices A5-I and A5-III of the MLC, 2006. Noncompliance could constitute a serious or repeated breach of the requirements of the MLC, 2006, under the provisions of Standard A.5.2.2 paragraph 6 referred to above. Detention of a ship would be permitted by a port State control officer if, in his or her professional judgment, the nonpayment of wages represented a serious or repeated breach of the requirements of the Convention.[40] It is clear that, under the provisions of the MLC, 2006, the complaint-handling procedures give a clear indication that, in accordance with the Convention, as much as possible the intention was to find solutions that are of a more practical nature. The approach favored by the Convention leaves intact the option that a member State has or the legal representative of the seafarer to resort to the courts depending on the circumstances of the case.

Indeed, the seafarers' right to wages is also one of items that can be secured by a maritime lien in accordance with the International Convention on Maritime Liens and Mortgages, 1993.[41] Article 4 (1) (a) and (b) of that Convention provide as follows:

I. Each of the following claims against the owner, demise charterer, manager or operator of the vessel shall be secured by a maritime lien on the vessel:

(a) claims for wages and other sums due to the master, officers and other members of the vessel's complement in respect of their employment on the vessel, including costs of repatriation and social insurance contributions payable on their behalf:

(b) claims in respect of loss of life or personal injury occurring, whether on land or on water, in direct connection with the operation of the vessel . . .

In addition, the International Convention on Arrest of Ships, 1999,[42] includes in its definition of "maritime claim" in Article 1 a claim arising out of the following:

[40]See PTMC/2005/23, p. 25, paras. 184–185. See also, MLC, 2006 Guidelines for Port State Control Officers, para. 98, p. 69, which gives an example of circumstances that could give rise to detention in port of a ship. Such a situation could be where there were "*repeated cases of non-payment of wages or the non-payment of wages over a significant period or the falsification of wage accounts or the existence of more than one set of wage accounts*".

[41]http://unctad.org/en/PublicationsLibrary/aconf162d7_en.pdf.

[42]See https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XII-8&chapter=12&clang=_en.

loss of life or personal injury occurring, whether on land or on water, in direct connection with the operation of the ship;

. . .

costs or expenses relating to the preservation of an abandoned ship and maintenance of its crew

. . .

wages and other sums due to the master, officers and other members of the ship's complement in respect of their employment on the ship, including costs of repatriation and social insurance contributions payable on their behalf.

Article 7 paragraph 1 of the Arrest of Ships Convention, 1999, also grants to the court of the State, in which the arrest has been effected (e.g., the port State) or security provided, jurisdiction to determine the case upon its merits. Of course, arrest and judicial sale of a ship are not necessarily a good result for the seafarers, who may then be left without employment.

Depending on the response of the shipowner or flag State in the event of a detention for nonpayment of wages, it is also clear that the legislation of a ratifying State could permit legal action in its courts in circumstances where detention of the ship by the port State, for instance, did not to result in the payment of outstanding wages. Legal action could be potentially taken under common law that could lead to the sale of the ship with payout as per maritime lien priorities. Of course, there are complexities related to whether other legal venue should not be pursued, such as legal action in the flag State or the State where the shipowner may have his/her habitual residence or address. Such legalistic mechanisms are already provided for under international law. The Arrest of Ships Convention, 1999, covers costs relating to loss of life and personal injury directly connected with the operation of the ship, cost of maintenance of crew, outstanding wages, repatriation costs, and costs related to social insurance contributions.

6.3.2.1 Australia

Australia ratified the MLC, 2006, on December 21, 2011.[43] In this regard, it is interesting to see how one country has sought to implement Standard A.5.2.1 paragraph 6 (b) of the MLC, 2006, with respect to enforcement of wage claims against foreign flag ships and possible extraterritoriality issues.

The Convention has been implemented primarily through the Navigation Act 2012 (Cth) and Marine Order 11.[44] Australia's Marine Order 11 provides that "any person with an interest in the living and working conditions of a vessel that is in an Australian port" may report a complaint alleging a breach of the MLC, 2006, to Australian Maritime Safety Authority (AMSA), and having received a complaint,

[43] http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:11300:0::NO::P11300_INSTRUMENT_ID:312331.

[44] See Marine Order 11 (Living and working conditions on vessels) 2013: http://www.ilo.org/dyn/normlex/en/f?p=1000:80024:::NO::P80024_COUNTRY_ID:102544.

"AMSA must investigate the complaint and act in accordance with its obligations under MLC." For instance, where the Maritime Union of Australia (MUA) lodges a complaint with AMSA alleging, for example, that crews have not been paid their wages and/or their wages are not being paid in a timely manner, AMSA is under an obligation to investigate the complaint, which ordinarily involves an AMSA officer attending on board a vessel to inspect records of the payment of wages and interviewing members of the crew.[45]

It is to be noted that, consistent with the MLC, 2006, Section 53 Marine Order 11 provides that the owners of a vessel must pay each seafarer (a) at intervals of no more than one month and (b) in accordance with the work agreement—pursuant to the Navigation Act, AMSA has power to detain a vessel for noncompliance with Marine Order 11, including in relation to the payment of wages.

Concerning foreign ships engaged in the coastal/domestic voyage trade (cabotage), information on the Australian legislation sets out the situation under the current regime concerning wages as follows:

> Under the current regime where a foreign flagged and crewed vessel which has made at least two other voyages under a temporary license in the last 12 months and is performing another Australian coastal voyage under a temporary license Australian labour law applies to the crew pursuant to the Fair Work Act 2009 and the ship's officers and crew must be paid not less than the minimum wages set out in part B of the Seagoing Industry Award 2010 (SIA 2010) in respect of the period from when loading begins until unloading ends in respect of the cargo that is being shipped pursuant to the temporary license – which is sometimes referred to as a "cabotage bonus payment.".[46]

Clause 15 of SIA 2010[47] provides, among other things, that the crew must be paid "their wages, penalties and allowances at a frequency of not longer than monthly." It has thus been argued that any part B cabotage bonus payment should be paid at intervals of no more than one month after the entitlement accrued.[48] Payment of the cabotage bonus falls outside the jurisdiction of AMSA and is administered by Fair Work Australia pursuant to the Fair Work Act and Regulations. Various sanctions may follow from a finding that the payment of the cabotage bonus has not been made in accordance with the requirements of SIA 2010.

It has been strongly recommended that owners and operators of foreign-crewed tonnage calling at Australian ports ensure that there are not any anomalies in relation to the payment of the crews' wages and any overtime/cabotage bonus entitlements or otherwise with regard to their "living and working conditions" as there is a strong possibility that "on-shore" complaints will be lodged with AMSA and/or Fair Work Australia.[49]

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[45]See NIC VAN DER REYDEN, Lawyers for International Commerce: http://www.hfw.com/downloads/HFW-Australian-cabotage-update-July-2015.pdf.

[46]Ibid.

[47]For the Seagoing Industry Award 2010 see: http://www.airc.gov.au/awardmod/databases/seagoing/Exposure/seagoing2.pdf.

[48]Ibid.

[49]See VAN DER REYDEN, op.cit. a http://www.hfw.com/Australian-cabotage-update-July-2015.

AMSA has issued directions requiring a vessel to comply with specific requirements while approaching, entering, or leaving ports in Australia or its EEZ.[50] Situations in which such directions may be issued include noncompliance with the MLC, 2006, such as payment of wages, crew welfare, or Seafarer Employment Agreements, and poor management of fatigue and hours of work and rest. In 2016, AMSA banned two vessels from entry into Australian ports for 12 months for noncompliance with the MLC, 2006, after having found that the vessels had a number of deficiencies, including, in one case, insufficient provisions for its intended voyage and nonpayment of salary of the crew for several months[51] and, in another case, failings with respect to hours of work and rest for seafarers.[52]

6.3.2.2 Norway

Norway ratified the MLC, 2006, on February 10, 2009.[53] According to Section 51 of the Norwegian Maritime Code, 1994, as amended in 2013, wages and other sums due to the master and other persons employed on board in respect of their employment on the vessel are recognized as claims secured by maritime liens against the ship and take priority over all other encumbrances on a ship. It is also important to note that Chapter 4 Section 92 of the Norwegian Maritime Code, 1994, as amended, enables seafarers to seek the arrest of a ship in order to secure a maritime claim in respect of wages and other remuneration that is due to the master and other employees on board in respect of their service on the ship.[54] The Norwegian legislation also provides for financial security/guarantee to cover wages and repatriation with respect to its implementation of the MLC, 2006.[55] Sections 4-7 of the Ship Labour Act, 2013, concerning the obligation of the shipping company to furnish a guarantee provides as follows:

> (1) The company is obliged to furnish a guarantee for specific compensations for employees who are not covered by Norwegian or EEA social security schemes, and who: a) work on

[50] https://www.amsa.gov.au/vessels/ship-safety/port-state-control/refusal/index.asp.

[51] See https://www.amsa.gov.au/media/documents/01092016_FiveStarsFujianbannedfor12months.pdf.

[52] https://www.amsa.gov.au/media/media-releases/2016/documents/feb/07022016_Media-Release_Noah-Satu-12-Month.pdf.

[53] See http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:11300:0::NO::P11300_INSTRUMENT_ID:312331.

[54] The MLC, 2006 is mainly implemented in in Norway by Act of 16 February 2007 No. 9 relating to Ship Safety and Security (The Ship Safety and Security Act) and Act of 21 June 2013 No. 102 relating to employment protection etc. for employees on board ships (The Ship Labour Act). The Ship Labour Act replaced the Seamen's Act on 20 August 2013. See also, Guidance Note on Norway's implementation of the MLC, 2006; http://www.ilo.org/dyn/normlex/en/f?p=1000:80024:::NO::P80024_COUNTRY_ID:102785.

[55] See https://www.sjofartsdir.no/globalassets/sjofartsdirektoratet/fartoy-og-sjofolk---dokumenter/mlc/nor/nma-mlc-guidance-note-for-inspections-and-certification.pdf.

> board a ship registered in the Norwegian International Ship Register; or b) is employed in the service of a foreign employer engaged in commercial activities on ships engaged in foreign trade and registered in the Norwegian Ordinary Ship Register (NOR). (2) The company is also obliged to furnish a guarantee for specific compensations for employees who are employed in hotel and restaurant services on board tourist ships registered in the Norwegian International Ship Register (NIS), and who are covered by the EEA social security scheme.[56]

6.3.3 Repatriation

Seafarers' right to repatriation had been provided for in earlier ILO Conventions.[57] The MLC, 2006, in Title 2.5, dealing with repatriation, replaced and updated the earlier instruments. Standard A2.5 paragraph 6 provides as follows:

> Taking into account applicable international instruments, including the International Convention on Arrest of Ships, 1999, a Member which has paid the cost of repatriation pursuant to this Code may detain, or request the detention of, the ships of the shipowner concerned until the reimbursement has been made in accordance with paragraph 5 of this Standard.

Paragraph 5 of Standard A2.5 of the MLC, 2006, however, provides that if a shipowner fails to make arrangements to repatriate the seafarer, the State from which the seafarer is to be repatriated or the State of which the seafarer is a national may arrange for the repatriation and recover the cost from the flag State. Article 1 of the Convention on Arrest of Ships referred to above includes in its definition of "maritime claim" the costs of repatriation. Under the MLC, 2006, legal action could therefore be taken in a port State where the shipowner has failed to assume responsibility for repatriation of seafarers.

6.3.3.1 Germany

The Government of Germany has implemented Standard A2.5 paragraph 6 of the MLC, 2006, in its legislation. Section 140 of the German Maritime Labour Act, 2013, provides as follows:

> In the event of the repatriation of a crew member on a ship flying a foreign flag, who has been stranded in Germany, being delayed the Occupational Accident Insurance Fund shall inform the consular representative of the flag State and of the State of nationality or of the State of residence of the crew member without delay. If the Occupational Accident Insurance Fund arranges for repatriation, it shall request the flag State to refund the expenses disbursed. In place of asserting the entitlement in accordance with sentence

[56] See Act of 21 June 2013 No. 102 relating to employment protection etc. for employees on board ships, https://www.sjofartsdir.no/contentassets/e2109922eca44281ade9fffcbe891e37/ship-labour-act.pdf.

[57] See ILO Repatriation of Seamen Convention, 1926 (No. 23) and the Repatriation of Seafarers' Convention (Revised), 1987 (No. 166).

> 2, in accordance with the International Convention of 10 May 1952 for the Unification of Certain Rules relating to the Arrest of Seagoing Ships (Federal Law Gazette 1972 Part II p. 655), it may arrest ships of the shipowner until the expenses disbursed have been refunded by the shipowner.

German legislation therefore enables resort to its courts and arrest of ships in the event of noncompliance with the obligation relating to repatriation of foreign seafarers.

6.3.4 Abandonment and Claims for Death and Injury

Two very important amendments to the MLC, 2006, were approved in June 2014 by the International Labour Conference of the ILO.[58] These were the first set of amendments to the Convention since its adoption in 2006. They relate to the Code (Standards and Guidelines) of the MLC, 2006, and were adopted in accordance with Article XIII of the MLC, 2006—the more rapid amendment procedure. The amendments entered into force on January 18, 2017.

The *2014 Amendments to the MLC, 2006*, filled a gap that was long outstanding and had been discussed in a Joint IMO/ILO Working Group established by the two organizations in 1998. Its mandate was to consider questions of liability and compensation in connection with crew claims; to ensure, through the operation of appropriate international instruments, the rights of crew members/seafarers to adequate compensation for loss of life, personal injury, and abandonment; and to formulate suitable recommendations to the IMO Legal Committee and the Governing Body of the ILO, as appropriate. Nine meetings were held to discuss the issues and propose solutions. Work on the issues was suspended between 2001 and 2008, the period of the development, adoption, and start of the ratification process of the MLC, 2006.[59]

The amendments are intended to better address the problem of abandonment of seafarers and to clarify matters relating to claims for compensation in the case of a seafarer's death or long-term disability due to an occupational injury or illness. Financial security for repatriation and for abandonment has been included among the areas under the MLC, 2006, that are subject to detailed inspection.

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[58]The 2014 amendments to the MLC, 2006 were approved by the International Labour Conference at its 103rd Session in June 2014. See http://www.ilo.org/ilc/ILCSessions/103/reports/WCMS_248905/lang--en/index.htm.They were adopted by the first meeting of the Special Tripartite Committee (STC) on 11 April 2014. See http://www.ilo.org/global/standards/maritime-labour-convention/events/WCMS_228789/lang--en/index.htm.

[59]The postponement of the discussion was due to the legal complexities relating to liability and compensation in connection with crew claims. It was agreed to set aside work of the working group until the completion of the broader process concerning the work on the MLC, 2006 and to return to the issues at a later stage.

6.3.4.1 Abandonment

Abandonment normally takes place in a foreign port. It results from the failure of the shipowner to repatriate the seafarer. The first meeting of the Special Tripartite Committee (STC) under the MLC, 2006,[60] took place in April 2014,[61] 8 years after its adoption. It was tasked to consider proposals for amendments to the Code (Standards and Guidelines) of the MLC, 2006, in order to better address the problems faced by abandoned seafarers and their families and to elaborate on the requirement in the MLC, 2006, for shipowners to provide financial security to assure compensation in the event of abandonment and of death or long-term disability of a seafarer due to occupational injury, illness, or hazard. Proposals for the text of these amendments were submitted jointly by the Shipowner and Seafarer representatives on the STC. The amendments made to the Code implementing Regulation 2.5—Repatriation—were intended to better address the specific problems faced in cases of abandonment of seafarers. In accordance with Regulation 2.5 and the related Standard A2.5 of the MLC, 2006, all seafarers are entitled to the coverage for repatriation, a matter that must be included in the seafarers' employment agreement and also verified on flag State inspections. The Conference noted at the time of the adoption of the Convention in 2006 that, in practice, the needs of seafarers who are abandoned were not adequately covered under existing mechanisms and provisions.[62]

The new Standard A2.5.2 concerning financial security for abandonment of seafarers is intended to "ensure the provision of an expeditious and effective financial security system to assist seafarers in the event of their abandonment." Abandonment has been defined by the amendment.[63] The new Standard A2.5.2 paragraph 14 provides as follows:

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[60]First meeting of the Special Tripartite Committee of the MLC, 2006: Background paper for discussion at the first meeting of the Special Tripartite Committee established under Article XIII of the Maritime Labour Convention, 2006 (Geneva, 7–11 April 2014) (STCMLC/2014). The Special Tripartite Committee as provided for by Article XIII of the MLC, 2006 was established by the ILO Governing Body and has a mandate to "*keep the working of [the] Convention under continuous review*". It has special competence in the area of maritime labor standards.

[61]Ibid.

[62]See Resolution concerning the Joint IMO/ILO Ad Hoc Expert Working Group on Liability and Compensation regarding Claims for Death, Personal Injury and Abandonment of Seafarers, adopted 20 February 2006. See http://www.ilo.org/wcmsp5/groups/public/---ed_norm/---normes/documents/publication/wcms_088130.pdf.

[63]Standard A.2.5.2 defines abandonment as follows: "2. *For the purposes of this Standard, a seafarer shall be deemed to have been abandoned where, in violation of the requirements of this Convention or the terms of the seafarers' employment agreement, the shipowner: (a) fails to cover the cost of the seafarer's repatriation; or (b) has left the seafarer without the necessary maintenance and support; or (c) has otherwise unilaterally severed their ties with the seafarer including failure to pay contractual wages for a period of at least two months*". http://www.ilo.org/dyn/normlex/en/f?p=1000:51:::NO:51:P51_CONTENT_REPOSITORY_ID:3257890?.

> The provisions in this Standard are not intended to be exclusive or to prejudice any other rights, claims or remedies that may also be available to compensate seafarers who are abandoned. National laws and regulations may provide that any amounts payable under this Standard can be offset against amounts received from other sources arising from any rights, claims or remedies that may be the subject of compensation under the present Standard.[64]

This provision opens the door to legal jurisdiction and therefore extraterritorial application in the cases relating to abandonment, in addition to the fact that Standard 2.5.2 paragraph 4 of the 2014 Amendment provides as follows:

> The financial security system shall provide direct access, sufficient coverage and expedited financial assistance, in accordance with this Standard, to any abandoned seafarer on a ship flying the flag of the Member.

The significance of the abovementioned provision concerning direct access by the seafarer to the shipowners' financial security or insurance would in addition enable quick resolution of claims and payment.

6.3.4.2 Claims for Death and Injury

The other area where the issue of legal jurisdiction arises concerns claims for death and injury. With respect to shipowners' liability, the question of legal remedies available to seafarers is to be found in the MLC, 2006. Regulation 4.2 paragraph 1 provides that each member State that ratifies the Convention is to ensure that measures "are in place on ships that fly its flag to provide seafarers employed on the ships with a right to material assistance and support from the shipowner with respect to the financial consequences of sickness, injury or death occurring while they are serving under a seafarers' employment agreement or arising from their employment under such agreement."

Regulation 4.2 paragraph 2 provides that this Regulation "does not affect any other legal remedies that a seafarer may seek." The related Standard A4.2 states that "shipowners shall provide financial security to assure compensation in the event of death or long-term disability of seafarers due to an occupational injury, illness or hazard. . . ." The *Amendments of 2014 to the MLC, 2006*, relating to Standard A 4.2.1(now renamed form Standard A4.2) added a new Standard A4.2.2 concerning shipowners' liability for contractual claims relating to death or long-term disability of seafarers due to occupational injury, illness, or hazard. It also provided that the seafarer, in accordance with Regulation 4.2 paragraph 2, "shall receive payment without prejudice to other legal rights. . . ." Standard A4.2.1, new paragraph 8 (e), expressly provides that a "claim for contractual compensation may be brought directly by the seafarer concerned or their next of kin, or a representative of the seafarer or a designated beneficiary." Ships of ratifying countries must carry on board a certificate or documentary evidence of financial security issued by the

[64] See http://www.ilo.org/wcmsp5/groups/public/---ed_norm/---relconf/documents/meetingdocument/wcms_248905.pdf.

financial security provider. The new Standard A4.2.2 paragraph 3 provides that national laws and regulations are to ensure that effective arrangements are in place to receive, deal with, and impartially settle contractual claims relating to compensation through expeditious and fair procedures. The new Appendix A4.-1 provides for the elements that must be included in the certificate or other documentary evidence concerning the financial security. The new Appendix B4-1 contains a Model Receipt and Release Form, which could be used by the parties concerning the payment of contractual claims. The Form includes an important proviso as follows:

> The payment is made without admission of liability of any claims and is accepted without prejudice to [my] [the Seafarer's legal heir and/or dependant's]* right to pursue any claim at law in respect of negligence, tort, breach of statutory duty or any other legal redress available and arising out of the above incident.

The above provisions allow the seafarer or an heir or dependant to pursue legal action in the future. They provide clear evidence that legal claims by seafarers in a port State or elsewhere are possible under the provisions of the MLC, 2006. Depending on the legislation of a member State, legal action to enforce the provisions of the MLC, 2006, as amended, is an option open to seafarers. It is also to be noted that financial security with respect to shipowners' liability, for abandonment and claims for death and injury, are areas that are subject to detailed inspection by port State control.

As also noted earlier, there is an overlap with the definition of "maritime claim" under Article 1.1(b) of the International Convention on the Arrest of Ships, 1952, which also includes "loss of life or personal injury occurring, whether on land or on water, in direct connection with the operation of the ship,"[65] permitting legal action under that Convention.

6.4 Conclusion

This chapter has examined the extent to which some of the provisions of the MLC, 2006, could give rise to legal claims that may be pursued in a port State, although the issue is not expressly addressed by the Convention. The MLC, 2006, has been set in the broader context of Article 94 of UNCLOS and in the wider regime of maritime law and conventions relating to ship arrest and maritime liens. The MLC, 2006, system of compliance and enforcement is directed for the most part to the existing international maritime regime of ship inspection, port State control, and MOUs, buttressed by the ILO approach involving seafarer/worker complaint systems and regular monitoring by the ILO supervisory system, as well as the public remedies related to that system. However, because of the overlap, importantly Article 1 of the MLC, 2006, imposes an obligation on all States that ratify the

[65] A similar definition is included in the Arrest of Ships Convention, 1999, op.cit.

Convention to cooperate to ensure the effective implementation and enforcement of the Convention. Title 5 of the MLC, 2006, deals with compliance and enforcement, while paragraph 4 of that title provides that its provisions do not determine legal jurisdiction or legal venue. This means that the normal rules relating to jurisdiction and legal venue apply to the MLC, 2006, in the same way as with other international maritime Conventions such as SOLAS or MARPOL. In the context of port State control under the MLC, 2006, a State must exercise its responsibilities under the Convention, particularly with respect to its port State responsibilities, and enable legal action to be taken with a view to seeking redress.

The MLC, 2006, is an international treaty reflecting international law and in particular is the generally accepted reference point for international maritime labor law today by virtue of the detailed and comprehensive provisions it contains concerning generally accepted internationally agreed minimum labor standards. It is now an important instrument for international labor law that can ensure that seafarers' rights are protected and that they can enjoy the decent work benefits provided for under the Convention. This is possible not only by reference to Title 5 of the MLC, 2006, which contains detailed requirements concerning compliance and enforcement provisions of the Convention but also in some cases through legal action in courts of a port State or courts of the flag State or the State of the seafarers' residence where the circumstances warrant it.

The law and practice of States relating to compliance and enforcement of the Convention are still at an early stage. It would be interesting to see whether legal action will be taken, if legally possible, where PSC action has not been sufficient to ensure enforcement of a seafarer's employment rights as provided for under the Convention and set out in the SEA. Only time will tell how effective the MLC, 2006 will be in ensuring seafarers' employment rights. This will have to be observed not only from the perspective of the impact of PSC and the work of the ILO supervisory bodies in monitoring the application of the Convention in law and practice but also whether judicial decisions will be handed down, which also take into account the minimum standards set out in the MLC, 2006.

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Chapter 7
Managing Financial Resources in Shipping

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7.1 Introduction

An important characteristic and key feature of the shipping industry is that it is highly *cyclical*; this cyclicality is particularly apparent in the traditional, less specialized and highly fragmented dry bulk and tanker shipping sectors. Freight rates follow a volatile pattern, due to changes in the industry's underlying demand and supply forces. As can be observed in Fig. 7.1, volatility of freight rates has a direct effect on shipping assets whose value follows a cyclical pattern similar to that of freight rates. Another important characteristic and key feature of the shipping industry is that it is highly *capital intensive*. The acquisition, ownership, and management of shipping assets require the commitment of very large amounts of capital. The establishment of a meaningful presence (critical mass) in shipping will typically involve the formation of a fleet of at least 7–10[1] vessels, and depending on the specific shipping sector, this will require a significant investment amount; e.g., the acquisition of a 5-year old Capesize vessel would require in September 2016 the commitment of about $24 million. As a result of the industry's cyclical and capital-intensive nature, it is fundamental for the industry's participants and capital

[1]Tradewinds, Bank competition to 'make shipping like airline industry', June 2, 2016, http://www.tradewindsnews.com/weekly/761761/bank-competition-to-make-shipping-like-airline-industry

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I.D. Visvikis, P.M. Panayides (eds.), *Shipping Operations Management*,
WMU Studies in Maritime Affairs 4, DOI 10.1007/978-3-319-62365-8_7

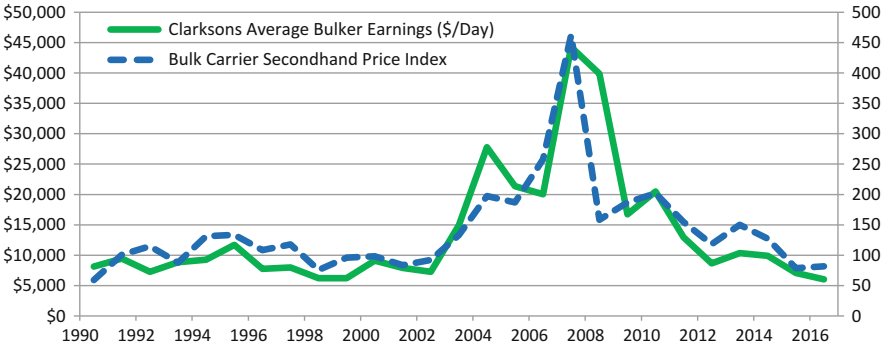

Fig. 7.1 Average earnings and secondhand price index. *Source*: Clarksons Research, Shipping Intelligence Network (SIN)

providers to determine if the timing is appropriate for investments in shipping. Furthermore, and in order to ensure the viability of shipping investments, it is equally important to develop an understanding on the different financial sources of capital that are available in the industry and the techniques and strategies that can be employed to manage business risks. This chapter aims to expose the reader to the different sources of shipping finance, analyze each of them, and provide an overview of the present challenges in the sector. A deeper understanding of these ship-financing sources and conditions will assist toward employing these and developing the best possible capital structure for a shipping project and a company as a whole.

7.2 Sources of Shipping Finance

Historically, shipowners' capital requirements in bulk shipping tended to be relatively small as, invariably, their shipowning operations involved small fleets of one to two vessels. These typically involved the shipowner committing his own equity resources (generated from other merchant and trading activities), which on a number of occasions were supported by equity contributions from the shipowner's extended network of friends and family.

During the twentieth and the twenty-first centuries, as a result of the increased internationalization of trade and the rapid technological advancement, ships became larger so as to benefit from economies of scale. Furthermore, ships particularly in specialized sectors such as tanker, liquefied petroleum gas (LPG), and liquefied natural gas (LNG) became highly sophisticated in order to meet the increasingly stricter maritime regulatory environment, e.g. the introduction of the requirement of double-hulled tankers during the 1990s. Larger and highly specialized shipping assets could no longer be supported by the traditional friends and family financing model. Thus, shipowners started to rely increasingly on external, primarily debt, financing sources.

At present, the shipping industry has developed to a multibillion US dollar industry with the top 10 shipowning countries' fleet being valued as of February 2016 around $450 billion.[2] Shipowners' financing requirements are typically catered by a number of different capital sources, ranging from bank debt (senior term loan facilities) to leasing, bond issues, private and public equity, export credit agencies (ECA), and mezzanine finance, among others. Each of these ship-financing sources is examined next separately.

7.2.1 Bank Debt

Bank finance is the dominant source of capital for the shipping industry as it represents the cheapest form of ship finance when compared to other capital sources. Furthermore, debt finance is typically available in large amounts, which is important for shipping in view of its capital-intensive nature. There are a large number of local, regional, and international banks that cater for the global shipowning community's debt ship-financing requirements. These banks may either be (i) commercial banks, which have set up dedicated shipping departments to service their shipping client's needs; (ii) specialized shipping banks, which are involved in financing companies in the transportation or shipping industries only; and (iii) private banking institutions, which are involved in ship financing in order to develop cross selling (private banking) opportunities. The importance of bank debt compared to other sources of shipping capital is evidenced in Table 7.1.

The most typical form of debt ship finance is the senior term loan facility. Under this arrangement, the bank (the lender) will lend to the shipowner (the borrower) a specific amount of capital (the loan amount) that is repayable over a set period of time, the "Term." The loan amount is available to the borrower in one drawing. It is repayable in equal installments over the duration of the term, by way of repayments; typically, these are quarterly or semi-annual installments. Depending on the age of the vessel, terms typically range from 5 to 8 years, possibly more for newbuilding vessels. The repayment of a shipping loan facility is related to the underlying asset's remaining economic life. Thus, term loan facilities will usually have an amortization profile that is longer than the term of the loan. As an example, the repayment terms of a $100 million senior loan facility may involve a term of 7 years and a profile of 10 years. The repayments during the 7-year term will be calculated on the 10-year amortization profile, meaning that during each of the 7-year term, the borrower would have capital installments (repayments) of $10 million per annum. At the end of the 7-year term, the borrower would need to pay

[2]Infographic, Top 10 Shipowning Nations by Value' data sourced, Vessels Value, February, 2016, http://worldmaritimenews.com/archives/182683/infographic-top-10-shipowning-nations-by-value/

Table 7.1 Sources of capital—shipping, in billion US$

Capital source	2007	2008	2009	2010	2011	2012	2013	2014	2015
Bank loan[a]	91.9	83.6	33.0	37.6	51.5	40.8	56.3	61.8	49.1
Bonds	12.1	4.1	7.5	22.9	16.9	22.3	12.3	15.3	6.3
Leasing	6.7	4.8	0.6	1.0	1.5	1.8	2.3	0.1	2.2
Public equity	22.6	4.9	5.7	13.4	9.5	3.6	5.8	5.7	3.3
Private equity	0.0	1.1	0.6	2.1	4.3	2.9	7.5	3.4	1.0
Total	133.3	98.4	47.4	77.0	83.7	71.4	84.1	86.3	61.9

Source: Marine Money Magazine, January 2016
[a]Syndicated Loans (Dealogic); 2015 Syndicated Loans are first 9 months only

back the difference, typically known as the "Balloon" (i.e., $30 million in the above example), either by refinancing or selling the underlying shipping asset.

Prior to extending a shipping loan, shipping banks will carry out their *Credit Analysis* to determine if, and under what terms, they should proceed with the approval of a specific loan facility. Each shipping bank has its own credit analysis process, but invariably this will involve the evaluation of a number of different "Quantitative" and "Qualitative" factors. Table 7.2 outlines such factors that are analyzed during the credit analysis process. Kavussanos and Tsouknidis (2016) report that industry-specific variables, such as the current and expected market conditions, the risk appetite of the borrowers (shipowners) as seen from chartering policy choices, and a pricing variable (arrangement fee) capturing other factors, including the character and capacity of the shipowner and the company management team, are found to be significant factors that explain the default probabilities of bank loans.[3]

An important consideration for any debt ship-financing application is for the lending bank to properly evaluate and feel comfortable with the "Securities" package being offered for the financing. Loan facilities in shipping are secured with a number of different securities. These will typically be the following:

- *First-priority mortgage* over the underlying shipping asset: this is the cornerstone upon which lenders build a finance transaction. An important feature of a ship mortgage is that it gives to the lender "in rem" rights against the mortgaged vessel, that is, rights against the vessel itself, not just personal rights against the owner—under the "in rem" right, the holder is entitled to satisfy his claim against the vessel, irrespective of change of ownership. The first-priority mortgage gives the lender priority over unsecured creditors of the shipowner. In the event of a default, the lender can take possession, sell the ship, and realize funds to satisfy the debt.

[3]During 2007, a large number of mortgages in the US went into default, creating thus a severe recession in the US and the world economy as a whole.

Table 7.2 Typical factors considered during the credit analysis process

Credit analysis	
Quantitative factors	Qualitative factors
1. Macroeconomic fundamentals (world economic indicators, demand and supply conditions for the shipping service and the underlying commodities) 2. Timing, in relation to the shipping cycle 3. Financial standing of the borrower, the guarantor, and the charterer (if any); analysis of the financial statements 4. Value of the underlying asset to be financed (collateral value and stress scenarios) 5. Shipowners' financial strength and liquidity position 6. Expectations about the shipping markets and the world economy	1. Character of the shipowner (analysis of the shipowner's credit history in terms of his relationship with other lenders, his reputation and willingness to repay) 2. Capacity of the shipowner (analysis of his ability to repay, i.e. assessing his ship-management expertise in terms of acquiring assets at the appropriate timing in the shipping cycle and operating them in a cost-efficient manner)

Source: Authors

- *General assignment*: this typically involves the assignment to the lender of any insurances, earnings (specific assignment of any specific charter party), as well as assignment of requisition compensation.[4]
- *Guarantees and indemnity*: this security typically involves the shipowner providing his personal guarantee, while a corporate guarantee may also be provided either by the management company or the holding company if there is a corporate holding structure.[5]
- *Accounts pledge*: the shipping company's operating (earnings) and retention accounts are pledged in favor of the lender.[6]
- *Shares pledge or charge*: the shares of the borrowing company, which typically owns the shipping asset (the ship), are pledged in favor of the lender.

As soon as the credit analysis is completed and the securities' package is evaluated and findings are acceptable, the bank will issue an *Indicative Termsheet* outlining the proposed terms and conditions for the loan facility. The Indicative Termsheet is communicated to the shipping client, and once this is accepted by him, the bank will proceed and present the proposed debt facility to its credit committee. If the loan facility is approved by the bank's credit committee, a *Commitment Letter* will be issued by the bank for the shipping client's acceptance. Upon acceptance of the Commitment Letter, the bank will initiate the "documentation process" during which lawyers specializing in shipping finance prepare the loan agreement and the

[4]Requisition Compensation is paid to the shipowner in the event of requisition (appropriation) of his shipping asset.

[5]Under Personal Guarantee, the shipowner is required to pay back the loan personally in the event of a default.

[6]Retention Accountis a bank account where part of the vessel's earnings is retained for the purposes of the debt service.

security documents, which will govern the relationship between the lender and the shipping client during the period that the loan is outstanding.

Overall, debt ship finance is critical for a shipping company's expansion and fleet modernization as it is competitively priced compared to other capital sources. Access to this important source of capital largely depends on shipping companies' size, transparency, track record, and financial standing. Typically, well-established, large shipping companies are better positioned to develop relationships with large, international shipping banks, while smaller shipping companies have limited access to debt capital and tend to rely either on local or small international shipping banks.

7.2.2 Export Credit Agencies

Export credit agencies (ECAs) are typically government-controlled or quasi-governmental institutions that are mandated to promote their respective home country's exports of goods and services by providing export finance structures. These institutions are relevant for ship finance as ECAs of major shipbuilding countries are keen to financially support shipowners placing newbuilding orders in the ECAs' home countries. In view of the necessary export element that has to be in place in the ship-financing transaction, ECA financing is only applicable for newbuilding orders. Furthermore, ECAs are typically involved in ship-financing transactions of sizeable, transparent, and highly reputable shipping companies.

ECAs have been increasingly important for the shipping industry, particularly since September 2008, as in view of the financial turmoil, availability of traditional debt ship finance was severely restricted. ECAs, particularly from South Korea and China, have played an important role supporting their local shipbuilding industry through the financing they have extended for a number of newbuilding orders, involving a wide range of shipping assets, such as dry bulk vessels, tankers, LNG and LPG carriers, drillships and cruise vessels, among others.

Ship financing under an ECA structure will typically take one of the following two forms:

(a) ECA-guaranteed structure: under this arrangement, the necessary funding is extended to the shipowner by commercial banks, against a guarantee or insurance policy issued by the ECA. As a result, in the event that the borrower (shipowner) defaults in his loan obligations, the commercial banks' exposure is secured by that ECA cover.
(b) ECA direct financing: under this arrangement, the shipowner who has placed the newbuilding order will raise debt finance for this order, either directly from the ECA or possibly from a banking consortium where the specific ECA will participate; i.e., the ECA will act as a direct lender to the shipowner. As an example, in China, this financing is typically arranged with China Export Import Bank (CEXIM).

An important element for ECA finance is that, since ECAs are government/quasi-government controlled, the Organization for Economic Co-operation and Development (OECD) has formulated a set of nonbinding guidelines for government-supported export credits for ships.[7] Under these guidelines, an ECA can finance up to 80% of the contract price, while the repayment term must be maximum 12 years down to zero (i.e., without any balloon). ECAs are expected to continue playing a very important role in the ship-financing industry, particularly for sizeable transactions of large shipping companies. They represent an important alternative ship-financing source as they have significant capacity and liquidity resources to extend long-term, attractively priced financing for newbuilding shipping projects.

7.2.3 Bond Issues

Bonds represent an important and attractive financing source for shipping companies. These are debt instruments that are issued by shipping companies to investors, through which they borrow money from them. Typically, bonds are issued at a face value and carry a coupon, which is expressed as a percentage (%) of that face value. The shipping company (issuer) is obligated to pay coupons to bondholders, typically semi-annually or annually during the term of the bond, that is, during the life of the bond. At maturity, that is, at the end of its life, the shipping company is obligated to pay to the investors the face value of the bond. Bonds are particularly attractive to shipping companies because of their nonamortizing element. That is, during the life of the bond, the shipping company is not required to repay any of the initial principal as this is repaid in full at maturity, thereby reducing the amount of the periodic installment due. Bonds' nonamortizing element is an important feature that differentiates them from senior debt finance, which typically requires principal amortization. The lack of required principal amortization under a bond structure improves the shipping companies' cash flow, which is particularly important during bad markets when freight rates and incomes are low. Figure 7.2 shows the amount of capital raised by shipping companies through bond issues during the period 2007 to 2015. As can be observed, during 2010–2014 bonds capital increased substantially compared to 2008 and 2009 levels as, during that time, the availability of bank debt finance was very limited.

In order to proceed with a bond issuance, shipping companies have to obtain a *Credit Rating* by at least two major accredited rating agencies, such as Moody's and Standard and Poor's. Credit ratings provide information on the ability of a debt issuer to make timely payments of the specific debt obligation; i.e., it provides

[7]The OECD guidelines for government-supported export credits for ships are under OECD's "Sector Understanding on Export Credits for Ships (SSU)."

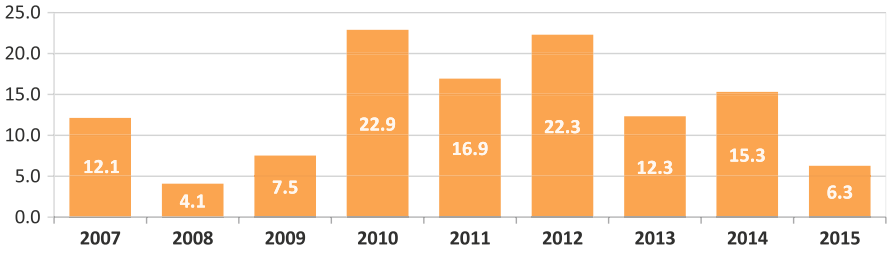

Fig. 7.2 Shipping bond issues (2007–2015), in billion US$. *Source*: Marine Money Magazine, January 2016

Table 7.3 Examples of shipping "high-yield" bond issues for 2015 and 2016

Shipping company (issuer)	Bond issue (amount)	Issue (year)	Maturity (year)	Coupon (p.a.)
Teekay corporation	$200 million	2015	2020	8.5%
Diana shipping Inc.	$63 million	2015	2020	8.5%
GasLog ltd.[a]	NOK 750 million ($90 million approx.)	2016	2021	6.9% Over 3 months NIBOR

Source: Marine Money International (Magazine, January 2016) and Nasdaq Globenewswire
[a]NasdagGlobenewswire, GasLog Ltd.: Completes Issuance of Bonds, June 14, 2016, https://globenewswire.com/news-release/2016/06/14/848473/10163493/en/GasLog-Ltd-Completes-Issuance-of-Bonds.html

information to potential investors of the quality and the underlying risk of a specific bond issue.

The shipping industry is generally considered high risk as it is highly cyclical, volatile, and capital intensive, while shipping companies are often highly geared and operate in exceptionally competitive markets; see, for example, Kavussanos (2002) and Kavussanos and Visvikis (2006, 2011). As a consequence, shipping companies' bond issues are considered as "below investment grade" and are issued with a credit rating below BBB. Examples of new shipping (high-yield) bond issues and their characteristics for the years 2015 and 2016 are presented in Table 7.3.[8]

Table 7.4, adapted and modified from Kavussanos and Tsouknidis (2014), presents a more complete picture of active shipping bond issues and their characteristics over an 8-year period, from 2002 to 2010. As can be observed, the number of active bonds ranges from a low of 13 in 2003 to a high of 50 in 2005. The number of new bond issues first issued each year varies from 0 in the crises years of 2009 and 2010 to a high of 25 during the outstanding year of 2004. The average spread of active bonds, defined as the yield to maturity of the shipping bond minus the yield to maturity of a corresponding, in maturity, US Treasury bond, fell substantially from 795.88 in 2003 to 351.65 basis points in 2005. The financial/shipping crisis almost

[8]Marine Money International, Magazine, Issue—January 2016, DEBT, pp. 32 and 38.

Table 7.4 Shipping bonds' characteristics by year

Year	Number of active bond issues	Number of new bond issues	Average spread of active bonds (bps)	Total market value of active bonds (in million US$)	Average market value of active bonds (in million US$)	Average coupon (%) of active bonds	Average maturity of active issues (years)	Standard and poor's risk rating
2003	13	–	795.88	2116.43	109.92	9.45	6.16	B+
2004	38	25	393.92	8987.64	187.26	8.23	8.09	Bb-
2005	42	5	351.65	9952.21	241.99	7.75	7.84	Bb-
2006	46	4	425.93	10,604.11	235.50	7.86	6.85	Bb-
2007	50	5	466.48	11,037.22	238.10	7.89	6.24	Bb-
2008	47	2	631.44	10,125.43	250.71	7.95	6.13	Bb-
2009	44	0	882.13	9598.41	233.59	7.97	5.42	BB
2010	41	0	753.74	9471.64	236.16	8.02	4.83	BB

Source: Adapted from Kavussanos and Tsouknidis (2014)
Notes: This table presents characteristics of shipping bonds for the period 2003–2010. Bond spreads are winsorized at the 1st and 99th percentiles

doubled spreads in the period 2007–2009, from 466.48 in 2007 to 882.13 bps in 2009. The total market value of active bonds increased more than four times between the years 2003 and 2004, reaching a peak in 2007 and then started falling. The average coupon values range between 7.75% and 8.23%, with the exception of the value of 9.45% in 2003. The annual average credit ratings place shipping bonds in the speculative grade category. It is worth noting that the average maturity of bonds issued by shipping companies is 6.51 years, with average maturity declining steadily from 8.09 years in 2004 to 4.83 years in 2010.

The main reasons that the majority of shipping bonds are classified as speculative (or noninvestment) grade is that the cash flows of shipping companies are affected by significant volatility (Kavussanos 2003), cyclicality (Stopford 2009), and seasonality (Kavussanos and Alizadeh 2001), among high leverage and retained earnings. The noninvestment grade rating suggests a higher chance of the shipping company defaulting on its obligations, that is, not paying coupon interest or principal at maturity in a timely manner. As a consequence, of the lower credit rating, these companies must offer a higher yield to compensate the bondholder for the higher risk and to attract buying interest. As a result, shipping companies' issues are commonly known as "high yield bonds" and carry coupons ranging from 7% to 9%.

Past studies investigating shipping bond issues include Leggate (2000), Grammenos and Arkoulis (2003), Grammenos et al. (2007), and Kavussanos and Tsouknidis (2014). In the latter study, which takes into account and remedies technical issues that exist in the aforementioned studies, thus ensuring a robust estimation framework, it is shown that the bond issue's liquidity, the volatility of the stock market, the cyclicality of the bond market, the freight earnings, and the bond issue's credit rating are the most significant factors that explain the variability of credit spreads of global shipping bond issues.

7.2.4 Private Equity

The majority of shipping companies are private held; that is, they have a small number of shareholders, and the companies' shares are not offered to the public. Equity for these companies has historically been sourced from the shipowner and, in some cases, from "friends and family." Equity capital from these sources is rather limited and cannot always support the shipowners' expansion and fleet modernization plans. As a result, shipowners have always been interested to raise equity from private equity sources, that is, typically from institutional investors, among other sources of capital. Institutional investors, also known as "smart money," include private equity funds, hedge funds, pension funds, endowment funds, insurance companies, commercial banks, and mutual funds. They generally refrain from investing in the shipping industry as they consider it to be rather risky. Furthermore, they lack the knowledge and expertise to operate shipping assets, which represents an additional complication when considering investments in the shipping industry.

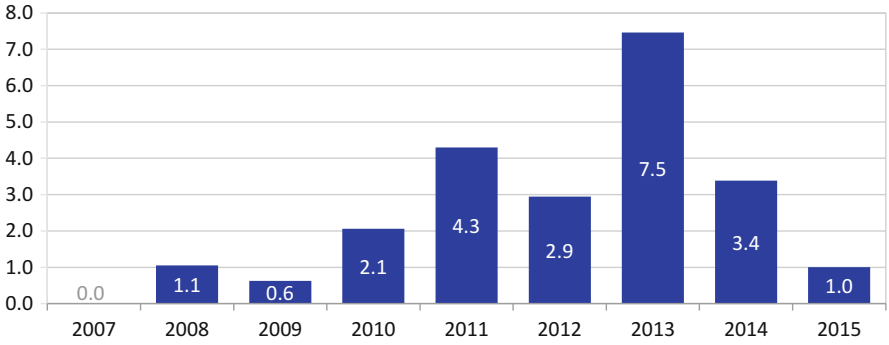

Fig. 7.3 Private equity investments in shipping (2007–2015), in billion US$. *Source*: Marine Money Magazine, January 2016

Figure 7.3 shows the amounts of private equity funds committed in the shipping industry from 2007 to 2015. Institutional investors developed interest to commit equity resources in private shipping companies and shipping projects particularly between 2010 and 2014. During that period, starting from 2009, as a result of the financial and the shipping crises that followed the Lehman Brothers' collapse in September 2008, shipping assets' values had reached historical lows. These represented attractive investment opportunities for the shipping sector, which, coupled with the reduction of bank lending to shipping, tempted private equity funds to capitalize on them. From 2015 onward, however, institutional investors' interest became rather subdued on the back of the low freight rate environment.

Overall, although institutional investors represent an important source of equity capital, their interest for shipping is rather limited due to the high-risk sector perception. Furthermore, another important consideration is that institutional investors have in most cases a well-defined medium-term investment horizon and an exit strategy. This approach may not always be in line with shipowners' long-term investment approach and the cyclicality of the industry.

7.2.5 Public Equity

Public equity involves the sale of equity securities to the general public, by shipping companies that are either already listed (secondary issue) or are about to be listed (initial public offer—IPO) on stock exchanges. Historically, the public equity markets did not represent an important equity capital source for the shipping industry as institutional and retail investors were deterred by the industry's cyclicality. However, following China's entry in the World Trade Organization (WTO) in 2001, and the subsequent tremendous increase in international trade and in shipping company's profitability, the investment community developed a very strong interest for the industry. As a result, a large number of shipping companies

are now publicly listed in a number of stock exchanges around the world, such as in the US, the UK, Norway, and Hong Kong, among many others.

There are a number of studies in the maritime literature that investigate shipping stocks. Indicatively, Kavussanos and Marcoulis (1997a, b, 1998, 2000a, b) provide a series of empirical evidence on asset pricing in transportation. For example, Kavussanos and Marcoulis (1998) report that the water transportation industry has significantly lower market risk than the average stock and that their systematic risk does not significantly differ from other sectors. Grammenos and Marcoulis (1996) argue that the average age of the fleet and the degree of financial leverage are significant factors in explaining shipping stocks' returns. Kavussanos et al. (2003), using 108 global-listed shipping-involved companies (1996–1999), report no significant difference in the systematic risk between the bulk, tanker, container, and ferry sectors. Moreover, it is found that there is no difference in the systematic risk of companies that *diversified within shipping or shipping-related industries when compared to companies that diversified in other areas*. In addition, it is shown that the betas in all sectors are lower than the market average, with the exception of betas in the drilling sector, which are higher than one. Drobetz et al. (2010), using 48 global-listed shipping companies (1999–2007), argue that shipping stocks display significantly low market betas, which are lower than the overall stock market, and by having different factor exposures to common factors in a multifactor pricing framework, they could potentially be viewed as a distinct investment asset class. Grelck et al. (2009) examine the diversification properties of shipping stocks and argue that when shipping stocks are added to a portfolio of stocks and bonds, diversification is enhanced. Also, diversification benefits were more profound during the year 2000–2003 shipping market, compared with the bull market 2003–2007. Panayides et al. (2013) examine all water transportation companies on NYSE/AMEX/NASDAQ (1960–2009) and report higher average returns for stocks with higher illiquidity measures. Drobetz et al. (2016) examine how cash flow shocks influence financing and investment decisions of shipping stocks and report that the ability of healthy shipping companies to raise debt did not change over changing market conditions as companies were able to increase long-term debt during the post 2008 financial crisis period.

There are several motives behind a shipping company's decision to access public equity markets: the shipping company may wish to raise equity capital in order to implement its expansion strategy through vessel acquisition; diversify its capital sources; reduce its debt burden, improving thus its financial standing and reducing its financial risk; and provide an exit strategy for the shipping company's shareholders, that is, provide a vehicle for *cashing out* their investment in shipping. The IPO process is rather time-consuming, since it takes around 24 weeks, while its outcome is uncertain, as the capital markets are volatile and the investment community may not be receptive of the new issue. As a result, a shipowner will have to critically assess the pros and cons associated with this process. These are outlined in Table 7.5.

Table 7.5 Public equity markets—advantages and disadvantages

Advantages	Disadvantages
(1) allows the company's rapid expansion (2) enhances diversification of capital sources (3) reduces financial risk as equity as opposed to when debt capital is raised, thereby reducing financial leverage (4) increases market awareness and international recognition of the shipping company (5) reduces equity capital commitment from the shipowner (6) allows shareholders to cash out, thereby providing an exit mechanism (7) improves future capital raising ability	(1) loss of control: Existing shareholders may lose control of the company's affairs (2) there is increased disclosure requirements (3) management job becomes less flexible due to the requirements for public announcements and disclosures (4) it results in high IPO costs, ranging between 6% and 8% of gross proceeds, and large administrative expenses, which include legal, accounting, and public relations expenses (5) resistance to change: Older generation principals and employees may not agree with the company becoming transparent to the investment community (6) stock market prices can be influenced by factors external to the shipping industry, such as the stock market sentiment

Source: Authors

The decision to proceed with an IPO is very important. A number of key elements are considered by the shipping company in this decision. They include the following:

1. Choice of stock exchange: most shipping companies are listed in the US capital markets (NYSE and NASDAQ) as they are sizeable markets with abundant capital and liquidity and with a diverse investment community; Oslo, Singapore, and London may be considered as alternatives.
2. Structure of the IPO: a number of structural elements need to be decided, such as which of the company's vessels are appropriate for the IPO, whether the management company will be part of the listed entity, and the country of incorporation of the holding and the ship-owning companies, among others.
3. Organizational issues of the company: the company will have to set up internal controls to comply with the Sarbanes-Oxley Act requirements; put in place a management team knowledgeable in public equity matters; appoint a governing board, including independent ones; and set up various committees, such as an audit committee, a remuneration committee, etc.

An important party that facilitates a shipping company's entry in the public equity markets is the "Underwriter," typically a financial institution, such as an investment bank. The underwriters' role during the IPO process is very important as they offer a number of services, including the following:

1. Advisory services: this includes offering advice on financial matters (e.g., suggest the number of shares to issue and price the offer), Security and Exchange

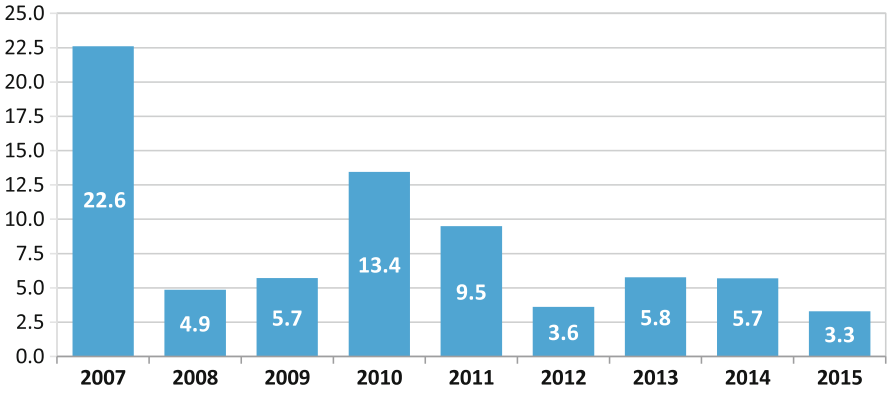

Fig. 7.4 Public equity raised by shipping companies (2007–2015), in billion US$. *Source*: Marine Money Magazine, January 2016

Commission (SEC) and regulatory matters, the filing process, and the appropriate timing for the offer.
2. Underwriting and distribution services: the underwriter may purchase the entire share issued for resale to the public or act solely as a broker (intermediary) for the sale of shares to the public;
3. Aftermarket services: invariably, the underwriter also provides aftermarket price support through its research analysts, increasing awareness of the investment community for the specific stock.

Access to public equity is very important, particularly for shipping companies that wish to embark into a fleet expansion, diversification, or modernization strategy. Its importance is reflected in Fig. 7.4, which shows total public equity raised, through IPO and follow-on (secondary) offerings by shipping companies for the period 2007 to 2015.

As can be observed, during 2007, when freight rates were at historically high levels, the shipowning community raised significant amounts of public equity, reaching approximately US$22.6 billion. In 2008, following the shipping and the global economic crises, this amount fell by more than five times its level in 2007. This increased slightly the following year, while in 2010 it went up to US$13.4 billion. Since then, these amounts have been hovering from a high US$9.5 billion in 2011 to a low of US$3.3 billion in 2015. As a result of the recession in freight markets across all major shipping segments, the public equity markets were significantly reduced as a source of funds for shipping companies.

7.2.6 Ship Leasing

Leasing represents yet another source of ship financing. Under a lease arrangement, the underlying asset, being the vessel, is rented (leased) by the ship management company, while the vessel's ownership resides with the leasing institution. In such

an arrangement, the ship management company is referred to as the "Lessee" (the disponent owner of the vessel), while the leasing institution, which owns the vessel, is referred to as the "Lessor." The lessors are typically financial institutions, such as banks and funds. The lease-financing structure may take the form of a finance lease or an operating lease. An important distinction between the two is that under a finance lease, at the end of the lease period the lessee is required to buy the vessel at a predetermined price, the purchase obligation price; as a result, ownership is transferred from the leasing institution to the ship management company. On the other hand, under an operating lease, at the end of the lease period the ownership of the asset remains with the leasing institution. According to the Internationally Accepted Accounting (IAS) rules Number 17—Leases, a lease will be classified as finance lease if any of the following four conditions is met:

1. Ownership of the asset transfers to the lessee at the end of the lease.
2. The lease term is for 75% or more of the expected economic life of the asset.
3. A bargain purchase option price exists to buy the asset below its fair market value (FMV).
4. The minimum lease payments' present value is almost equal to or greater than the asset's FMV.

From an accounting perspective, an operating lease is typically referred to as *off-balance sheet* financing as the lease liabilities are not recorded on the lessee's balance sheet, improving thus the company's financial and leverage ratios. On the other hand, a financing lease is considered as an *on-balance sheet* financing as the lease liabilities are recorded on the lessee's balance sheet.[9]

Leasing structures can assist shipping companies achieve borrowing levels that are substantially higher than those they would be able to achieve under a traditional senior term loan facility. Typically, depending on its financial strength, a shipping company may achieve a loan to value (LTV) ratio to the level of 80–90% or even more. The increased financial leverage that lease-financing structures entail increases the default risk as the shipowner may not be able to meet the high lease payments. Thus, leasing institutions are very selective in their shipping clientele. Typically, lease-financing structures are employed by large, transparent shipping companies, with a good credit history, a strong financial standing, and invariably earnings visibility through a specific earnings stream for the leased asset, which could be a time-charter-backed arrangement.

[9] An "*off-balance sheet*" item typically refers to an asset or liability or other financing activity that it does not have to be reported on the balance sheet of the company. An "*on-balance sheet*" item refers to the opposite case, as an asset or liability needs to be reported in the company's balance sheet.

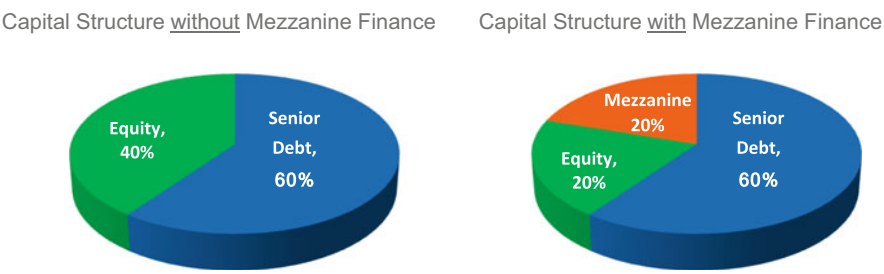

Fig. 7.5 Mezzanine Finance in a shipping company's capital structure. *Source*: Authors

7.2.7 Mezzanine Financing

Mezzanine finance represents a source of ship finance that complements the shipping companies' capital structure and typically lies between senior debt and common equity. Financial institutions such as Northern Shipping Funds and ICON Capital specialize in this form of financing. To understand the role of mezzanine finance, consider the example in Fig. 7.5, where without it the company should provide 40% equity for the 60% senior debt obtained. In this example, with the use of mezzanine finance, the amount of equity used to finance the ship by the owner is reduced to 20%. Thus, mezzanine finance allows a shipping company to increase its leverage levels, thereby reducing the equity capital that needs to be committed by the shipowner.

Mezzanine finance may have debt or equity characteristics, depending on the form it may take. Typically, mezzanine finance will take one of the following three forms:

1. *Subordinated debt:* under this form, the financing is extended to the shipping company by the mezzanine financing institution as a loan facility and is treated as a debt instrument. In this case, the financing is recorded as a liability on the company's balance sheet. The facility will be subordinated to the senior debt loan, and the subordinated debt, also commonly referred to as "junior' debt," will be secured with a second priority over the securities' package. The relationship between the senior and the junior (mezzanine) lender will be governed by the "Intercreditors Agreement," also known as the "Coordination Deed."[10] As an example of this type of financing, a shipowner may acquire a vessel with a senior secured loan of 50% of the vessel's FMV, requiring thus 50% equity. He can reduce the amount of equity that he is required to commit to the project to 30% by raising subordinated debt equal to 20% of the vessel's FMV; this

[10]The Intercreditor Agreement is an agreement entered into between creditors who have the same debtor and outlines the ranking of their respective liens as well as the responsibilities, rights and liabilities of each creditor.

subordinated debt will be secured with a second-priority mortgage on the vessel.[11]

2. *Preferred equity:* mezzanine finance may also take the form of preferred equity; that is, the additional financing is extended in the form of preference shares. In this form, mezzanine financing is treated as an equity instrument, in which case the financing is not recorded as a liability on the company's balance sheet. Preference shares do not have voting rights and commonly have a fixed preferred coupon, which is usually expressed as a percentage of the preferred equity portion par value (issue price). Payment of the preferred coupon has priority over dividend payments to common equity. Since in this form mezzanine finance is not treated as a debt instrument, failure to pay the coupon of preferred equity is not treated as a debt payment default. With reference to the above example, in this situation, the shipowner raises the additional 20% financing against the vessel FMV by issuing preferred shares that rank ahead of the common shares that the shipowner holds.
3. *Hybrid:* mezzanine finance may also take a hybrid form, exhibiting both debt and equity characteristics. In this form, mezzanine finance is typically extended as a convertible bond. This is a debt instrument that allows the financier to convert the bond to a specific number of common equity stock (shares). As a result of this option, which allows the financier to participate in the company's upside potential, the coupon of the convertible bond is typically lower than that of a bond that does not have this convertibility feature.[12] With reference to the above example, the shipowner may raise the additional 20% financing against the vessel's FMV by issuing a bond that the bondholder has the option to convert to common equity; this feature will enable the shipowner to offer the bond with a coupon that is lower than what it would otherwise be.

7.3 Challenges in Ship Finance

Shipping is predominately a privately held business. Thus, shipping companies rely mostly on bank lending for their capital requirements, particularly following the financial/shipping crisis of 2007–2008. The debt ship-financing industry, however, is changing constantly. Maritime capital providers closely monitor developments in the macroeconomic, geopolitical, regulatory, and shipping environment, particularly developments in freight rates and asset values, and proceed with changes that they consider appropriate and prudent in their lending (credit) policy. A bank's credit policy is thus largely determined by the industry's cyclicality, as well as by

[11]The second-priority mortgage is subordinated to the first-priority mortgage that is registered on a vessel by a shipping banks when it extends a shipping loan against that vessel.

[12]Typically, the option is exercised when the common equity stock market price is higher than its predefined strike (exercise) price.

the increasingly tighter, banking regulatory environment. See, for example, Kavussanos and Tsouknidis (2016) for evidence that credit margins charged by banks on shipping loans depend on the market conditions of the shipping industry. Both issues are examined next.

7.3.1 Cyclicality of Ship Finance

Figure 7.6 depicts a typical shipping business cycle where, as can be observed, shipping freight rates and asset values follow a cyclical pattern with periods of trough, followed by periods of recovery, peak, and recession until the bottom of the cycle is reached again. During these periods, shipping companies' profitability and financial standing change accordingly.

When the shipping market is at its peak, shipping companies record stellar revenues and generate strong profits, thus being perceived as a rather good "credit risk" to finance. In view of the strong freight rate environment, a large number of capital providers, some of who are new entrants, create the perception that the market is low risk. They start extending attractive financing at high leverage and low pricing against secondhand shipping assets, as well as newbuilding orders whose values are at historically inflated levels. As soon as these newbuilding orders start coming into the market, creating overcapacity, the shipping industry's self-correcting mechanism begins, with freight rates as well as asset values falling and the market going into recession. More information about shipping business cycles can be found in Stopford (2009).

During the trough period, freight rates and asset values are at historically low levels; the shipping companies' profitability and financial standing are adversely affected, with many of them defaulting their obligations. As a result of this challenging freight rate environment and despite assets' values being at attractively low levels from a historical perspective, a number of capital providers create the

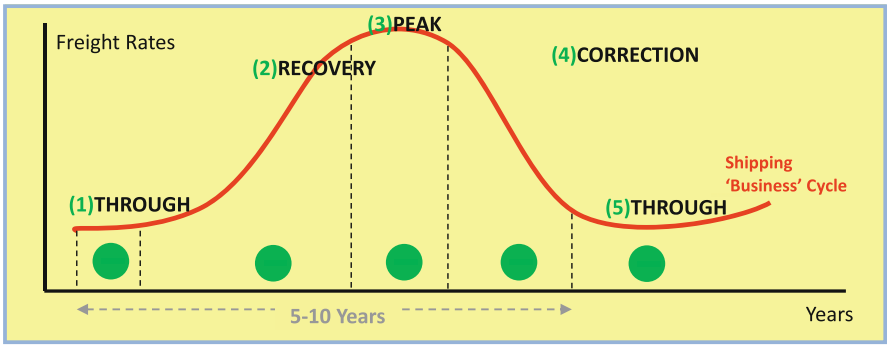

Fig. 7.6 Shipping business cycles

perception that the shipping industry is high risk. During that period, a large number of capital providers aggressively reduce their lending and exposure in shipping, while some leave the ship-financing industry altogether. This procyclical approach followed by shipping banks and maritime capital providers is exacerbating the shipping cycle as, during the recovery and peak periods, the ship-financing industry intensifies the buildup of overcapacity, by providing cheaply ample financing. On the other hand, there are some prudent maritime capital providers who tend to adopt a more counter-cyclical approach in ship finance and expand their portfolio, selectively, during trough and recovery periods.

7.3.2 Banking Regulatory Environment

Shipping banks represent the traditional, most dominant source of funding for the shipping industry. Since 1974, with the establishment of the nongovernmental organization, the Basel Committee on Bank Supervision shipping banks and the banking industry as a whole have been increasingly monitored and regulated. The purpose of the Basel Committee was to establish standards, guidelines, and recommendations on banking practice. In 1988, it issued Basel I, introducing a set of minimum capital requirements for banks. In 2004, it issued Basel II, suggesting that banks with a big risk exposure need to safeguard their solvency and stability by holding larger amounts of capital as reserve capital. By 2013, the European Union, as well as a number of other countries, such as Australia, India, Brazil, Turkey, among others, have implemented these rules.

Despite the Basel Committee's efforts and its set of rules under Basel I and Basel II, which were widely implemented, the financial crisis of 2007–2008 revealed that there are important weaknesses in the financial/banking regulation system. As a result, in 2010, the Basel Committee on Bank Supervision introduced a new set of rules and standards, known as Basel III; its aim was to strengthen the regulation, supervision, and risk management of the banking sector in order for it to be able to absorb shocks arising from financial and economic stresses. Basel III is implemented progressively by 2019 and will result in a further increase in the banking industry's capital requirements from 8% to 9%, aiming to further strengthen banks' capital adequacy. The restrictions imposed under Basel III are expected to have a negative impact on the ship-financing industry as the sector is considered of higher risk, compared to other industries; see, for example, Kavussanos and Tsouknidis (2016). This translates into larger capital reserve obligations and, as a consequence, higher costs for the lending bank to shipping companies. Furthermore, Basel III requirements incentivize banks to prefer short-term lending, as part of a risk mitigating strategy, which does not match well with long-term shipping assets, which typically require long-term financing. *Basel III* requirements are expected to have a transformational impact on ship finance.

European banks, which have dominated the ship-financing industry over the last decades, are under the strict supervision of the European Central Bank (ECB). The European banking system has been negatively affected by the US subprime crisis of 2007, the financial crisis that followed the Lehman Brothers bank collapse in 2008 and the European sovereign debt crisis that started in 2009. As a result of these challenges, European banks are closely monitored by the ECB, undergoing repeated asset quality reviews (AQRs) to ascertain their financial standing. Since shipping portfolios are considered riskier, for the reasons outlined earlier in this chapter, there has been an increase in the reserve capital requirements by banks involved in shipping finance. This in turn increases the cost of operation to banks, which is expected to lead to increases in the senior cost of debt for shipping companies. In addition, it reduces the banks' liquidity and the capital available for other loans. Thus, in view of this increased regulatory scrutiny, European shipping banks have curtailed significantly their shipping portfolios, while others have decided to exit shipping altogether. Figure 7.7 clearly displays the situation, showing approximately a $119.82 billion or 32% decline in funding provided to the shipping industry from European banks for the period 2010–2015. This has created a financing gap in the industry, some of which is filled by Asian (mostly China)/Australian banks, which have increased their funding to shipping by $61.9

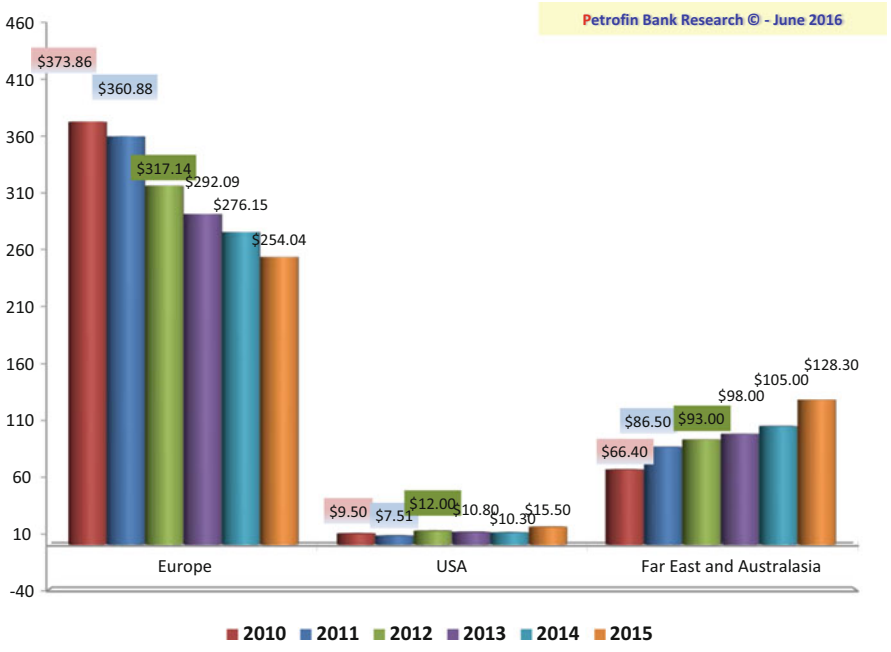

Fig. 7.7 Global end of year portfolio values of ship-financing banks, in billion US$. *Source*: Petrofin Bank Research

billion (a 93% increase since 2010), and by USA banks providing another $6 billion extra (63% rise compared to 2010) and also from other sources of capital, as explained earlier.

7.4 Conclusion

Ship finance is of paramount importance for the shipping industry in view of its capital-intensive nature. Throughout history, different capital sources have been made available to shipowners and have supported them toward their fleet expansion and modernization strategies. Traditionally, the senior-secured term loan facility (bank mortgage) has always been the dominant and most important form of ship financing. The industry has, however, evolved, and over the last decades, other capital sources have begun to capture market share. Export credit agency finance, high-yield bonds, private and public equity, leasing, and mezzanine finance represent alternative financing forms that can be tapped by the international shipowning community. The ship-finance industry evolves constantly and follows its own cycles, which may be driven by global events, changes in the regulatory landscape, and underlying shipping cycles themselves. By 2017, ship finance is undergoing significant challenges. A number of European banks, which have historically dominated the international ship-finance industry for decades, are exiting or retreating from the industry as a consequence of the financial crisis, the shipping industry crisis, and the tighter banking regulatory environment. The latter has placed significant demands for increased capital reserves, thereby reducing liquidity ratios and increasing costs for banks involved in shipping finance. The financing gap is being filled by Asian/Australian banks and other sources of capital available in this constantly evolving landscape. For shipping companies, the new shipping finance scene is increasingly challenging and will lead them to seek alternative finance "partners," perhaps at an increasing cost of capital from alternative sources of finance. The shipping and the ship-financing industries are constantly changing. Likewise, shipping companies and their capital structure need to go through this process of transformation as it will help them grow and evolve even further.

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Chapter 8
Maritime Energy Management

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8.1 Introduction

Maritime Energy Management (MEM) is (a) the study of energy flows such as supply, transformation, storage, production and consumption in the extensive maritime domain, which includes ships, ports, shipbuilding yards and ship-breaking activities, as well as (b) how this energy and its sources are optimised to manage consumption and reduce wastage in order to limit environmental and economic impacts of energy use.

In practice, MEM requires monitoring, analysing and developing measures to optimise use of energy, as well as to select appropriate energy sources. Each maritime sector possesses its own specificities and constraints; therefore, dedicated guidance and instruments are proposed to each sector. For example, ports may adhere to World Ports Climate Initiative framework, initiated following the World Ports Climate Declaration at the C40 World Ports Climate Conference in 2008, and shipping companies may use broad guidance proposed by classification societies such as American Bureau of Shipping (ABS 2015) or specific guidelines on ship operation produced by industry Lloyds Register (Lloyds Register 2012) or international organisations such as International Maritime Organization (IMO 2012). Despite this diversity, it is necessary to recall the interconnection of ports, ships and shipping (Moon and Woo 2014; Poulsen and Sornn-Friese 2015). Facing this complexity of interactions, the present text focuses on ships for two main reasons: (a) ships are, by far, the main consumer of energy in the maritime domain, and (b) the energy efficiency of ships is regulated by the IMO.

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I.D. Visvikis, P.M. Panayides (eds.), *Shipping Operations Management*,
WMU Studies in Maritime Affairs 4, DOI 10.1007/978-3-319-62365-8_8

In its studies on greenhouse gas (GHG) in shipping, the IMO highlighted that carbon dioxide (CO_2) emissions form the overwhelming majority of GHG emitted by ships (IMO 2009, 2014). Despite uncertainties on bunker fuel quantities, the Third IMO Greenhouse Gas Study 2014 estimated that, over the period 2007–2012, the world fleet annually burnt between 247 million and 325 million tonnes of fuel (IMO 2014). As energy on board quasi-exclusively relies on fossil fuels, the air emissions from ships release large quantities of CO_2. Indeed, air emissions by ships account for 2.5–3% of world greenhouse gas emissions (IMO 2009, 2014). Following the predicted expansion of seaborne trade and economic and energy development, shipping emissions could grow between 50% and 250% by 2050 (IMO 2014). However, the implementation of MARPOL Annex VI measures to enhance energy efficiency on ships intends to reduce the total amount of GHG emitted by ships by requiring enhancement in ship design and operation.

> We stand at a juncture where our words need to be matched by actions, so that climate change will not accelerate its adverse effect on everybody. And the decisions and actions we must take without further delay, will be of paramount importance for generations to come. [. . .] That said, mid-range scenarios show that, by 2050, those emissions could grow by a factor of 2 to 3 if no regulations to stem them are enacted. Successfully addressing climate change will be far from easy; but the consequences of failing to do so are too dire to contemplate (IMO Secretary-General, in IMO 2009).

Beyond generic figures on GHG emitted, fuel consumption on board ships has major implication in ship management expenditures. Bunker fuels, which provide chemical energy for ships, constitute a major cost in ship operation (Stopford 2009; Ronen 2011). A recent publication (Guan et al. 2016) highlights that bunker costs of ultra large containerships amount to up to 41% of the total costs.

Main engines and numerous auxiliary equipment (IMO 2014) require energy to ensure effective and safe operation at sea through the activation of screw(s) shaft(s), production of electric power, provision of mechanical power or heat for numerous processes (Dokkum 2013). Because the chemical energy converted in ships' engines and boilers originate from fossil fuels, the present world fleet and trade patterns highly depend on combustible availability. Therefore, uncertainties on supply and volatility of prices affect ship operation, the shipping sector and trade (Stopford 2009).

Considering the magnitude of engine machineries, any reduction in energy consumption on ships, particularly when it entails the main engine power reduction (e.g., slow steaming), implies large savings (Smith et al. 2014). However, any modification may require adjustments on ships (Sanguri 2012; Smith et al. 2014), as well as may affect company and port organisation (Corbett et al. 2009; Cariou 2011; Notteboom and Cariou 2013).

The literature focuses on mechanisms to reduce costly fossil fuel consumption in shipping or alternative technologies and operational settings that may participate in reducing air emissions and operation costs. This approach is particularly understandable in present economic and policy context (Smith et al. 2014). Consequently, energy management in shipping focuses on means to enhance energy efficiency of ships (reduce consumption) and energy resource management (best

fuel source) in operation context. To achieve optimal energy management, the maritime community promotes a combination of technological and operational measures (IMO 2009) to apply within constraints and barriers in the sector (Thollander and Palm 2013).

In short, finance and regulatory pressures provide incentives and obligations to reduce the amount of energy used on board ships. However, ship safety also demands immediate and sufficient energy. The inherent risks of ship conduct and operations require to maintain sufficient manoeuvrability capacities (Papanikolaou et al. 2015) and adequate reserve of power to cope with any unexpected situations requiring extra power such as fire or stripping pumps (SOLAS, Chapter II-2 Regulation 10). Therefore, appropriate energy management strategies on board ships and in shipping become a trade-off between finance, operation demand, safety and compliance with rules.

In its first part, the present chapter presents the evolution in terms of sources of energy used to operate ships and the drivers to promote energy management. The following part presents design and operational measures to foster energy management on ships. The last part highlights the barriers hindering the implementation of energy management measures.

8.2 Energy and Ships

The success of shipping to carry goods has to be understood in connection with the physical properties of the water and its ability to sustain and ease the transportation of people and weights without large energy spending. Adapted vehicles suffice to displace large masses using the inherent properties of water. Ports serve as hub to concentrate activities and to facilitate supplies, as well as to enhance overall productivity of shipping activities. Both sectors, shipping and port management, evolve jointly to enhance trading activities (Alderton and Saieva 2013).

After hand-propelled boats and ships, the first archaeological image of a sailing boat has been found on an ancient ceramic jar estimated from the late fourth millennium BCE (Paine 2013). The recent introduction of fossil fuel and mechanically propelled ships commenced with one on the main innovations of the industrial revolution: the steam engine. The journey to establish engine-driven shipping took time. Indeed, in 1860, 90% of the British fleet remained wind propelled (Hughes and Reiter 1958). However, in 1910, it remained only 10% of the British fleet with sails as main propulsion (Woodman 2009).

Iron construction, screw and diesel engine established the domination of mechanically propelled ships with fuel oil as energy source. As in the navy, fuel oil proved its value over coal, particularly because of its higher energetic capacity, its storage, its fast and at sea refuelling, its reduction of manpower to feed engines, etc. (Churchill 2005), which, inter alia, enhanced carrying capacity and speed. Moreover, the nineteenth century improvements in shipbuilding enabled

specialisation and innovation to reduce costs and to respond to emerging markets such as oil trade with tankers (Woodman 2009; Auzanneau 2015).

8.3 Energy as Major Expense

Contrary to wind power, fossil fuels are not free. Their price is established by the integration of numerous market drivers external to shipping. So energy expenses imply costs and uncertainties to manage. It is vital for shipowners and operators to scrutinise energy expenses and minimise wastes. Service providers such as shipbuilders, equipment manufacturers or classification societies support shipowners and participate in finding effective solutions to enhance energy efficiency of ships by considering design and operation. Eventually, alternative fuels may be tested to control energy costs. For example, following the 1979/1980 oil crisis, Australian National Line ordered in Japan an innovative coal-fire bulk carrier (Sakata and Koga 1982) to reduce its exposure to oil uncertainties. Today, LNG is considered an important alternative to fuel oils.

However, a simple method to enhance energy efficiency of seaborne transport has long been to increase size and benefit from economy of scale on multiple cost parameters (e.g., fuel, crew, maintenance, etc.). This tendency is particularly noticeable in container liner industry but may reach certain limits when the ship is not considered isolated from its shipping network (OECD/ITF 2015).

In addition to economic incentive to manage energy on board, the concern on air emissions supported the development of regulations aiming to internalise the externalities of shipping air emissions.

8.4 Emergence of an International Framework to Address Air Emissions

The air pollution gradually passed from local scale to global scale with the success of industrialism in multiplying sources of emissions (Mosley, in Encyclopaedia of Life Support Systems (UNESCO-EOLSS), http://www.eolss.net/). The magnitude of air emission does not only affect nearby populations but also affect remote communities and the climate system supporting human life on earth (IPCC 2014).

The World Health Organization (WHO) considers air pollution as the biggest environmental risk to health (WHO 2016), and the International Panel on Climate Change (IPCC) asserts that anthropogenic emission of GHG affects the climate and the oceans (IPCC 2014). Therefore, the international community developed regulations to cope with both air pollutants and GHG. It is noticeable that all international instruments have their tradition in shipping.

The 1979 Convention on Long-Range Transboundary Air Pollution (LRTAP Convention) to combat acid rain constituted the first binding reaction to regional air pollution. Sulphur dioxide (SOx) was the initial target; however, without naming them, the Convention considers other major pollutants. The next important step to address global air emission was the 1985 Vienna Convention for the Protection of the Ozone Layer. This Convention identifies the adverse effects of ozone depleting substances (ODS) on climate system. It is noticeable that the pollutants considered in both instrument have integrated MARPOL Annex VI Chapter 3.

In response to the first assessment of the IPCC on climate change, the 1992 Earth Summit in Rio adopted the United Nations Framework Convention on Climate Change (UNFCCC). The UNFCCC's main objective is to stabilise GHG concentrations to avoid *dangerous anthropogenic interference with climate system* (UNFCCC art. 2). Moreover, the Convention explicitly mentioned energy efficiency (EE) as a strategy to refrain GHG emission. Following the 1997 Kyoto Protocol, the 2015 Paris Agreement aims to push all countries to act on climate change. The UNFCCC identified six GHG target priorities (CO_2, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride).

Recognising the shipping specificities, the international community incited the IMO to regulate air emissions from ships in both categories: air pollutants and GHG. The IMO greenhouse gas studies from 2000, 2009 and 2014 demonstrate that CO_2 is the main GHG to address in shipping.

8.5 MARPOL Annex VI Chapter 4

Despite discussion during the 1973 Conference on the International Convention for the Prevention of Pollution from Ships (MARPOL), air emission control measures were excluded at that time. However, in a first attempt to control air pollutants, the 1997 Protocol inserted Annex VI in MARPOL. Entered into force in 2005, the new Annex VI regulated some emission from ship: ozone-depleting substances (ODS), nitrogen oxides (NOx) and sulphur oxides (SOx) and particulate matter. In addition, Chapter 3 also instated the Emission Control Areas principle inside which stringent rules may apply to SOx and/or NOx emissions, as well as a regulation on availability and quality of bunker fuel. While this Protocol responded to pollutant control and ODS conventions, no requirement on GHG emission was set up.

Acknowledging that fuel oil consumption in shipping determines ship operation and shipping development, it took time for the IMO to address GHG emissions. After two comprehensive studies on GHG emissions (2000 and 2009), the IMO adopted in 2011 an additional chapter to MARPOL Annex VI to tackle GHG emissions. A completed chapter of the Second IMO GHG Study highlighted the *technological and operational potential for reduction of emission*. The chapter disclosed that a combination of design and operational measure could reduce shipping emission by 25–75% (IMO 2009). To cope with this outcome of the

second report, MARPOL Annex VI Chapter 4 presents regulations on both, design and operation.

To cover design, regulations 20 and 21 introduced the energy efficiency design index (EEDI). Attained EEDI is a calculation formula that intends to indicate the ship's efficiency based on its specifications. As main factors, EEDI formula incorporates engine power and abatement technology, as well as deadweight and speed. Many guidelines accompany the EEDI to support its calculation. After calculation, attained EED needs to meet required EEDI. The required EEDI reduces over three phases from 2013 to 2025 and onwards.

Introduced by regulation 22, the Ship Energy Efficiency Management Plan (SEEMP) promotes energy efficiency and fuel saving by focusing on the ship's operation. Moreover, to ensure widespread of energy-efficient technology, regulation 23 of Chapter 4 promotes technical cooperation and transfer of technology.

Market-based measures constituted another aspect discussed during the development of measure to address GHG emission in shipping. By increasing the cost of GHG emission by incorporating a fuel tax or trading permits, the principle was to create an economic incentive to invest in abatement technologies. Facing strong opposition, the discussion on MBM stopped. Following the European Union (EU) directive on Monitoring Reporting and Verification (MRV), recent IMO discussions on the establishment of data collection and reporting (DCR) systems of GHG emission from ship may trigger new developments. With its regulation 2015/757 from 29 April 2015 on the MRV of carbon dioxide emissions from maritime transport, the EU will require from 2018 certain ships in the regional waters to report annual CO_2 emissions in order to collect reliable data on ship emissions.

In this tightening regulatory context, the introduction of the notion of energy management is deemed necessary. Energy management means to optimise energy production and energy consumption in the triple context of climate change and air pollution mitigation, scarcity of energy resources and economic challenges, combined with management processes, energy efficiency (less power for the same amount of work) and alternative energy production (alternative fuels and renewable energy) form the core pillars of energy management (see Fig. 8.1).

8.6 Energy-Efficient Ship Design and Operation

As described above, technical measures and operational measures are ship design and ship operation related, respectively. In order to appreciate those measures, we first need to understand the demand for energy on board a ship and its different forms. Ships are known as autonomous systems since different forms of energy for them are produced and converted on board (Woud and Stapersma 2003). A ship needs different forms of energy to be able to perform her functions such as cargo loading/unloading, cooling, propulsion, firefighting and so on. This is achieved by

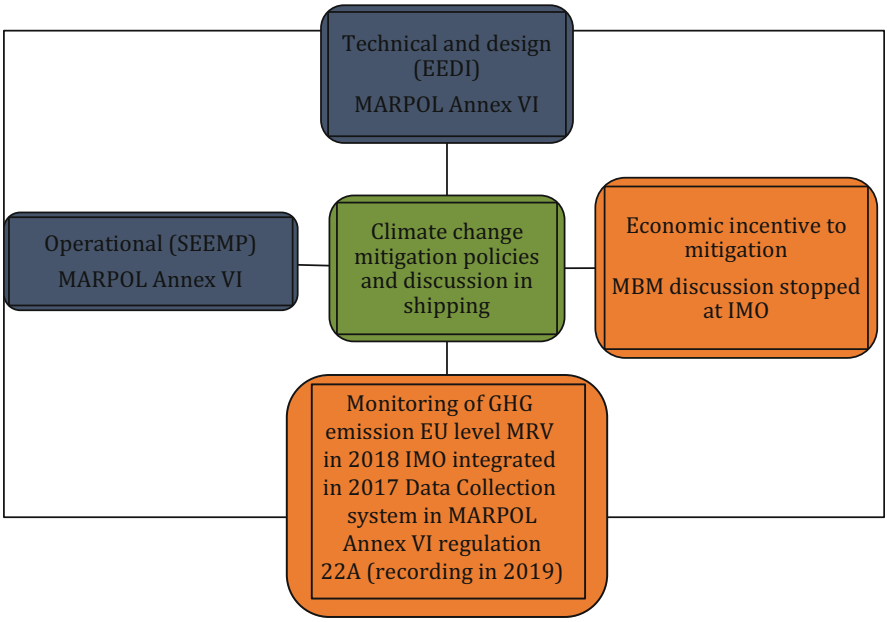

Fig. 8.1 Review of present policies and discussion in shipping. *Source*: Authors

transforming solar, wind, chemical and nuclear energy through different energy converters (turbine, engine, fuel cell, etc.) into

- heat (for example, cargo heating or domestic heating),
- electricity or electric energy (for example, lighting),
- cooling (for example, domestic cooling),
- mechanical energy (mainly for propulsion system),
- hydraulic and pneumatic energy

in order to be used for the operation of pumps, deck cranes, HVAC equipment, lighting and so on (Woud and Stapersma 2003; DNV-GL 2014).

There is not any 100% efficient system in the world, neither man-made nor natural. Ships are not exception to this. If the total energy produced on board a ship is assumed to be 100, its 40–50% goes to propelling her; the rest is lost as heat and exhaust (IMO 2nd GHG Study 2009; DNV-GL 2014). Since efficiency figures depend on ship type and environmental conditions, 40–50% is given as a range. Within this range, there will still be some losses such as transmission and mechanical losses. When those losses are minimised during ship design and/or ship operation, energy efficiency of a ship is increased. Resistance and propulsion are the two main areas, also called hydrodynamic improvement means, to improve energy efficiency of a ship at the life-cycle stage of design. It is a known fact that decreased resistance leads to decreased power requirement, thereby reduced fuel consumption.

There exist four main resistance components whenever a ship advances in the water (Molland et al. 2011):

- wave-making resistance,
- viscous resistance,
- air resistance,
- appendages resistance.

For each component mentioned above, there is a different way of dealing with the resistance reduction. For reduction of wave-making resistance, finding the best hull shape or hull form optimisation, which gives the least resistance, is the most widely used and accepted tool.

8.7 Energy Impact of Ports

Ports can be considered the main gate between the land and sea. They represent vital and important activity hubs with high energy demand in relation to the different activities, mainly because ports are surrounded by metropolitan industrial area and regions where they constitute an essential and economical element of the supply chain transportation system. According to the Eurostat Statistic Explained,[1] ports handle approximately 40% of all commodities in Europe, and according to the Lloyd's Maritime Intelligence Unit, container shipping accounts for 52% of the total value of the world's seaborne trade.

8.7.1 International and National Policy Aims

Energy efficiency is becoming ever-more important. Responding to environmental and energy-related policies at international and European levels, ports are adopting strategies to reduce energy consumption. The European Sea Port Association (ESPO) environmental review (2016) states that 70% of European seaports have become certified under either the European Management and Audit Scheme (EMAS) or the EcoPorts Port Environmental Review System (PERS). Some have also adopted the internationally recognised ISO 14001 and 50001 standards. Among the policy initiatives implemented at ports is the wider use of new technologies and utilisation of renewable energy sources (Wiegmans and Geerlings 2010; Denktas-Sakar and Karatas-Cetin 2012; Yap and Lam 2013; Acciaro et al. 2013; ESPO 2016).

In September 2015, the United Nations General Assembly adopted the 2030 Agenda for Sustainable Development, which includes a bold set of 17 Global

[1] Eurostat Statistic Explained, European Union, 1995–2013, http://www.ec.europa.eu.

Goals. Goal 7 seeks to ensure access to affordable, reliable, sustainable and modern energy for all, and goal 13 encourages urgent action to combat climate change and its impacts. These goals clearly underscore the importance of energy efficiency in general, and since ports consume large amounts of energy (Parise et al. 2016), these goals also impact port management.

The EU Energy Efficiency Directive of 2012 establishes a set of binding measures to help the EU reach its 20% energy efficiency target by 2020. Under the Directive, all EU countries are required to use energy more efficiently at all stages of the energy chain from its production to its final consumption. This applies to all sectors of industry, including ports, which are increasingly adopting Port Energy Management Plans (PEMP) to address requirements for higher efficiency.

8.8 Port Energy Management Plan (PEMP)

The energy consumption in port terminals can be a significant overhead cost for terminal operators, which can be minimised and monitored through the implementation of a PEMP. A PEMP is a strategic tool for port authorities and maritime administrations that allows port authorities to address energy-saving and environmental objectives and goals by obtaining a structured and detailed analysis of the current status of energy-environment consumption in the port area and subsequently to set up potential directions and solutions. The primary objective of energy management is to minimise cost and maximise profit for the port authorities and maritime administration. Sub-objectives include reducing energy use and increasing energy efficiency to comply with overall regulation by putting in place monitoring, reporting and management strategy mechanisms.

Port energy consumptions vary according to the geography and type of the port, as well as the energy needs and kind of available energy sources. There is no general information available about the average energy consumption and distribution in ports. Table 8.1 lists different EU and international ports according to their energy consumption and distribution, underlining the importance of energy management in the sector.

8.8.1 PEMP Structure and the Five Main Pillars of Development

A PEMP constitutes the guidelines for port communities in order to achieve predefined goals. The plan will include a timeline and energy monitoring methods and will define the responsibility of each port actor involved in the process. In general terms, PEPM consists of a comprehensive and structured set of analytical

Table 8.1 Examples of port energy consumptions

Port of Valencia—Noatum Container Terminal, 2014 (kWh)[a]								
Port of Valencia	STD cranes	Office	Container reefers	Yard lighting	Cathodic protection	Other		
	37%	15%	37%	43%	–	–		
Port of Livorno—Terminal Darsena Toscana, 2012 (kWh)[a]								
	27%	11%	48%	43%	–	–		
Port of Koper—PCT, 2011 (kWh)[a]								
	43%	3%	26%	21%	2%	3%		
Port of Genova, Terminals—Consumption/Year (kWh $\times$ 10^3)[b]								
Port of Genova	SECH	Messina	Fruit	Oil	VTE Terminal	Stazione Marittima	Dry bulk	Other
	4.500	5.000	4.600	2.500	19.000	6.300	5.000	49.900
Port of Los Angeles—Cargo Terminal Relative Energy Demand, 2013[c]								
	Buildings	Outdoor lighting	Wharf crain	Refrigerated containers		Miscellaneous		
	12%	34%	26%	15%		13%		

Source: Drawn by Authors
Data from
[a]Green Cranes Project (2011)
[b]PEAP – Genova Port (2012)
[c]Matulka et al. (2013)

documents, technical papers, policy documents, strategies and communication tools that provide and assist

- the management (i.e., the Energy Manager) with the necessary tools in order to take decisions in relation to the implementation of concrete actions;
- private operators and stakeholders with adopting concrete and comprehensive tools in order to obtain the necessary information that highlights the potential for optimising economic return.

Already some EU port authorities have started the process of implementing PEPM. The Port Authority of Genoa, Italy, has developed and implemented a Port Energy Environmental Plan (PEEP) with the aim of limiting energy use (Acciaro et al. 2013; Delponte et al. 2017). The Hamburg Port Authority has developed a smartPORT Energy plan aimed at developing sustainable energy solutions and improving the energy profile of the port.

Figure 8.2 summarises the main steps that port authorities and decision-makers have to take into consideration when setting up the PEMP. The process is complex and involves many actors. A PEMP includes different steps that can be simplified into six main pillars (see Energy Management Action Plan 2014; Boile et al. 2015):

- energy and environmental strategies,
- corporate energy policies,
- energy surveys/mapping,
- planning phase,
- implementations phase,
- monitoring and progress reviews.

Figure 8.2 presents a generic port energy management framework that has been created in compliance with the ISO 50001 standard. This framework highlights the different strategic steps for the development of the energy and environmental plans for port authorities and port operators. By following this schematic approach, port authorities can examine in detail their facilities and improve the energy efficiency. Once the port's energy management vision, goals and objectives have been set out, a thorough review of energy policies at port, local, national, European and international levels should be undertaken in order to gain a clear understanding of all regulations that should be abided by (Boile et al. 2015).

8.9 Energy and Environmental Strategy

An energy and environmental strategy (ENS) involves analysing, evaluating and giving recommendations. A strategy is developed on the basis on a number of guiding priorities (see Energy Management Action Plan 2014; Welch 2011):

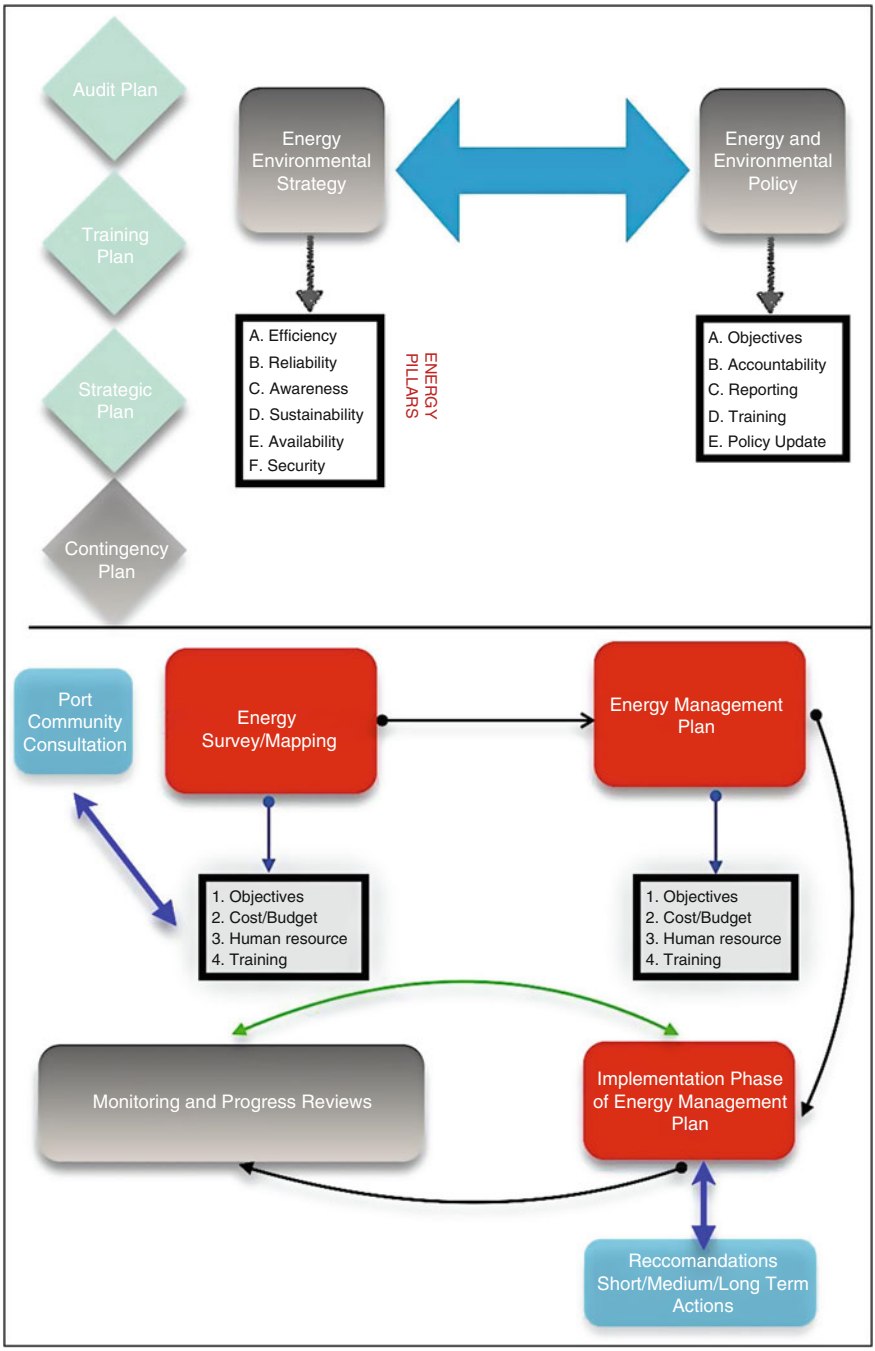

Fig. 8.2 Port Energy Management Plan (PEMP) Structure. *Source*: Authors

1. *port energy resilience:* the ability to maintain business continuity during power outages and resume operations after catastrophic events;
2. *port energy availability*: availability of electricity needed for the present and future trend of demands in relation to power generation, transmission and distribution;
3. *port energy reliability*: the availability of high-quality, consistent electricity that meets predicted peaks in demand;
4. *port energy efficiency*: reduction of energy demands through management practices and technologies that maximise the operational productivity and cost-effectiveness;
5. *port energy sustainability*: integration of energy management practices and renewable power generation to minimise the depletion of natural resources and provide economic, social and environmental benefits.

8.9.1 Corporate Energy Policies

This step involves the development of a business plan, selection of technologies and development of training programs. The objectives can include purchasing new equipment and new technologies with emphasis on life cost analysis (LCA). Moreover, this step involves a deep and critical policy and regulation analysis at local, national and international levels.

8.9.2 Energy Surveys and Mapping

This phase is very important since the energy manager through the energy audit will map the energy demand and consumption of the port facilities (i.e., terminal cargo, terminal passengers, warehouse, office, passenger terminals, etc.). The assessment will take into consideration the predefined port key performance indicators (PKPIs) that will assist the port authority in analysing and identifying the gaps and needs useful for the development of the PEMP. The use of PKPI will help prioritise the energy consumption in the port and develop the preliminary recommendations. PKPIs have to be realistic and relevant and need to be adaptable over the time and reflect, for instance, that the cargo portfolio could change. Table 8.2 shows some examples of PKPI related to energy.

8.9.3 Planning Phase

This phase includes a consultation process with port stakeholders and may involve lengthy negotiations on agreed vision, strategy and objective of the PEMP. In

Table 8.2 Examples of energy and environmental PKPIs

Category	Monitoring target	KPIs
Energy	Fossil fuel consumed by weight or volume	Litre of diesel fuel consumed in mobile machinery fleet
Energy	Fossil fuel consumed by weight or volume	Cylinder of LPG consumed for forklift track fleet
Emission	GHG emission by weight	CO_2 emission in total tonnes per TEU moved to the main gate
Energy	Total annual energy cost (dollars/euros)	Renewable energy technology (e.g., solar energy generation) for warehouse rooftop
Energy	Total annual energy cost (dollars/euros)	Automatic ventilation, lighting and heating system in building, warehouse and offices in port areas

Source: Authors

addition to involving stakeholder in the decision-making process, this kind of consultation also helps ports gain insight into the public perception of energy efficiency. Port community focus groups will therefore provide information and guidance.

8.9.4 Implementation Phase

The PEMP will clearly define the role and responsibility of each port actor involved in the implantation phase. The timeline and workloads will be defined and monitored under the supervision of the Energy Manager and the Steering Committee.

8.9.5 Monitoring and Progress Reviews

The objectives of the Monitoring and Progress Review process are to measure and compare energy consumption with the company goals and/or with general energy consumption standards and regulations. The reporting scheme has to be reviewed periodically in order to ensure that the system in place is efficient and effective in accordance with the PEMP goals. The plan will also define how the port energy performance will be monitoring and evaluating using, for example, dedicated PKPIs.

At this stage, all the data and input collected about the energy consumption in port areas will be aligned with the established goals and regulation in place. The reporting review is planned periodically in order to monitor the port performance and, if needed, to identify energy improving measures. Such measures could include the improvement of the lighting system through the implementation of light-emitting diode (LED) technology for outdoor lighting, use of solar panels on the roof of the warehouses or the improvement of the insolation of the buildings.

8.10 Barriers in Maritime Energy Management

In recent years, technological development has enabled ships to be designed and operated in more energy-efficient ways and helped the discussions concerning economic and environmental issues in the international shipping. In addition, international political voices such as the adoption of the Paris Agreement within the UN's Framework Convention on Climate Change promoted energy efficiency to be a global agenda, and more shipping companies feel obliged to actively respond to energy efficiency in the maritime transport. Some companies engage in case studies in identifying good operational practices to save energy (Poulsen and Johnson 2016). Though it seems promising for the future maritime transport, the actual management process for energy-efficient shipping may not be always straightforward.

Maritime energy management usually involves the international and national standards and the company's policies to regulate the procedures and assessment of energy use for ships, ports and offshore. For a ship alone, there are a number of regulations for energy efficiency, including MARPOL Annex VI Chapter 4, Regulation 22A (a mandatory submission of administration annual reports on fuel consumption and transport work parameters for ships of 5000GT and above), which is expected to enter into force in 2018.

When legal instruments are ready and technology comes along to make more environmentally friendly methods of ship design and operation available, it seems that the industry's motivations are high enough. However, the actual energy management does not seem to be progressed as expected. Why is it so? Thollander and Palm (2013) identify that there is 'a gap between the potentially cost-effective energy efficiency measures and the measures actually implemented', and they call it 'energy efficiency gap'. Research into a possible hindrance to the implementation of energy-efficient measures has been recently recognised as 'barriers' to maritime energy management. 'Barriers' need to be considered when choosing the most applicable method for a successful implementation of energy efficiency in the maritime industry.

8.10.1 Types of Barriers

Acciaro et al. (2013) categorise possible barriers into six aspects. The first barrier is 'safety and reliability' and questions whether a chosen method for energy efficiency is reliable enough without compromising safety, which is to be foremost for ship operation. The second barrier is 'technical uncertainty', which concerns the interaction between different ship components when new or unproven technologies are introduced. Third, behavioural barriers imply the interaction within the shipping firm and the availability of information across the organisation. The fourth barrier is described as 'market constraints' where split incentives may come to question: who

should owe the cost? The fifth barrier tends to make a serious impact on decision-making, which are 'financial and economic constraints'. Shipping industries are particularly vulnerable when fuel prices go up. Market conditions also create both opportunities and threats. Companies' economic viability may affect where and how investment is prioritised. Last but not least, the sixth barrier identified by Acciaro et al. (2013) is 'complexity'. When energy efficiency measures and procedures are introduced in a routine of work, it may cause a complexity in the work process as a system. Kitada and Ölçer (2015) add another dimension of complexity in the workplace, reflecting today's business structures. Unlike the organisation where all the workflows are completed within themselves, many organisations today divide and delegate the work to a specialised unit such as subsidiary companies or even outsource it. In this kind of business practices, it can be difficult for the manager to supervise the work done by subsidiary or outsourced firms, and this would be a barrier for energy management.

8.10.2 Managing Barriers

The impact of these barriers should not be underestimated. It is worth noting that maritime energy management cannot be accomplished by only economic and environmental drivers but requires an interdisciplinary approach, including but not limited to human element and other social aspects. The successful implementation of energy efficiency requires an examination of barriers in a given situation, and if barriers are identified, we need to think about how to minimise the effect of barriers. Though barriers themselves are not a 'risk', the effect of barriers may be seen as a 'risk' by the managers, who attempt to implement energy efficiency measures. It may be, however, too simplistic to say that we should remove the barriers that would make energy-efficient measures fail. In fact, most barriers described earlier are not easy to remove completely because barriers tend to be embedded in the system of maritime business and management.

The minimisation of the effect of barriers is crucial, but how? The first and second barriers, 'safety and reliability' and 'technical uncertainty', deal with a human factor issue: specifically speaking, a human–machine interaction. The acceptance by operators of new maritime equipment is a common issue in other industries such as manufacturing and road transport. In order to build a 'trust' of operators in new technology, the involvement of operators is necessary at all stages from the concept level to the evaluation of a working system (Grech et al. 2008). Such a process will allow operators to familiarise with the new technology and feel more confident to use it. Safety concerns from the operators' eyes would also help to understand the limitation of technology to introduce; hence, they will be able to identify a critical point where safety may potentially be threatened during the operation of ships. Operators' involvement is also helpful to reduce the effect of 'behavioural barriers' (the third barrier) as the participation of operators in the process of integration between humans and technology would assure information

sharing and communication between managers and workers. The fourth and fifth barriers, 'market constraints' and 'financial and economic constraints', are both related to business management and leadership. With the company's short-term, mid-term and long-term visions, the best competitive methods should be chosen, and they can start with an affordable option rather than a full change in the workflow. Technology providers should also consider offering different levels of product and service packages so that the companies have more choices and feel encouraged to participate in energy-efficient management. The sixth barrier, a 'complexity' either in a system of work or management of work makes us rethink what is a system in the new situation. A system should be kept developing and adapting when a change occurs. This may be an area for further investigations of how to manage changes in a complex system of work.

8.11 Conclusion

Maritime energy management is a mutidimensional concept with several key stakeholders, be it shipowners and cargo traders, governments and regulators, as well as the general public. The management of ship-related energy consumption is of vital importance to shipping companies from a number of perspectives, not least as a means of reducing the cost of ship operation itself but also to comply with the increasingly stringent and varied international regulations set by the IMO and other bodies responsible for the setting of national and international energy-related regulations. This chapter addresses a number of issues with respect to energy management, including key international regulations and their main requirements such as MARPOL and relevant regulations for sea and air emissions. In addition, it addresses issues of energy-efficient ship operations highlighting examples of corporate policies, as well as port energy management, by discussing relevant plans. It should be emphasised that possible barriers are important elements to consider for a successful energy management in the maritime industry. They should not be seen as drawbacks of energy management but will inform us about important elements to consider for the effective implementation of energy-efficient measures. It is also an interdisciplinary approach to motivate people to speak with each other and facilitate knowledge sharing among people with different roles. Research into barriers in maritime energy management is relatively a new area, and there are few case studies available. The section on barriers has been therefore developed based on theories and concepts. Future research should look into practices of maritime energy management and how theorised barriers may influence the process of energy-efficient operation of ships. The business situations in the developing countries may present a slightly different picture of barriers in maritime energy management.

Ports are part of industrial and commercial areas, as well as gateways to major cities, which is why energy usage and consumption needs managing. Regulation and polices have become more stringent, and ports therefore have to take measures

in order to meet these requirements. Port energy management plans can be important tools for port authority and maritime administration, not only to evaluate energy performance and consumption, which can be a major overhead for port operators, but also to stimulate port authorities to invest in and be aware of green technologies that will help to promote a green approach to environmental management.

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Chapter 9
Safety and Security in Shipping Operations

Dimitrios Dalaklis

9.1 Introduction

Maritime accidents appeared along with the first human efforts to conquer and tame the seas and the oceans of our planet.[1] Fortunately, today the safety level of seagoing vessels is extremely high when compared with the past. Both academics and maritime practitioners (Tetley and Calcutt 2007; Dalaklis et al. 2009; Schröder-Hinrichs et al. 2012) have already pointed out that the widespread technological evolution has helped naval architects to design modern vessels capable of remaining seaworthy in all sorts of dire situations—such as extreme weather conditions—that in the past would surely cause them to founder. Others (Pallikaris et al. 2016) have also emphasized that, following the so-called *industrial revolution*, numerous technology achievements facilitated the continuous introduction of more and better equipment on board ships.[2] However, the application of advanced technology is not a guarantee that maritime accidents will be avoided; danger at sea is always present, and in many cases the failure to deal with looming risks can result into numerous human casualties and/or even the loss of the vessel.

Probably, the most well-known example of overreliance on technology is the case of RMS Titanic, a British passenger liner that sank in the North Atlantic Ocean in the early morning of April 15, 1912, after sideswiping an iceberg during her

[1]Maritime accidents, such as groundings or collisions, still frequently make headline news. Accidents still happen at sea today, despite the fact that the contemporary existing means of avoidance are present in every aspect of the maritime profession and far more reliable than they used to be.

[2]Electronics (and the introduction of the microprocessor), have made possible a great number of inventions that have been of great importance to all aspects of human endeavor; the field of navigation is not an exception.

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I.D. Visvikis, P.M. Panayides (eds.), *Shipping Operations Management*,
WMU Studies in Maritime Affairs 4, DOI 10.1007/978-3-319-62365-8_9

maiden voyage from Southampton (UK) to New York City (USA). The largest ship afloat at the time, the RMS Titanic was the second of three Olympic class ocean liners operated by the White Star Line. Considering the related time frame, it was extremely advanced in terms of technology. This very large ship was built by Harland and Wolff shipyard in Belfast, and it featured a double bottom and 16 watertight bulkheads equipped with electric watertight doors, which could be operated individually or simultaneously by a switch on the bridge; these watertight bulkheads even inspired the Shipbuilder magazine, in a special issue devoted to the Olympic liners, to deem them "practically unsinkable." But, according to certain hypotheses, Titanic was doomed from the start, by the design so many lauded as state of the art.[3]

Titanic left the port of Southampton on April 10, 1912. On April 14, 4 days into the crossing of the Atlantic and about 375 miles (600 km) south of Newfoundland, the vessel hit an iceberg at 11:40 p.m. ship's time. The collision caused her hull plates to buckle inward along the starboard side and opened five (5) out of the total sixteen (16) watertight compartments to the sea; the ship gradually filled with water. At 2:20 a.m., Titanic broke apart and foundered, with well over 1000 people still on board. Within just 2 h after the ship sank, the RMS Carpathia arrived at the scene, where she brought aboard an estimated 705 survivors. Without any intention to provide a full description of this tragedy, it is worth mentioning that associated statistics indicate that out of the 2224 passengers and crew aboard, more than 1500 died. The specific case under discussion was clearly one of the deadliest commercial peacetime maritime disasters in modern history; extensive media coverage at that time created public outcry and heavy pressure for introducing regulations in order to avoid similar events in the future. The outrage at the huge loss of life and the regulatory and operational failures that had led to it was a very strong drive for cumulative action.

As a result, and on the positive side of this disastrous event, a series of public inquiries in the UK and the USA led to major improvements in maritime safety. Furthermore, it is interesting to note that, according to Ryan (2012), following the RMS Titanic's loss, several new wireless regulations were passed around the world in an effort to control the many communication missteps—which might have saved many more passengers. The most important highlight development of the aforementioned inquiries was the establishment in 1914 of the International Convention for the Safety of Life at Sea (SOLAS), which will be the main focus of analysis within the current chapter. Therefore, the first attempt toward SOLAS took place in London in 1914, and it constituted the response of shipping nations to the disaster of the RMS Titanic, with the UK holding a leading role. The outcome of the Conference aimed to address various safety aspects revealed after the ship's loss. Among

[3]The watertight compartment design contained a flaw that may have been a critical factor in Titanic's sinking: while the individual bulkheads were indeed watertight, water could spill from one compartment into another. See also: History.com (2009) History.com Staff http://www.history.com/topics/titanic (accessed on 30 Dec 2016).

the most important were construction of ships and fire protection; life-saving equipment, lifeboats adequate for all passengers and crew on board, as well as lifeboat drills; radiotelegraphy and communication ship to ship and ship to shore; ships' response to distress calls and reporting of dangers.

It is important to clarify at this point that, despite the fact this treaty never entered into force because of the outbreak of the First World War, the Conference pioneered numerous safety principles; with continuous improvements and large revisions, a newer version of SOLAS governs the maritime safety domain today. Additionally, by considering that the contemporary version of SOLAS also includes an extended number of codes, a limited selection of extremely influential regulatory toolboxes (codes) under this Convention will be discussed, such as the International Safety Management Code (ISM) and the International Ship and Port Facility Security Code (ISPS). The reason for this choice is rather self-explanatory: the first one is dealing with risk mitigation in relation to the safety domain, and ISPS is dealing with the security aspect of shipping operations.

9.2 Historical Evolution of SOLAS

The SOLAS Convention (in its successive forms) is generally regarded as the most important of all international treaties concerning the safety of merchant ships; it is no coincidence that in the introductory text of the specific Convention (IMO 2014a) it is emphasized that "Of all the international conventions dealing with maritime safety, the most important is the International Convention for the Safety of Life at Sea, better known as SOLAS, which covers a wide range of measures designed to improve the safety of shipping." It was already pointed out that the first attempt toward creating a rigid regulatory framework in relation to maritime safety took place in 1914,[4] in response to the Titanic disaster; the second in 1929[5]; the third in

[4]SOLAS Article 1 (1914 version), highlighted the intention of the Treaty and the importance to develop adequate domestic legislation in order to enforce the Convention. More specifically, it stated that: "*The High Contracting Parties undertake to give effect of the provisions of this Convention, for the purpose of securing safety of life at sea, to promulgate all regulations and to take all steps which may be necessary to give the Convention full and complete effect*." The evolution of SOLAS is also available at: International Maritime Organization—IMO (2016a) IMO's Staff. http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-(SOLAS),-1974.aspx (accessed on 12 Dec 2016).

[5]It is worth mentioning that the 1929 version of SOLAS did not change substantially the principles developed during its earlier version; however, the application of the Convention was slightly extended. Furthermore, the associated technical details were further clarified and some important consideration inserted as, inter alia, stability test, radio watches and meteorological services. Additionally, a revised version of the international regulations for preventing collisions at sea (Collision Regulations) was inserted in Annex II.

1948,[6] after the end of the Second World War; and the fourth in 1960. Finally, in 1974, a major revision of SOLAS took place; although the 1974 Convention has been updated and amended on numerous occasions, this Convention is still in force today, and sometimes it is referred to as *SOLAS, 1974, as amended*.

In order to avoid confusion in the paragraphs that follow, it is necessary to point out that chapter numbering in the first (1914) version was different from the latest one in place (1974). In the initial version, Chapter III (Safety of navigation) particularly highlighted the need to report dangers, to possess adequate lights for Morse communication, and recalled the importance of collision avoidance regulations. More specifically, Article 8 formalized the obligation of reporting ice and derelicts; the obligation to communicate the related info by all means available to the vessels in the vicinity and the relevant competent authorities was also clearly stated. Furthermore, it is interesting to note that these authorities were expected to consolidate and distribute the (relevant) information free of cost to the vessels concerned.

Today, national authorities still hold the responsibility to provide safety and security information to ships. This is achieved via the Global Maritime Distress and Safety System (GMDSS), an internationally agreed-upon set of safety procedures, types of equipment, and communication protocols, all used to increase safety and make it easier to rescue distressed vessels. GMDSS consists of several systems, some of which are new, but many of which have been in operation for many years. It is intended to perform the following functions: alerting (including position determination of the vessel in distress), search and rescue coordination, locating (homing), maritime safety information broadcasts, general communications, and bridge-to-bridge communications. Specific radio carriage requirements depend upon the ship's area of operation, rather than its tonnage. The system also provides redundant means of distress alerting, and emergency sources of power. SOLAS was amended in 1988 to include the GMDSS.[7]

Additionally, Chapter IV (Construction) of the 1914 version imposed certain constraints on ships' design, with the aim of enhancing resistance to sea conditions and fire. It is indicative that compartments (subdivision of ships), anticollision

[6]Between 1929 and 1948, significant technological improvements in relation to shipping activities, as well as the need to cover other categories of ships triggered the 1948 SOLAS Conference, held (again) in London. The application of SOLAS expanded to Cargo and Tanker ships, although the vast majority of its numerous provisions remained applicable only to Passenger ships. For example, while Part E detailed the requirements on Fire Detection and Extinction for both Passenger and Cargo Ships, Part D on the same topic remained in force exclusively for the Passenger ones. The 1948 SOLAS Convention recognized the value of casualty investigation as a tool to improve related regulations in the future. Furthermore, the technical requirements of shipbuilding stated within the Convention expanded significantly, both in number and level of detail. For example, various mathematic formulas were integrated in the official text, particularly in the part dealing with construction.

[7]For a more detailed description of the GDMSS system and other useful info see IMO (2016b) IMO's Staff. http://www.imo.org/en/OurWork/Safety/RadioCommunicationsAndSearchAndRescue/Radiocommunications/Pages/Default.aspx (accessed on 12 Dec 2016).

precautions, watertight and fireproof bulkheads were considered, as well as deck openings and deck water tightness. SOLAS 1914 Chapter V (Radiotelegraphy) set formal requirements concerning the implementation and use of communication equipment on board ships. This constituted the first attempt to formally establish the necessary technical means of communication from/to ships, and thus breaking ships' isolation at sea; it can also be viewed as the foundation of search and rescue (SAR) operations. Last but not least, Chapter VI (Life-saving appliances and fire protection) included key principles to safeguard life at sea. A very influential principle is clearly stated in Article 40, according to which "At no moment of its voyage may a ship have on board a total number of persons greater than that for which accommodation is provided in the lifeboats and the pontoon life-rafts on board [. . .]."

In any case, due to the international and interconnected nature of the maritime industry, any action taken toward improvement of activities at sea is far more effective if taken collectively rather than individually; coordination among all parties involved is needed. Reflecting upon the history of IMO, it has always been recognized that the best way of improving safety at sea is by developing international regulations that are followed by all shipping nations. Although several countries had put forward a proposal for a permanent international body with the task to promote maritime safety more effectively, it was not until the establishment of the United Nations itself that this notion was realized. In 1948, an international conference in Geneva adopted a convention formally establishing IMO (the original name was the Inter-Governmental Maritime Consultative Organization, or IMCO, but the name was changed in 1982 to IMO).[8]

The IMO Convention entered into force in 1958, and the new Organization met for the first time the following year. Since its inception, in 1959, the Organization (IMO) has exerted every effort to protect human life at sea. The purposes of IMO, as summarized by Article 1(a) of its Convention, are ". . . to provide machinery for cooperation among Governments in the field of governmental regulation and practices relating to technical matters of all kinds affecting shipping engaged in international trade; to encourage and facilitate the general adoption of the highest practicable standards in matters concerning maritime safety, efficiency of navigation and prevention and control of marine pollution from ships." The Organization is also empowered to deal with administrative and legal matters related to these purposes. IMO's first task was to adopt a new/updated version of the International Convention for the Safety of Life at Sea (SOLAS), the most important of all treaties dealing with maritime safety; this was achieved in 1960.

The 1960 version of the SOLAS Convention, which was adopted on June 17, 1960, and entered into force on May 26, 1965, was the first major task for IMO after its inception; it represented a considerable step forward in modernizing regulations and in keeping pace with the numerous technical developments in the

[8]IMO (2016c) IMO's Staff. http://www.imo.org/en/About/HistoryOfIMO/Pages/Default.aspx (accessed on 12 Dec 2016).

shipping industry.[9] The intention was to keep the Convention up to date by periodic amendments. But, in practice, this amendment procedure proved to be very slow. Soon it became clear that it would be impossible to secure the entry into force of amendments within a reasonable period of time. As a result, a completely new Convention was adopted in 1974, which included not only the amendments agreed up until that date but also a new amendment procedure: the tacit acceptance procedure. This mechanism of amendments was designed specifically to ensure that necessary changes could be made within a specified (and acceptably short) period of time.

9.3 Structure of SOLAS 1974

Steering the discussion toward the technical provisions of SOLAS, it is emphasized once more that its main objective is to specify minimum standards for the construction, equipment, and operation of ships, compatible with safety. Flag States are responsible for ensuring that ships under their flag comply with those requirements; an extended number of certificates are prescribed in the Convention as proof that this has been achieved. Certain control provisions also allow Contracting Governments to inspect ships of other Contracting States if there are clear grounds for assuming that the ship and its equipment do not substantially comply with the requirements of the Convention (this procedure is better known as "Port State Control"). In summary, the current version of the SOLAS Convention includes articles setting out general obligations, amendment procedure, and so on, followed by an Annex divided into various chapters.[10] More specifically, Chapter I (General provisions) includes regulations concerning the survey of the various types of ships and the issuing of documents signifying that the ship meets the requirements of the Convention. This chapter also includes provisions for the control of ships in ports of other Contracting Governments.[11]

[9]Ibid. Despite that the 1960 SOLAS followed the same structure with the 1948 version, the respective regulations were significantly expanded, particularly on machineries and electric installations. Additionally, in an effort to cope with the latest trends of that era, Chapter VIII (on Nuclear powered ships) was added and the provisions in relation to radio-communication systems were elaborated in great detail.

[10]International Maritime Organization-IMO (2016a) IMO's Staff. http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-(SOLAS),-1974.aspx (accessed on 12 Dec 2016).

[11]This chapter includes twenty-one (21) Regulations and it is divided in three different parts: Part A provides the various definitions needed for application. Among other definitions, it is clarified that the "*present Regulations apply only to ships engaged on international voyages*". Regulation 2 defines an international voyage as "*a voyage from a country to which the present Convention applies to a port outside such country, or conversely*". Furthermore, Regulation 3 stipulates that "*The present Regulations, unless expressly provided otherwise, do not apply to: (ii) Cargo ships of less than 500 Gross Tonnage*"; Part B describes in detail the means of inspection and survey of ships; finally, Part C is dealing with casualty investigations.

In addition, Chapter II-1 (Construction—subdivision and stability, machinery and electrical installations) describes the subdivision of passenger ships into watertight compartments; the arrangement must be such that after assumed damage to the ship's hull, the vessel will remain afloat and stable. Requirements for watertight integrity and bilge pumping arrangements for passenger ships are also laid down, as well as stability requirements for both passenger and cargo ships. The degree of subdivision (measured by the maximum permissible distance between two adjacent bulkheads) varies with the ship's length and the type of service in which it is engaged.[12] Requirements covering machinery and electrical installations are designed to ensure that services that are essential for the safety of the ship, passengers, and crew are maintained under various emergency conditions; the steering gear requirements of this chapter are also particularly important.[13]

Chapter II-2 (Fire protection, fire detection and fire extinction) includes very detailed fire safety provisions for all ships and specific measures for passenger ships, cargo ships, and tankers. The respective provisions follow certain principles, such as division of the ship into main and vertical zones by thermal and structural boundaries, separation of accommodation spaces from the remainder of the ship by thermal and structural boundaries, restricted use of combustible materials, detection of any fire in the zone of origin, containment and extinction of any fire in the space of origin, protection of the means of escape or of access for firefighting purposes, ready availability of fire-extinguishing appliances, minimization of the possibility of ignition of flammable cargo vapor. Additionally, Chapter III (Life-saving appliances and arrangements) includes requirements for life-saving appliances and arrangements, including requirements for lifeboats, rescue boats, and life jackets according to type of ship. The International Life-Saving Appliance (LSA) Code provides the specific technical requirements for LSAs and is mandatory under Regulation 34, which states that all life-saving appliances and arrangements shall comply with the applicable requirements of the LSA Code.

Chapter IV (Radio-communications) incorporates the Global Maritime Distress and Safety System (GMDSS). All passenger ships (and all cargo ships of 300 gross tonnage and upward) on international voyages are required to carry equipment designed to improve the chances of rescue following an accident. According to the respective provisions, satellite emergency position indicating radio beacons

[12]For rather self-explanatory reasons, the highest degree of subdivision applies to Passenger ships.

[13]It is interesting to note that during the 1990s, the Maritime Safety Committee (MSC) recognized that the prescriptive-based regulations were unable to cope with the new ship design challenges and took appropriate action to incorporate the goal-based philosophy into the technical regulations of SOLAS. The basic principles of IMO's goal-based standards-regulations are: (1) Broad, overarching safety, environmental and/or security standards that ships are required to meet during their lifecycle. (2) The required level to be achieved by the requirements applied by class societies and other recognized organizations, Administrations and IMO. (3) Clear, demonstrable, verifiable, long standing, implementable and achievable, irrespective of ship design and technology. (4) Specific enough in order not to be open to differing interpretations. International Maritime Organization's (IMO) official website (2016d). IMO's Staff. http://www.imo.org/en/OurWork/Safety/SafetyTopics/Pages/Goal-BasedStandards.aspx (accessed on 12 Dec 2016).

(EPIRBs) and search and rescue transponders (SARTs) for the location of the ship or survival craft are required. Furthermore, regulations in Chapter IV cover undertakings by Contracting Governments to provide radio-communication services, as well as ship requirements for the carriage of communication equipment. This chapter is closely linked to the Radio Regulations of the International Telecommunication Union (ITU).

Chapter V (Safety of navigation) identifies certain navigation safety services that should be provided by Contracting Governments and sets forth provisions of an operational nature applicable in general to all ships on all voyages. It is interesting to note that this is in contrast to the Convention as a whole, which only applies to certain classes of ship engaged on international voyages. The subjects covered include the maintenance of meteorological services for ships, the ice patrol service, routeing of ships, and the maintenance of search and rescue services.[14] This chapter also includes a general obligation for masters to proceed to the assistance of those vessels in distress and for Contracting Governments to ensure that all ships shall be sufficiently and efficiently manned from a safety point of view. Finally, this chapter makes mandatory the carriage of Voyage Data Recorders (VDRs) and Automatic Ship Identification Systems (AIS) for certain ships.

Chapter VI (Carriage of cargoes) covers all types of cargo (except liquids and gases in bulk) *which, owing to their particular hazards to ships or persons on board, may require special precautions*. These regulations include requirements for stowage and securing of cargo or cargo units (such as containers). This chapter requires cargo ships carrying grain to comply with the International Grain Code. Chapter VII (Carriage of dangerous goods) contains regulations in different parts.[15] Part A (Carriage of dangerous goods in packaged form) includes provisions for the classification, packing, marking, labeling and placarding, documentation, and stowage of dangerous goods. Contracting Governments are required to issue instructions at the national level, and the chapter makes mandatory the International Maritime Dangerous Goods (IMDG) Code, developed by IMO, which is constantly updated to accommodate new dangerous goods and to supplement or revise existing provisions.[16] Part B covers construction and equipment of ships carrying dangerous

[14]Regulations 4–13 state that Contracting Governments must take all necessary steps to bring to the knowledge of those concerned the information about any dangers to navigation. Therefore, administrations must undertake to encourage the collection of relevant data and to arrange for their examination, dissemination and exchange in the manner most suitable for the purpose of aiding navigation. These activities involve for example meteorological and hydrographic services (forecasts and warnings), vessel traffic services (VTS) in territorial seas, ship's routeing, search and rescue services, as well as support of life-saving signals and the maritime buoyage system.

[15]There is also Part D, including special requirements for the carriage of packaged irradiated nuclear fuel, plutonium and high-level radioactive wastes on board ships and requires ships carrying such products to comply with the International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes on Board Ships (INF Code).

[16]In another subdivision, Part A-1 (Carriage of dangerous goods in solid form in bulk) covers the documentation, stowage and segregation requirements for these goods and requires reporting of incidents involving such goods.

liquid chemicals in bulk and requires chemical tankers built after July 1, 1986, to comply with the International Bulk Chemical Code (IBC Code). Part C covers construction and equipment of ships carrying liquefied gases in bulk and gas carriers constructed after July 1, 1986, to comply with the requirements of the International Gas Carrier Code (IGC Code).

Chapter VIII (Nuclear ships) provides the basic requirements for nuclear-powered ships and is particularly concerned with the respective radiation hazards.[17] It refers to the detailed and comprehensive Code of Safety for Nuclear Merchant Ships, which was adopted by the IMO Assembly in 1981. More importantly, Chapter IX (Management for the safe operation of ships) makes mandatory the International Safety Management (ISM) Code, which requires a safety management system to be established by the shipowner or any person who has assumed responsibility for the ship (the "Company" also holds a crucial role). In any case, more details on the specific topic will be provided in the next section. Continuing with the discussion of SOLAS technical provisions, Chapter X (Safety measures for high-speed craft) makes mandatory the International Code of Safety for High-Speed Craft (HSC Code), and Chapter XI-1 (Special measures to enhance maritime safety) clarifies the requirements relating to the authorization of recognized organizations (responsible for carrying out surveys and inspections on Administrations' behalves), enhanced surveys, details about ships' identification number scheme, as well as operational requirements on Port State Control.

Focusing upon the security domain, Chapter XI-2 (Special measures to enhance maritime security) was adopted in December 2002 and entered into force on July 1, 2004. Regulation XI-2/3 of this chapter enshrines the International Ship and Port Facilities Security Code (ISPS Code). Part A of the Code is mandatory, and part B contains guidance as to how best to comply with the mandatory requirements (the term "recommended" is often used). The regulation requires Administrations to set security levels and ensure the provision of security level information to ships entitled to fly their flag. Prior to entering a port, or while in a port, within the territory of a Contracting Government, a ship shall comply with the requirements for the security level set by that Contracting Government, if that security level is higher than the security level set by the Administration for that ship. Regulation XI-2/8 confirms the role of the master in exercising his/her professional judgment over decisions necessary to maintain the security of the ship. It states that he/she shall not be constrained by the company, the charterer, or any other person in this respect. Regulation XI-2/5 requires all ships to be provided with a ship security alert system,[18] with Regulation XI-2/6 covering requirements for port facilities,

[17]Nuclear-powered civil merchant ships have been developed only by a rather limited number of countries, such as USA, Germany, Japan and particularly Russia that has successfully operated this type of propulsion in ice-breakers at the Polar Regions (Arctic and Antarctic) since the year 1959.

[18]When activated the ship security alert system initiates and transmits a ship-to-shore security alert to a competent authority designated by the Administration, identifying the ship, its location and indicating that the security of the ship is under threat or it has been compromised. This system does not raise any alarm on-board the ship. The specific system is capable of being activated from the navigation bridge and in at least one other location.

providing among other things for Contracting Governments to ensure that port facility security assessments are carried out and that port facility security plans are developed, implemented, and reviewed in accordance with the ISPS Code. Other regulations in this chapter cover the provision of information to IMO, the control of ships in port (including measures such as the delay, detention, restriction of operations including movement within the port, or expulsion of a ship from port), and the specific responsibility of companies. There is also Chapter XII (Additional safety measures for bulk carriers). This chapter includes structural requirements for bulk carriers over 150 meters in length. Chapter XIII (Verification of compliance) introduced (from January 1, 2016) the IMO's Member State Audit Scheme. Finally, Chapter XIV (Safety measures for ships operating in polar waters) makes mandatory (from January 1, 2017) the Introduction and part I-A of the International Code for Ships Operating in Polar Waters (the Polar Code).[19]

9.4 The International Safety Management (ISM) Code

Psaraftis (2002) rightly points out that the International Safety Management Code (better known as ISM Code) is one of the most useful tools toward the improvement of the safety of vessels at sea and one of the pillars of the so called *quality navigation*. Starting the discussion by referring to the details of the ISM Code's application, according to Regulation IX/2.1, SOLAS Chapter IX applies to ships (regardless of date of build) as follows: passenger ships, including passenger high-speed craft; oil tankers, chemical tankers, gas carriers, bulk carriers, and cargo high-speed craft of 500 gross tonnage (GT) and above; and other cargo ships and mobile offshore drilling units (MODUs) of 500 GT and above.[20] It is crystal clear that Chapter IX of the SOLAS Convention represents an upheaval of major importance in seafaring activity because the implementation of the International Safety Management Code (ISM Code) introduced the approach of *regulated self-regulation* for the shipping industry.[21] The respective official document of IMO (IMO 2014b) describes the implementation of the Safety Management System (see Regulation 4.3), to which not only the vessel but also *the Company* is bound (see Regulation

[19]Adopted in 2014, the Polar Code (PCD) aims to enhance safety of ships and safety of navigation in the harsh polar environment. This Code introduces various new measures affecting design, equipment and operation of ships in Polar waters. One of the key elements is the Polar Water Operational Manual (PWOM) which must include the relevant operational procedures.

[20]In order to avoid confusion, it is also necessary to pin point that under SOLAS Regulation I/1(a), the Regulation IX/2.1 applies only to ships on international voyages.

[21]The ISM Code development was a result of various combining factors that resulted into a unique overall background: a number of very serious maritime accidents/casualties (e.g. Herald of Free Enterprise), forcing regulators to respond; a shipping crisis leading to numerous claims and reaction of insurance market; the discovery of "human factors" and "risk management"; the establishment of the ISO 9001 system of management.

1.2). Through ISM, a different approach was introduced in the management of shipping operations, and the master has now (external) help during the decision-making in the face of danger. In the front of an ever-growing industry, the economical intricacies of which could make the safety at sea uncontrollable on a global scale, the purpose of IMO was to implicate the shore-based stakeholders in the whole process.

Very briefly, the ISM Code was developed to deal with *human errors* and the associated maritime accidents. According to Anderson (2015), the Code elaborates in the context of *human factors* and the domain of *risk management*; clearly, there is a very strong influence from the ISO 9001 standards. The ultimate intention of the ISM Code is to address the following issues: eliminate substandard ships/owners/managers; address the *human element* issue by a proper control of human errors; improve ship operation/management/on-board rules; enforce compliance with mandatory and industry rules and regulations; demonstrate compliance of the company through a safety management system; and do all that at the minimum cost. In order to comply with the requirement of the ISM Code, each company had to develop a safety management system, supporting the safe operation of ships. Available on board and ashore, there is a large "documentary system" that delivers the Safety Management System (SMS); a dedicated set of procedures (developed by the company) composes its content. The SMS is (in very simple terms) a regulation to guide and control the company and shipboard work processes. Four axes form the structure of this Code: management, crew, equipment, and technical system and methods. These elements are gathered in numerous written instructions and procedures, which are supposed to safeguard the ship by imposing work processes. The context of the ISM Code introduced *self-regulation* in shipping, which changed the (previous) *command-and-control* practice that was verified during State inspections.

The ISM Code, in its current form, was adopted by IMO in 1993 (and amended in the years 2000, 2004, 2005, 2008, and 2013, respectively). The latest edition (IMO 2014b) consolidates all the amendments to the ISM Code from resolutions MSC.104(73), MSC.179(79), MSC.195(80), MSC.273(85), which entered into force on July 1, 2002, on July 1, 2006, on January 1, 2009, and on July 1, 2010, respectively, as well as resolution MSC.353(92), which entered into force on January 1, 2015. Apart from SOLAS Chapter IX, as amended, the ISM Code 2014 edition also includes Revised Guidelines on the implementation of the International Safety Management (ISM) Code by Administrations (resolution A.1071(28)), adopted in December 2013; Revised Guidelines for the operational implementation of the International Safety Management (ISM) Code by companies (MSC-MEPC.7/Circ.8); Guidance on the qualifications, training and experience necessary for undertaking the role of the designated person under the provisions of the International Safety Management Code; and, finally, Guidance on near-miss reporting (MSC-MEPC.7/Circ.6) – (MSC-MEPC.7/Circ.7).

9.5 The International Ship and Port Facility Security (ISPS) Code

IMO defines the International Ship and Port Facility Security Code (ISPS Code) as "the comprehensive set of measures to enhance the security of ships and port facilities, developed in response to the perceived threats to ships and port facilities in the wake of the 9/11 attacks in the United States" (IMO 2012). The specific toolbox of regulations was developed in order to effectively manage the risks of maritime terrorism, as well as improving security status at sea and the various port locations around the globe; as already briefly mentioned, SOLAS 1974 Chapter XI-2 establishes special measures to enhance maritime security, while Regulation XI-2/3 of this chapter addresses the ISPS Code. Whereas part A of the Code establishes the mandatory provisions, the not mandatory (*recommended*) part B encompasses guidelines about how to comply with the mandatory requirements of part A. This set of regulations only applies to passenger ships, including high-speed passenger vessels; cargo vessels of 500 gross tonnage and above; mobile offshore drilling units (MODUs) in transit and at ports (but not to fixed and floating platforms and MODUs on the oil field); and all types of port facilities serving vessels offered for international voyages. In any case, the extent to which these guidelines apply on ships will depend on the type of the ship, its cargo and number of passengers, as well as its sailing routes and the features of the port or port facilities visited by that specific ship. Regarding the application of guidelines to port facilities, it will depend on the type of carriages and vessels visiting that particular facility and its "ordinary" trading routes, namely facilitation of international trade.

The main objectives of the ISPS Code are (IMO 2012) to detect security threats and implement security measures; to establish roles and responsibilities concerning maritime security for governments, local administrations, ship and port industries at the national and international level; to collate and promulgate security-related information; to provide a methodology for security assessments so as to have in place plans and procedures to react to changing security levels. It is necessary to point out that the ISPS Code does not specify detailed measures that each port and ship must undertake to ensure the safety of the vessel/facility against terrorism because of the many different types and sizes of these ships and facilities. Instead, it outlines "...a standardized, consistent framework for evaluating risk, enabling governments to offset changes in threat with changes in vulnerability for ships and port facilities." Very briefly, for ships, the ISPS framework includes requirements for ship security plans (SSP), ship security officers (SSO), company security officers (CSO), certain on-board equipment. For port facilities, the requirements include port facility security plans (PFSP), port facility security officers (PFSO), certain security equipment. In addition, the requirements for ships and for port facilities include monitoring and controlling access; monitoring the activities of people and cargo; ensuring that security communications are readily available.

Nordfjeld and Dalaklis (2016a) notice that, according to the mandatory part A of the ISPS Code, Contracting Governments have to appoint the Designated Authority to carry out certain maritime security duties/responsibilities established in the Code. This Designated Authority holds the responsibility of ensuring compliance with the maritime security measures at all ports (where the ISPS Code applies) through the Port Security Assessment (PSA) and Port Facility Security Assessment (PFSA); the revision, approval, and control of compliance of the Port Security Plan (PSP) and Port Facility Security Plan (PFSP), which shall be based upon the PSA and the PFSA, are also included. A very important function within the ISPS Code is the setting of security levels, which is performed by governments through the Designated Authority. It focuses on the alert for the perceived risk of terrorist attacks, but governments may include other type of threats in their risk evaluation. These security levels apply to ships sailing both within the respective territorial sea as well as into port facilities. The Designated Authority can decide on the implementation of different security levels for different ports, port facilities, and different areas of their territorial waters. It is necessary to point out that the change of security levels must be clearly communicated to the associated port(s), port facilities, and all the vessels transiting or attempting to transit those areas (IMO 2012).

As established by IMO, there are three different security levels, whereas Security Level 1 is considered normal and requires the minimum appropriate/protective security measures at all times. Its priority is the normal conduct of commercial operations and facilitation of trade. Security Level 2 requires additional protective security measures for the specific period of time that the risk of a security incident is heightened. Its priority is the allowance of continued commercial operations, but with increased security measures and its consequent restrictions. Security Level 3 requires specific protective security measures that shall last only for a limited period of time when risk for a security incident is probable or imminent, even when it is not possible to identify the target. It encompasses the strictest security measures, and its priority is the security of the port, port facilities, vessels, and society that may be affected by a security incident and can result even in the suspension of commercial operations. The control of security response under Level 3 is transferred to the government or other organizations responsible for dealing with significant incidents (IMO 2012).

The key instruments and concepts related to maritime security are addressed in the ISPS Code, with the aim of ensuring security at ports and within an acceptable risk level. Nordfjeld and Dalaklis (2016b) point out that the key instruments are the PSA and PFSA, which encompass the evaluation of security risks of the port or port facility. This risk evaluation must be done to develop the PSP or PFSP for the case of terminals, which then must be approved by the Designated Authority. The PSP is designed to ensure the compliance of measures and procedures aimed to protect the port, persons, cargo, port's equipment and machinery, and the vessels serving or buying services to that port from threats, security risks, and security incidents. The PFSP has the same objectives as the PSP, but limited to the terminal. It is the PSO and PFSO, the responsible person(s) to ensure that the risk evaluation (PSA/PFSA) is carried out according to the principles and guidelines of the ISPS Code, submitted

and approved and to establish the respective PSP/PFSP based on its PSA/PFSA and get it approved as well; once approved, the PSO/PFSO is also responsible for implementing and maintaining (or even improving via formalized procedures) the plan at all times.

9.6 Conclusion

Through the intensive efforts of IMO, a rather extended number of conventions and regulations stipulate the operational environment and the associated training requirements for maritime professionals, both on board vessels and ashore. The very important mission of the specific United Nations' (UN) entity is to promote safe, secure, environmentally sound, efficient, and sustainable shipping through cooperation. IMO ensures the adoption of the highest practicable standards of maritime safety and security, efficiency of navigation, and prevention and control of pollution from ships. The influence of international conventions that are regularly updated/improved, such as the one related to the Prevention of Pollution from Ships (MARPOL), the one dealing with Standards of Training, Certification and Watch-Keeping (STCW), and the extremely important Safety of Life at Sea (SOLAS), are all very well known within the members of the maritime community and many outsiders.

It is a rather self-explanatory fact that a vessel's technological standing is in reality a key factor for safety. Contemporary vessels' design concepts and principles, as well as uniform equipment standards set by SOLAS, provide multiple levels of safety risk mitigation; it is indicative the fact that this pivotal maritime safety Convention ensures that the ship's bridges—irrespective of size or mission to be accomplished—are equipped with the right type of devices and systems that greatly support the conduct of navigation and simultaneously reduce the possibility of an accident. In the course of human history, maritime accidents are always recorded; however, because of the regulatory framework of SOLAS, the safety level of contemporary vessels is extremely high when compared even with the very recent past. In any case, it is always important to learn from accidents, and responsible entities should take advantage of the "lessons learned" through the respective investigation and constantly review training methods to improve the safety and security measures that have been put in place.

It is also important to consider that the contemporary world is well interconnected, and there is an obvious trend toward economic globalization. UNCTAD states that, today, seagoing vessels are the most important means of transport; associated statistics indicate that about 90% of the total volume of global trade is borne (exclusively—or at least partially) by sea. Safe (and secure) shipping is a prerequisite for the normal conduct of worldwide trade, therefore the "backbone" of globalization. Furthermore, the geographical configuration of our planet greatly favors maritime transport endeavors; three-quarters of Earth's surface is covered by sea or lakes, and with the exception of the North and South Poles, the

transport of passengers and goods by seagoing vessels is possible to and from any part of the world. This fact by itself constitutes a comparative advantage for maritime transport against other means such as air or land. As a result, numerous ships transit each and every day, all year around, the various seas and oceans of our planet in order to deliver enormous quantities of goods—as well as a very large number of passengers—to their final destination. It is a rather self-explanatory fact that masters, officers, and watch personnel on seagoing merchant ships play a crucial role in the normal operation of the shipping industry: only competent and well-trained seafarers can ensure safety of life at sea, deliver the level of required maritime security, perform all duties related to the conduct of the passage efficiently, and finally maintain protection/preservation of the marine environment. The regulatory framework that IMO has created and implemented plays a very crucial role in relation to the effective functioning of the maritime industry by determining the numerous safety requirements and providing the necessary operational guidelines.

The SOLAS Convention clearly holds a pivotal role for maritime safety and security issues. As already discussed, the vast majority of worldwide trade is transported by sea; therefore, the safety level of vessels is critical to the global economy. On the positive side, the maritime industry saw the number of (worldwide) total losses remaining relatively stable during the year 2015, declining slightly to 85; that figure was the lowest total for a decade and the second year in a row that annual losses remain below the level of 100. It is also noteworthy that in the year 2015, maritime losses declined 3% compared with 2014. Last, but not least, the 2015 accident year represents a rather significant improvement on the 10-year loss average.[22] These very positive effects can certainly be attributed to SOLAS and other regulatory efforts by IMO. Additionally, considering the high-level competition and associated economic pressures for the wider maritime industry, enforcing uniform standards is a prerequisite for its normal functioning; the avoidance of distortions that could be produced by regional and national regulations is achieved by the (almost universal) applicability of SOLAS. The relevant IMO's statistics are impressive the least: "SOLAS 1974, as amended" is ratified by 163 different countries, covering about 99.15% of word tonnage.[23]

Finally, quite often up to now, IMO has been criticized on the notion that introducing *new regulations* was done only under a responsive approach and after a major maritime disaster occurred; to counter-argue this, a short mentioning of the newly introduced International Code for Ships Operating in Polar Waters (Polar

[22]Total losses are defined as actual total losses or constructive total losses recorded for vessels of 100 gross tons or over (excluding for example pleasure craft and smaller vessels). Safety and Shipping Review (2016). Allianz Global Corporate & Specialty based on the Lloyd's List Intelligence Casualty Statistics. http://www.agcs.allianz.com/assets/PDFs/Reports/AGCS_Safety_Shipping_Review_2016.pdf (accessed on 24 Feb 2016).

[23]International Maritime Organization's (IMO) official website (2016e). IMO's Staff. http://www.imo.org/en/About/Conventions/StatusOfConventions/Documents/Status%20of%20Treaties.pdf (accessed on 24 Feb 2017).

Code-PCD) is made at this point. This Code became effective on January 1, 2017, under the SOLAS framework. Navigating in the polar regions is clearly a very challenging endeavor, not only because of the difficult environmental conditions; strict shipbuilding criteria are just the first step that needs to be met, and special safety precautions to ensure the conduct of shipping operations in these dangerous waters are needed. This very brief discussion will facilitate to explain the fact that this Code is clearly a preemptive regulatory framework, aiming to enhance the status of maritime safety in polar waters. It is true that various estimations point out that traffic in the polar regions and especially the Arctic will increase; it is therefore very essential to have *in advance* the necessary regulation in place and not to follow the responsive approach of the past. These sensitive ecosystems do not have the capability to recover from a major safety incident such as a large oil spill. The timely introduction of the PCD indicates that IMO's way of updating SOLAS has now a forward way of thinking and not the (previous) responsive approach. In order to reap only benefits and minimize the risks of shipping operations in truly delicate regions such as the Arctic, strict regulations and precautions need to be in place.

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Chapter 10
The Relationship Between Nationality of Ships, "Genuine Link," and Marine Insurance

George Theocharidis and Patrick Donner

10.1 Introduction

In a world where 90% of the volume of the total trade is seaborne trade, the need to ascertain the risks connected with the carriage by ships is more than obvious. In 2017, the number of merchant ships navigating across the globe was 93,161.[1] These vessels are crossing the rough oceans not for charitable reasons but for the purpose of generating income for privately owned companies, in which, almost invariably, they are the most valuable assets. It is the risks inherent in shipping (e.g., rough weather conditions that can frustrate the expedition, volatile freight market, unpredictable asset values, etc.), which make the particular business worth pursuing for profit making. At the same time, the materialization of the risk depends on many factors, like the condition, maintenance and safe navigation of the ship, the encounter of adverse weather conditions, the competency of the seafarers as well as that of the onshore personnel, and the prevailing market conditions, which also dictate the mode of operation and exploitation of the ship. But how likely is the materialization of the risk? What impact will the severity of the consequences have to the company's trading continuation? During the last years, it has become increasingly common for ship-owning companies to devise business plans based on risk analysis and risk management.[2] There are many ways to tackle the problem of risks. One option may be that the risk is borne by the company itself with the expectation that the damage/loss would be compensated with legal recourse against the person who

[1]Statistics from UNCTAD, Data Center, 2017 (http://unctadstat.unctad.org/wds/TableViewer/tableView.aspx).

[2]Managing risk in shipping: a practical guide issued by the Nautical Institute (1999). See also Kavussanos and Visvikis (2006).

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I.D. Visvikis, P.M. Panayides (eds.), *Shipping Operations Management*,
WMU Studies in Maritime Affairs 4, DOI 10.1007/978-3-319-62365-8_10

caused it. However, such choice may prove futile for many reasons (e.g., third party becoming insolvent, inability to entertain recovery proceedings abroad). Another approach is to reduce the risk, either by reducing the frequency of occurrence or by minimizing the consequences. Risk reduction measures are not taken once and for all—they need to be continuously assessed and repeatedly reassessed. However, regardless of all efforts to reduce them, some risks will remain. The risk, which still remains, can be transferred to another party, either by transferring the activity to a specialist (e.g., subcontracting) or by transferring the financial consequences. It is the last option, namely transfer of risk by insurance, that will be examined in the light of the shipowner's unfettered right to elect registry for his ship.

10.2 Freedom to Navigate

A principle, not so obvious to all nations, is that the high seas should be freely accessible by any navigating construction made by humans.[3] Such proposition would be based on the fundamental rule that no sovereign rights of any state could be proclaimed over the high seas.[4] From that principle a right has been derived in favor of all states to access and navigate the single ocean,[5] which has been enshrined in various public international law instruments.[6] To be more precise, a freedom is recognized for all states, whether coastal or landlocked, to access the ocean in an open manner. Furthermore, two things should be observed. First, this general freedom comprises of several freedoms,[7] which must be exercised in a manner not prejudicial to the other states' respective freedoms. Therefore, as it happens with all rights/freedoms, there are limits to their exercise. Second, by virtue of the "constitution of the oceans," the exercise of the freedom of navigation is linked to the basic means of sea transport, i.e. the ship,[8] without resort to a specific definition.[9]

[3] See the famous treatise by Grotius (1609).

[4] Art. 89 of the UN Convention on the Law of the Sea, 1982 (hereafter "UNCLOS") "*No State may validly purport to subject any part of the high seas to its sovereignty*".

[5] Despite the division of the sea into seven oceans, the ocean is really single, one unit (Tanaka 2012). On the other hand, the term high seas dos not refer to sea waters—as one might expect—but rather an area containing sea water outside the exclusive economic zone, where established by the coastal state, or the territorial seas (or internal waters) of all coastal states.

[6] See art. 2 of the Geneva Convention on the High Seas, 1958 (hereafter "High Seas Convention") "*. . .The high seas being open to all nations, no state may validly purport to subject any part of them to its sovereignty. . .*" Similarly see UNCLOS art. 87 "*The high seas are open to all States, whether coastal or land-locked. . .*".

[7] See art. 87 UNCLOS par. 1 "*. . .It comprises, inter alia, both for coastal and land-locked States: (a) freedom of navigation; (b) freedom of overflight; (c) freedom to lay submarine cables and pipelines. . .*".

[8] The notion seems to be used interchangeably with that of "vessel" (see heading of art. 217 UNCLOS).

[9] Art. 90 "*Every State. . . has the right to sail ships. . .*" However, a logical question rises. What about other types of construction? Do they fall under this provision, so as to enjoy the freedom of

In order to ascertain the scope of the special freedom to navigate, we need to deploy hermeneutical tools, like the systematic interpretation. The relevant provisions are articles 87 par. 1(a), 90, 91, 92 and 94 pars. 1, 2(a–b) of the United Nations Convention on the Law of the Sea (UNCLOS).[10] What is obvious from first sight is that the special freedom derives from a right. As such, the freedom is not unlimited but is subject to conditions. From UNCLOS article 90, we can extrapolate the requirement that sailing the high seas is subject to flying a flag. At the same time, UNCLOS article 91 links the entitlement to fly a flag with conferment of nationality. However, the latter notion beseems to natural persons and not to vessels.[11] Nevertheless, it has traditionally been used as such, even for other "inanimate" entities.[12]

10.3 "Genuine Link" and Nationality of Ships[13]

Further, it is in UNCLOS article 91 that the international legislator provides that nationality may be granted to a ship upon meeting certain conditions fixed by each state, the fulfillment of which permits registration in the state's registry. These conditions should evince a *genuine link* between the state and the ship.[14] At this

navigation? If we were to accept that what is not explicitly prohibited is allowed, then any construction capable of navigating may qualify.

[10]As of 23.9.2016, UNCLOS had received ratification from 168 states, a feature which makes the particular instrument the central piece of international legislation in respect of the rights and duties provided for in it. Hence the present analysis focuses on UNCLOS provisions.

[11]Nordquist et al. (1995) argue that "...*There is no analogy between the nationality of ships and the concept of nationality as applied to individuals or corporations*".

[12]E.g. nationality of a corporation.

[13]Regarding the history of the concept, see Meyers (1967) on 243 et seq., especially the conclusions on 283–299.

[14]UNCLOS art. 91 has its origin in art. 5 par. 1 High Seas Convention, which provided in the relevant passage "...*There must exist a genuine link between the State and the ship, in particular, the State must effectively exercise its jurisdiction and control in administration, technical and social matters over ships flying its flag*..." This provision appeared in the text of the "Articles Concerning the Law of the Sea, 1956" (hereafter "Articles"), which was prepared by the International Law Commission. The text in art. 29 par. 1 read "...*Nevertheless, for purposes of recognition of the national character of the ship by other States, there must exist a genuine link between the State and the ship*." What is remarkable is that the draft provision made recognition of a ship's nationality by other states conditional upon the existence of a genuine link between the ship and the state of registration. By the time the draft provision became art. 5 of the High Seas Convention, this condition had been erased in exchange for elaborating on the genuine link, which was linked to effective jurisdiction and control of the ship by the flag state. However, in order to ascertain the reason for the inclusion of the concept "genuine link" in the draft provision one would need to refer back to the comments of the Articles. In 1896, the Institute of International Law adopted certain rules governing permission for ships to fly a flag. This initiative did not have the expected impact and it was abandoned by the International Law Commission at its 8th session, as it

point, it should be observed that this issue, especially in the light of *flags of convenience* practice, ignited a very hot debate at international level.[15] On one side of the pendulum stands the position that it is a state sovereign prerogative to fix the conditions for ship nationality and, ultimately, for ship registration. The diametrically opposite position insists that the genuine link sets minimum limits to the state's power to formulate conditions.[16] The foundation of the first position is obvious, with UNCLOS article 92 offering additional support.[17] Interestingly, the second position gains its support from a similar provision but with dissimilar wording. By virtue of UNCLOS article 94, a duty is placed on every member state to exercise jurisdiction and control in administrative, technical, and social matters over ships flying its flag. In particular, the state ship registry should ensure the record keeping of certain data relating to the ship, as well as the taking of measures in respect of the safety of the same. Remarkably, one of the measures involves the surveying of the ship prior to its registration and thereafter at appropriate intervals. Also, the flag state should ensure that the manning of the ship

was considered that the adopted criteria could not satisfactorily cover the very divergent practices of states in respect of ship registration. More specifically, "*. . .The Commission accordingly thought it best to confine itself to enunciating the guiding principle that, before the grant of nationality is generally recognized, there must be a genuine link between the ship and the State granting permission to fly its flag. The Commission does not consider it possible to state in any greater detail what form this link should take. This lack of precision made some members of the Commission question the advisability of inserting such a stipulation. But the majority of the Commission preferred a vague criterion to no criterion at all. While leaving States a wide latitude in this respect, the Commission wished to make it clear that the grant of its flag to a ship cannot be a mere administrative formality, with no accompanying guarantee that the ship possesses a real link with its new State. The jurisdiction of the State over ships, and the control it should exercise in conformity with article 34 of these articles, can only be effective where there exists in fact a relationship between the State and the ship other than mere registration or the mere grant of a certificate of registry*" (Commentary on Articles, Article 29, Yearbook ILC, 1956, vol. II, 279).

[15]It is not the aim of this paper to throw light on the practices of international registers and those of the offshore registers/"second" registers. At this point it is sufficient to mention that, although both afford privileges and incentives to shipowners (e.g. lower tax, lower crewing cost, ease of access to the registry etc.), the latter still insist on substantial links with their jurisdiction, especially in respect of beneficial ownership and management of the ship (see the analysis and references in *Coles and Watt (*2009*) par. 3.1 et seq. and 3.39 et seq.).*

[16]See Commentary on Articles, Article 29, Yearbook ILC, 1956, vol. II, 278–279 "*Each State lays down the conditions on which ships may fly its flag. Obviously, the State enjoys complete liberty in the case of ships owned by it or ships which are the property of a nationalized company. With regard to other ships, the State must accept certain restrictions. As in the case of the grant of nationality to persons, national legislation on the subject must not depart too far from the principles adopted by the majority of States, which may be regarded as forming part of international law. Only on that condition will the freedom granted to States not give rise to abuse and to friction with other States. With regard to the national element required for permission to fly the flag, a great many systems are possible, but there must be a minimum national element*".

[17]"*Ships shall sail under the flag of one State only and. . .shall be subject to its exclusive jurisdiction on the high seas. . .*".

would include a competent master and officers with proper qualifications. More importantly, this duty cannot be discharged unless the state complies with international rules and standards.[18] So, since the aforementioned duty encompasses obligations in respect of the ship's registry, there is support that the flying of the flag by a ship, which is linked to nationality, could not be permitted under any conditions but subject to certain conditions. Although convincing, this proposition is still incapable of according positive meaning to the vague expression *genuine link*.

An effort to throw light on this matter was attempted several years before the entry into force of UNCLOS. It was the slack regime for ship registration introduced by many states[19] that made the international community realize the need for a unified approach on the subject. In 1986,[20] the UN Convention on Conditions for Registration of Ships came into existence, providing for entry into force upon signature of not less than 40 states, amounting to at least 25% of the world's ship capacity. What is obvious, even from the preamble, is that the international legislator would run the risk of being crushed[21] between the Cyanean Rocks if he would not respect the existing international legislative regime,[22] as implemented and modified by current contracting states. The relevant provisions attempted to connect the various flag state obligations as incorporated in UNCLOS article

[18]UNCLOS art. 94 par. 5 "*In taking the measures called for in paragraphs 3 and 4 each State is required to conform to generally accepted international regulations, procedures and practices and to take any steps which may be necessary to secure their observance*". With respect to the protection of the environment from marine pollution, see UNCLOS art. 217 par. 1, which provides: "*States shall ensure compliance by vessels flying their flag or of their registry with applicable international rules and standards, established through the competent international organization...*".

[19]Known also as "flag of convenience" states, in which registration of a ship is permitted even to a foreign-owned or foreign-controlled company under conditions, which, for various reasons, are convenient and opportune for the company registering the ship (see Boczek 1962).

[20]At this point it should be recalled that the international community had not yet adopted the ISM Code (IMO Assembly Resolution A.741(18), 1993). An earlier attempt by UNCTAD in 1977 to define certain registers as "*flags of convenience*" by virtue of certain criteria did not bring the expected result (Report of the ad hoc Intergovernmental Working Group on the Economic Consequences of the Existence or Lack of a Genuine Link between the Vessel and Flag of Registry, TD/B/C.4/177).

[21]See the wording "*The State Parties to this Convention....Recalling also that according to the 1958 Geneva Convention on the High Seas and the 1982 United Nations Convention on the Law of the Sea there must exist a genuine link between a ship and a flag State and conscious of the duties of the flag State to exercise effectively its jurisdiction and control over ships flying its flag in accordance with the principle of the genuine link... Reaffirming, without prejudice to this Convention, that each State shall fix the conditions for the grant of its nationality to ships, for the registration of ships in its territory and for the right to fly its flag... Considering that nothing in this Convention shall be deemed to prejudice any provisions in the national laws and regulations of the Contracting Parties to this Convention, which exceed the provisions contained herein...*"

[22]See the wording of UNCLOS art. 8 par. 2 "*...These laws and regulations should be sufficient to permit the flag State to exercise effectively its jurisdiction and control over ships flying its flag*" and UNCLOS art. 94 par. 1 "*Every State shall effectively exercise its jurisdiction and control in administrative, technical and social matters over ships flying its flag*".

94, while the *economic link* functioned as the adhesive element for these obligations. More specifically, the nationality of the persons, who own fully or partially the ship, which is to be registered in the particular registry, ought to be identical to the flag of that state.[23] Alternatively, or cumulatively,[24] the manning of the ship should be done with persons domiciled or lawfully in permanent residence in the state, whose flag the ship flies. Additionally, the state of registration should require from the companies, which have applied for registration of the ship that they own, to have their principal place of business within their territory.[25] In the absence of such establishment, an appointed representative or management person domiciled in that state would suffice. Finally, the state of registration should ensure that the persons accountable for the operation and management of the ship are capable of meeting their financial obligations in respect of the operation of the ship, including claims of crew. For that purpose, they should furnish evidence in the form of insurance or other adequate means of guarantee.[26] For many reasons, this international instrument has not come into force yet.[27] However, it provided a valid ground for the argument that the requirement for a *genuine link* between the ship and the flag state encompassed also an "economic link" between the two, that is, in respect of the beneficial ownership, the manning, the management and the financial viability of the vessel, including the insurance against risks that could give rise to third party liability.

Another source for approaching the concept of *genuine link* is the jurisprudence of the International Tribunal of the Law of the Sea (ITLOS). In *The Saiga No.2*, the judges were confronted with the argument that it would not be a violation of international law if a state would refuse to recognize the nationality of a foreign ship on the ground that the foreign registration state had not exercised prescriptive and enforcement jurisdiction over the owner/operator of that ship.[28] The reason for this refusal would be that, in absence of such jurisdiction, no genuine link could be established between the flag state and the ship as prescribed by UNCLOS article 91. The judges interpreted the relevant provision narrowly and dismissed the argument by stating that "*The conclusion of the Tribunal is that the purpose of the provisions of the Convention on the need for a genuine link between a ship and its flag State is to secure more effective implementation of the duties of the flag State, and not to*

[23]See art. 8 par. 2 "*Subject to the provisions of article 7, in such laws and regulations the flag State shall include appropriate provisions for participation by that State or its nationals as owners of ships flying its flag or in the ownership of such ships and for the level of such participation…*"

[24]See art. 7 "*With respect to the provisions concerning manning and ownership of ships…. a State of registration has to comply either with the provisions of paragraphs 1 and 2 of article 8 or with the provisions of paragraph 1 to 3 of article 9, but may comply with both*".

[25]See art. 10 par. 1 and 2.

[26]See art. 10 par. 3.

[27]It has been argued that, despite the explicit wording, the relevant provisions leave for the states a lot of room to play in the implementation (Coles and Watt 2009, par. 2.18).

[28]ICGJ 336 (ITLOS 1999). See also similar approach in *Commission v. Hellenic Republic [1997] ECR I-6725*.

establish criteria by reference to which the validity of the registration of ships in a flag State may be challenged by other States." Although the judgment contributed no substantial content to the concept, the *ratio decidendi* was still useful in the sense that it determined what "genuine link" was not linked to. However, in *The M/V Virginia G*,[29] the matter was dealt with more specifically. Before the judges, the following two arguments were submitted: first, that the function of the genuine link was to establish an international minimum standard for the registration of ships and, second, that the genuine link not only was a formal registration but also required a real and substantial connection between the vessel and the flag state. In the absence of these (i.e., if neither the shipowner nor the crew were of the origin of the flag state), the registration state could not exercise effective jurisdiction. Therefore, the other states would not be bound to recognize the right of free navigation of that ship. The judges were not convinced by the above line of reasoning and unanimously rejected the contention by holding that "*... In the view of the Tribunal, once a ship is registered, the flag State is required, under article 94 of the Convention, to exercise effective jurisdiction and control over that ship in order to ensure that it operates in accordance with generally accepted international regulations, procedures and practices. This is the meaning of 'genuine link'....*"

From the above analysis, it may safely be extracted that the ship's nationality is conditional upon the existence of a *genuine link* between the flag state and the ship. However, that condition is not linked to the substantive conditions provided for by national law for granting the right to a ship to fly its flag. As a result, no definite limits seem to be prescribed by UNCLOS article 91 in respect of the freedom of a state to grant its nationality to a ship. The next step would be to examine if any limits exist in the freedom to place insurance on a duly registered ship.

10.4 Insurance—Insurability

Any risk is insurable[30] except those risks where a loss is inevitable, because, as a matter of principle, insurance provides protection only against fortuitous losses, i.e. losses, which may happen but are not certain to happen.[31] The scope of risks that a shipowner needs to cover is wide, but three main types of insurance can be distinguished. They are, firstly, protection against the loss of or damage to the ship itself, which is effected through hull and machinery (H&M) insurance. Secondly, the owner of the ship needs cover for the liabilities, which can be incurred in connection with the operation of the ship, usually in the form of protection and indemnity (P&I) cover. And thirdly, loss of hire (LoH) insurance may be needed to provide compensation for the loss of income in case of a casualty. All shipowners

[29] ICGJ 453 (ITLOS 2012).

[30] See Gilman et al. (2016), p. 192.

[31] As per Lord Sumner in *British & Foreign MI Co v Gaunt [1921] 2 AC 41, 47.*

face these three main categories of loss, but in addition, it is possible to insure against other losses to cover possible gaps in the standard insurance conditions normally offered in the market or for special needs.[32] However, such special cover falls outside the scope of this general overview, which will focus on the three main types mentioned above.

When the owner of a ship or his broker wishes to insure his ship, the insurer/underwriter needs to be able to make a reasonable assessment of the risk being presented to him. In order to do that, the underwriter needs to have a thorough understanding of not only the insurance market but also the market for that type of ship, both globally and regionally; the trades in which such ships operate, the cargos typically being carried by such ships and their inherent risks; as well as the "map of the world" in terms of politics, economics, law, and jurisdiction.[33] In the past, it was common to insure ships on voyage policies, i.e. for one particular voyage from one particular place to another. This risk assessment could be quite focused, but since insurance policies are now normally made in the form of time policies, usually for one year, the risk assessment actually entails predicting the future, which is notoriously difficult. In addition to knowing the market, the underwriter also needs to know and assess the particulars of the ship being insured—when it was built, where and by whom it was built, its classification society and classification status, its owner and ship manager, as well as its previous owners and managers. The ship register shows not only the current owner but also the previous owner(s). Alternatively, it shows from which country the vessel was acquired, which makes it possible to trace the vessel's ownership and trading history further back. It is in this context that the nationality of a ship and its registration are relevant factors in the risk assessment.

The first question, which needs to be asked, is whether registration is a prerequisite for insurance. The simple answer is "no." After all, any object or operation is insurable in principle, but whether it is insurable under a marine insurance policy is more questionable because marine insurance is defined as indemnity ". . .against marine losses, that is to say, the losses incident to marine adventure."[34] For example, a ship that is permanently moored and is used as a floating restaurant or a museum ship has every characteristic of a ship and may have previously been used as a trading ship, but its current use can hardly be described as a marine adventure, even though it may be afloat. Whether such "hulls" can be subjects of marine insurance under section 3 of the Marine Insurance Act 1906 is debatable, but the fact is that they are normally not entered in a ship register, and in practice marine underwriters are usually not keen to insure them. They can certainly be insured, but the risks for the property and the potential liabilities are very different from the risks normally being faced by trading vessels, and therefore marine underwriters are by definition not experts at assessing the risks. In this context, it can be noted that it is the commercial

[32]See Gold (2002), p. 77.

[33]See Dover (1975), pp. 140–141 and Gold (2002), pp. 136–137.

[34]Marine Insurance Act 1906, s.1.

operation of a ship in the form of carriage of goods or passengers (vessel used in navigation) that in the legislation of most countries[35] makes registration in the ship registry mandatory. Turning the question around, one may ask whether insurance is a prerequisite for registration, and again the answer is "no." It is the particulars of the vessel and its ownership that are entered in the register, but details of what insurances have been taken out are not recorded in the register of ships.

Following from that, it can be asked whether operation of the ship requires the ship to be insured. Again, the answer, strictly speaking, would be "no," or at least it used to be. It was noted at the beginning that the vessel is the most important, if not the only, asset of the ship-owning company, and therefore having it insured against loss or damage is certainly prudent. Moreover, while the law does not usually require a vessel to be insured, it may in practice be necessary and an explicit requirement for the financing of the vessel. Commercial vessels represent major investments, which in most cases makes it necessary to borrow funds from banks or other providers of finance. The providers of loans, which have been taken to buy and operate the vessel, demand collateral as security for the repayment of the loan, which is, more often than not, provided in the form of a mortgage registered over the ship. Consequently, entering the vessel in a national register of ships is a prerequisite for the registration of a mortgage. In case the shipowner is in breach of his obligations (e.g., he cannot pay the interest and amortization of the loan), the mortgagee can enforce his rights under the loan agreement and the deed of mortgage, effectively by forcing the vessel to be sold in order to recover the necessary funds from the proceeds of sale. However, should the vessel have a serious accident and suffer severe damage, or even a total loss of the ship, its value would be very low or nonexistent. In order to protect itself against this situation, a lending bank would normally make it a condition precedent for the loan that the owner takes out and maintains insurance over his ship for its full value, or at least the remaining outstanding loan and accrued interest and costs, and furthermore assigns the insurance to the mortgagee. The purpose of the mortgage is to safeguard the vessel's value as security for the outstanding loan, and the shipowner (mortgagor) is under an obligation not to act in a way that would prejudice the security value of the ship. However, if the shipowner is in breach of a warranty under the insurance or is grossly negligent in the operation of the vessel, the insurers may be entitled to refuse cover, in which case the voidance of the policy would affect the mortgagees as well. To safeguard against such an eventuality, it is common for mortgagees to take out mortgagee's interest insurance (at the mortgagor's expense).

Insuring the vessel (H&M insurance) and its earnings (freight insurance and LoH insurance) is a method to protect the investment of the owner and other financial stakeholders, and there are many other examples of contractual obligations relating to maintaining insurance,[36] but there is no statutory requirement that

[35] See, for example, Canada Shipping Act, 2001, sec. 46, New Zealand Ship Registration Act 1992, Swedish Maritime Code, Chapter 2, Finnish Maritime Code, Chapter 1:2.

[36] In case of bareboat charter see, for example, BARECON 2001, clauses 13 and 14.

would make this protection mandatory. There are numerous examples, mostly historical examples, of shipowners choosing not to insure their ships. For example, Gustaf Erikson, the legendary owner of commercially trading sailing ships, had kept his fleet of square-rigged tall ships uninsured up to the start of World War II, despite being the founding chairman of the Supervisory Board of Redarnas Ömsesidiga Försäkringsbolag (Shipowners' Mutual Insurance Company) and having insured his steamships.[37] The decision not to insure the vessels was based on purely economic grounds as the premium for a sailing ship was quite high compared to the market value of such ships.[38] Another, quite different reason for operating without insurance was found in the Soviet Union, where vessels might have been insured only while trading in non-Soviet waters, but many were not insured at all. In these cases, the initial investment was done by the state rather than the registered owning company, and in case of a total loss, the registered owner could approach the relevant ministry and apply for a vessel to replace the one that was lost.[39] Both these examples illustrate the fact that the objective of insuring the property is to provide economic security to the owner by transferring the risk of economic loss to the insurer, but only if the cost of doing so is viable and if, in fact, there is a loss to transfer. As noted in the introduction of the chapter, the decision to insure is based on an analysis of the risk. If the risk analysis concludes that the occurrence of a particular peril is so unlikely, even impossible, such as the risk of ice damage in tropical waters, then insuring against it simply does not make sense. On the other hand, the analysis may conclude that a certain type of loss is a quite common occurrence, but the expected loss is not costly enough to (seriously) harm the financial status of the owner of the vessel, in which case buying insurance against payment of a premium may not make economic sense. But as has been explained, in normal circumstances the financial implications for the various stakeholders are too high in shipping to risk the survival of the company. Consequently, transferring risks to insurers offers the necessary protection.

For very large shipping companies (within a group beneficially owned by the same interests), which own a significant number of vessels, being self-insured and retaining the risk may seem like a possibility since the risk would be spread across a larger fleet. In such cases, the group would have set up what is called a captive insurance company, which is a wholly owned subsidiary incorporated for the purpose of insuring the "property" of the group assets (i.e., the ships). Captive

[37] See Steinby (1988), pp. 1938–1988, and also Kåhre and Greenhill (1977), pp. 1872–1947. At the outbreak of World War II, however, Erikson took out war risk insurance on 7 September 1939—the following day his four-masted barque *Olivebank* sailed into a minefield, exploded and sank.

[38] "*Erikson had to pay his crews as little as possible and he could not afford to insure ships, but he also had to maintain them at such a standard that they were rated 100 A1 at Lloyd's*" in *Newby E.*, The Last Grain Race, Secker & Warburg, 1956, London, as cited by Wikipedia (https://en.wikipedia.org/wiki/The_Last_Grain_Race, accessed 22 December 2016).

[39] Advanced Study Group Report 240, Marine Insurance in the Former Soviet Union, The Chartered Insurance Institute, 1999, London.

insurance companies are usually domiciled in "offshore" jurisdictions, which offer favorable laws of taxation, so this method of insurance is tax efficient and offers cash flow advantages because the whole premium may not have to be paid in advance. Further benefits of captive insurance companies are that they can be cost-efficient, because of lower administration costs, and claims handling can be easier due to the direct lines of communication between the insurer and the assured. But technically, even in these cases of self-insurance, the vessels are still insured, and the captive insurance company would almost certainly transfer some, often a substantial portion of the risk, to the open market by buying reinsurance.[40]

10.5 Compulsory Insurance

The analysis above has concluded that insurance to cover the property values is not a statutory requirement and, therefore, not mandatory but also that having insurance cover is a necessity from an economic perspective. When it comes to the potential liabilities in connection with the operation of a vessel, the picture is different, and over the past half-century mandatory insurance to cover the shipowner's or operator's liability has become an increasingly common statutory requirement, particularly with respect to pollution liability. The first notable example of compulsory insurance cover appeared in the International Convention on Civil Liability for Oil Pollution Damage 1969 (CLC, 1969).[41] The liability regime of the CLC is based on strict liability, regardless of any fault or negligence on the part of the vessel's owner and, from the insurance perspective, in addition to the compulsory insurance requirement, also direct action, i.e. a right for the victims of oil pollution damage to claim directly against the provider of insurance, which is a significant deviation from normal insurance principles. The CLC applies to tankers flying the flag of a state party to the convention or that call at a port in a member state, which due to the high level of ratification means almost global application.[42] The compulsory insurance, which is normally provided by the P&I Clubs, needs to be verified by an appropriate certificate issued by the maritime authority of the flag state and is required only for tankers actually carrying more than 2000 tons of persistent hydrocarbon mineral oil as cargo in bulk.[43]

[40]Regarding the principles which apply in reinsurance, see Arnould's Law of Marine Insurance & Average, op.cit., Chapter 33.

[41]The CLC has been revised by Protocols in 1976 and 1984. In 1992, a new instrument was drawn, commonly referred to as CLC 1992. The latter was further amended by IMO in 2000 under the tacit acceptance system.

[42]CLC 1992 has been ratified by 139 States, including Hong Kong, Macau and the Faroe Islands, which are associate members of IMO. In addition, there are nine States, which are only party to CLC 1969 (http://www.imo.org/en/About/Conventions/StatusOfConventions/Pages/Default.aspx, accessed 23 December 2016).

[43]See Gold (2006).

Since the adoption of the CLC, it has served as a model for other conventions pertaining to other forms of marine pollution, such as the HNS Convention 1996[44] and its Protocol 2010 and the Nuclear Convention 1971.[45] In the current context, the Bunkers Convention 2001 is of significant importance because the compulsory insurance requirement applies to ships of all types over 1000 GT,[46] and although the geographical coverage of the instrument cannot be said to be global yet, Port State Control in countries, which have ratified it, enforce it quite vigorously. The Bunkers Convention 2001 differs from the CLC in as much as the Bunkers Convention does not channel liability only to the owner of the vessel but rather makes the owner, bareboat charterer, manager, and operator jointly and severally liable for any pollution damage.[47] The "CLC model" has been followed in some other international conventions as well. One example is the Nairobi Wreck Removal Convention,[48] which in case of a casualty imposes a strict liability of the registered owner to locate, mark, and remove the wreck if the costs are reasonable and in proportion to the hazards posed by the wreck, and this liability too has to be covered by compulsory insurance.

Another area in which compulsory liability insurance has become the norm is related to passengers and crew. The original Athens Convention Relating to the Carriage of Passengers and Their Luggage by Sea, 1974, did not require the vessel to carry insurance to cover liabilities toward passengers, but a Protocol adopted in 2002 brought a change in this respect.[49] The amendments were so comprehensive that the revised convention is now officially referred to as the Athens Convention Relating to the Carriage of Passengers and Their Luggage by Sea, 2002, and the liability regime is now quite similar to the "CLC model"—strict liability (for shipping incidents and up to a certain level of liability), compulsory insurance, and direct action, i.e. claims for compensation can be made directly against the liability insurers. It also needs to be noted that, subsequent to the entry into force of the Athens Convention 2002, the European Union adopted the regime with one

[44]International Convention on Civil Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea, 1996, which due to insufficient ratification has not entered into force yet.

[45]Convention Relating to Civil Liability in the Field of Maritime Carriage of Nuclear Material, 1971. This convention has been ratified by only 17 States, but it does cover almost 18% of the world tonnage (http://www.imo.org/en/About/Conventions/StatusOfConventions/Pages/Default.aspx, accessed 23 December 2016).

[46]International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001. There are currently 85 States party to the Bunkers Convention 2001 covering more than 92% of the total world tonnage (http://www.imo.org/en/About/Conventions/StatusOfConventions/Pages/Default.aspx, accessed 23 December 2016).

[47]See Williams (2013), p. 277.

[48]Nairobi International Convention on the Removal of Wrecks, 2007, currently has 33 State parties (http://www.imo.org/en/About/Conventions/StatusOfConventions/Pages/Default.aspx, accessed 23 December 2016) covering over 60% of world tonnage.

[49]See Soyer (2002).

Regulation[50] and Council Decisions[51] within the EU waters, including domestic routes and some vessels operating on inland waterways.[52] The Athens Convention 2002 has so far been ratified by only 26 countries, which, however, represent almost 45% of world tonnage, and if we also consider legislation in the United States of America, it can be said that the protection of passengers provided by regulations relating to carriers' liability is reasonably strong.

The responsibility of the owner or operator of a ship toward his crew was previously often left to be regulated by the flag state in its national laws. Some states, for example the Nordic countries, had national laws requiring the employer to maintain compulsory insurance for death or personal injury caused by occupational hazards.[53] Moreover, there are international conventions and national legislation in many countries that grant seafarers a maritime lien over the vessel to secure and give priority to payment of claims relating to salaries and "...other sums due...in respect of their employment on the vessel."[54] However, national laws relating to maritime liens vary significantly, and the level of ratification of the relevant conventions is not impressive. Moreover, the conventions did not require the employer to have insurance to cover his liability, leaving the individual seafarer to struggle to try to enforce his rights over the vessel. Therefore, it can be said that the protection of the rights of the seafarers was "patchy." This situation will now improve quite significantly with the entry into force[55] of an amendment to the Maritime Labour Convention 2006 (MLC 2006), which will require vessels to which the MLC 2006 applies to carry insurance or other financial security to cover outstanding wages, repatriation, and compensation for death or disability of members of crew. The MLC 2006 has to date been ratified by 84 countries, and since the members of the International Group of P&I Clubs have agreed to provide certificates verifying the existence of such insurance cover, the rights of seafarers will be quite well protected in this respect.

The fundamental difference between H&M insurance and P&I cover is that the former protects the owner against loss of or damage to his property, while the latter indemnifies the owner in cases where he becomes liable to third parties and the rationale for compulsory insurance cover is to protect the innocent victims, who are generally seen as the weaker party. In practice, commercial vessels have appropriate P&I insurance cover, but to make sure this is the case, the EU has implemented a Directive[56] that makes it mandatory for vessels over 300 GT flying an EU member

[50]Regulation (EC) No 392/2009 of the European Parliament and of the Council of 23 April 2009 on the liability of carriers of passengers by sea in the event of accidents.

[51]Council Decisions of 12 December 2011, 2012/22/EU and 2012/23/EU.

[52]See Røsæg (2013), 909 et seq.

[53]See Law on Accident Insurance (608/1948, as amended) in Finland. In Sweden and Norway occupational injury insurance is financed through levies paid by employers and administered as part of the national social security systems.

[54]International Convention on Maritime Liens and Mortgages 1993, Art. 4.

[55]18 January 2017.

[56]Directive 2009/20/EC of the European Parliament and the Council of 23 April 2009 on the insurance of shipowners for maritime claims.

state flag to have insurance cover for all claims subject to limitation under the Convention on Limitation of Liability for Maritime Claims, 1976, as amended by the 1996 Protocol. Based on what we have seen above, it is safe to say that it is now no longer possible to own or operate a commercial vessel in EU waters without insurance covering liability for maritime claims generally or worldwide without insurance covering at least the potential pollution liabilities and liabilities in respect of passengers and crew.

It was stated earlier that anything can be insured, at least in principle, and while it was said that entry of the vessel in a ship registry is normally a requirement for a marine insurer to offer to cover it, the choice of registry does not seem to prevent the owner from obtaining insurance. The decision of an insurer is directly based on an assessment of the risk posed by the vessel and by its owner/operator and indirectly by the flag flown by the vessel, and this risk assessment may, of course, cause an insurer to shy away from insuring ships entered in a particular registry if the legal regime of the flag state is unknown to the insurer or if, for example, the jurisdiction of the flag state does not recognize foreign court decisions, but this would be predominantly a commercial decision based on financial considerations. The assumption may be that a shipowner who chooses a "questionable" registry is not the kind of client that the insurer would wish to do business with,[57] or to put it another way, a "good" shipowner may choose any flag he wishes, while a "bad" shipowner may try to hide behind a "flag of uncertainty." However, a global business, such as shipping, is affected by international politics, and sometimes this can entail external obstacles, and international sanctions would be such an obstacle. The widely applied international sanctions imposed on the Islamic Republic of Iran are a recent example. The sanctions were first imposed by the United States and were followed by the United Nations and the EU, which imposed its own sanctions. However, historically, sanctions have not proven to be entirely effective as all countries and enterprises do not apply them, at least not fully. Consequently, there were still insurers in the international market willing to insure the vessels of the Islamic Republic of Iran Shipping Lines (IRISL) and the National Iranian Tanker Company (NITC), so there was a market, although somewhat limited, and there would always be access to insurance offered domestically. The market limitations would certainly influence the balance of supply and demand, which would affect the level of premium to be paid for insurance, but it is impossible to determine how and how much the premium is affected by the country risk, the operational risk, and the individual risk posed by the owner of the vessel. What may, however, be a real issue is whether the certificates verifying the existence of the required insurance are accepted or whether they in themselves would be considered breaches of the sanctions.

[57]Evidence of that may be deduced from the drastic legislative changes brought in Malta, subsequent to the Erika accident. It was obvious that the Maltese Government introduced strict rules in respect of safety and environmental protection as well as the policing of these rules on ships, so as to avoid in the future, as much as possible, pictures of the Maltese flag flying on ships, which brought catastrophe and attracted global attention.

10.6 Conclusion

The conclusion of the analysis remains that, while there are situations where the law imposes a requirement to have insurance to cover certain liabilities, the choice of registry is not a direct criterion for obtaining insurance but may be, and probably would be, a criterion for assessing the risk and setting the premium. Marine insurance is a business where decisions to request and offer insurance cover are business oriented and based, primarily, on business criteria and, only secondarily, on reputation criteria.

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Chapter 11
Ocean Governance and Sustainability

Lawrence P. Hildebrand and Neil A. Bellefontaine

11.1 Introduction

This chapter situates the maritime and shipping sector within the dynamic and integrated physical-social-ecological ocean system and the broad and evolving framework of ocean governance, management, and sustainability. While shipping operations occupy a prominent and historic role in the maritime world, ships no longer rule the waves alone. The ocean and coastal margins of the world are indeed vast and extensive, but they are increasingly crowded, competitive, and conflicted. And now we are expanding and intensifying traditional ocean industries and adding new exploitive activities to the mix, all in the pursuit of a "blue economy," whether reasonable or not, sustainable or otherwise. Our uses and abuses of the ocean to date have seriously compromised the very foundations of the ocean and coastal system and led to growing marine environmental degradation and the consequent costs of an underperforming ocean economy, loss of essential ecosystem goods and services (which largely sustain the former), increased use conflicts, and challenging legal questions.

While UNCLOS provides the constitution for the ocean and established international norms for virtually all ocean uses, it provides little guidance to nations on how to govern ocean resources in an integrated way. The question is, are our existing ocean governance and management laws, policies, institutions, and attitudes up to the dual challenge of contributing positively to a growing ocean economy while, at the same time, maintaining and indeed restoring the natural ocean capital upon which our society depends? Shipping is and will remain a vital component of the ocean economy. Its future development will, however, be in an increasingly shared ocean space, with accommodating compromises and a

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I.D. Visvikis, P.M. Panayides (eds.), *Shipping Operations Management*,
WMU Studies in Maritime Affairs 4, DOI 10.1007/978-3-319-62365-8_11

responsibility to provide societal needs and play a constructive role in protecting, restoring, and sustainably developing the world ocean.

11.2 Society and the Ocean

We expect a lot from the ocean. And our demands on it are growing rapidly. The vast and interconnecting ocean has long been a dependable highway upon which we move our goods around the world, a basket from which we harvest its living and nonrenewable natural resources, a life-sustaining habitat along its shorelines that supports much of human habitation and industry, a regulator of our climate, and a silent receiver of our waste. As a result of our unsustainable use and overexploitation of ocean resources (Large et al. 2015), unchecked pollution, and habitat degradation (Borja et al. 2016) and by undervaluing the inherent value of the goods and services that the ocean provides to life on the planet, human society, and the economy (Pendleton et al. 2016; Costanza et al. 2014), we are witnessing a serious decline in the health of the ocean (United Nations 2016) and its capacity to support our existing and growing demands. Climate change is adding a new layer of burden on the ocean, with rapidly changing ocean conditions and significant impacts on natural resources and human well-being (Weatherdon et al. 2016; Laffoley and Baxtor 2016). Despite long-standing efforts by a range of international organizations, regulatory regimes at global and regional levels have found it difficult to adjust to these new circumstances and effectively integrate issues arising from the growing presence of emerging ocean industries. The result has tended to be a piecemeal approach to adjusting existing regulations, which will continue to hamper future efforts to improve ocean governance and management (Cicin-Sain et al. 2015; WWF 2015).

11.3 Beyond Fish and Ships

There was a time, not so long ago, when the ocean was the almost exclusive domain of ships and boats, conducting exploration, trade and international commerce, and pursuing fish for essential protein and profit. For centuries, these ship-based pursuits operated at scales and intensities that avoided much conflict and that the ocean could absorb without apparent impact. Offshore oil and gas exploration and production joined the ocean economy in the 1960s, and recent decades have seen the intensification and global reach of industrial fisheries, rapid urbanization and development of coastal areas, technological developments that have extended our exploitive capacity, and growing coastal and maritime tourism. Today, emerging and additional ocean uses such as marine renewable energy, seabed mining, and biotechnology development are diversifying and reshaping the ocean economy. Thus, the world's oceans are no longer free, unlimited, and unaffected by human

activities and pursuits. At the same time, existing ocean governance mechanisms, which have traditionally been largely sector based, are not keeping up with the growing challenges (Cicin-Sain et al. 2015; The Economist 2015). We must now consider the diverse and growing ocean economy, our accounting of its monetary value, and the inherent value of the goods and services that the ocean provides, the deteriorating state of our ocean natural capital, and how our ocean governance systems are adapting—perhaps not quickly enough—to this new reality.

11.4 The Ocean Economy

The ocean has been the timeless and unlimited provider of goods and services that has allowed our modern societies to develop and flourish (WWF 2015). The ocean economy is also essential to the future welfare and prosperity of humankind. It is a key source of food, energy, minerals, health, leisure, and transport, upon which hundreds of millions of people depend. The OECD (2016) reports that by mid-century, enough food, energy, jobs, and raw materials and economic growth will be required to sustain a likely human population level of between 9 and 10 billion people. The potential of the ocean to help meet those requirements is huge, but fully harnessing it will require substantial expansion of many ocean-based economic activities.

That will, however, prove challenging because the ocean is already under significant stress from overexploitation, pollution, habitat degradation, and now climate change. There is clear evidence of rapidly degrading coastal and ocean ecosystems (Borja et al. 2016; United Nations 2016), increasing competition among traditional and emerging uses for ocean space (Jones et al. 2016), all demanding their share of what we are realizing is becoming a limited resource. Hence, realizing the full potential of the ocean will demand responsible, sustainable approaches to its economic development.

11.5 The Traditional Ocean Economy

The OECD published a seminal assessment of the ocean economy in 2030 (OECD 2016) from which much of the following detail and insights are derived. It describes the established ocean economy "as being comprised of the sum of the following economic activities: shipping, ports, shipbuilding and repair, capture fisheries, seafood processing, conventional (shallow water) offshore oil and gas exploration and production, marine manufacturing and construction, dredging, maritime and coastal tourism, marine business services, marine research and development, and education." Park and Kildow (2014) add aggregate mining (marine sand and gravel), construction (e.g., harbor development, coastal works against erosion and flooding), telecommunication cables, and defense.

The global economy, measured in terms of the ocean-based industries' contribution to economic output and employment, "is valued [conservatively and using 2010 figures] at USD 1.5 trillion in value added, or approximately 2.5% of world gross value added. The total asset base of the ocean is at least USD 24 trillion" (OECD 2016)

> If the ocean were a country, it would have the seventh largest economy in the world.—OECD (2016)

The OECD further tells us that offshore oil and gas accounted for one-third of the total value added of the ocean-based industries, followed by maritime and coastal tourism, maritime equipment, and ports. Direct full-time employment in the ocean economy amounted to around 31 million jobs in 2010. The largest employers were industrial capture fisheries with over one-third of the total and maritime and coastal tourism with almost one-quarter (OECD 2016). The OECD also projects that between 2010 and 2030 on a 'business-as-usual' scenario basis, the ocean economy could more than double its contribution to global value added, reaching over USD 3 trillion, and would employ approximately 40 million full-time jobs.

Global economic growth and increasing demand bode well for the shipping sector. Growth in the container traffic and volume is expected to triple by 2035 (UNCTAD 2016). Fisheries production worldwide is expected to expand by around a fifth over the next 10 years, although the main driver of overall production will be aquaculture (FAO 2016). And in tourism, aging populations, rising incomes, and relatively low transport costs will make coastal and ocean locations ever more attractive (OECD 2016).

11.6 Emerging Ocean Industries: The Blue Economy

Adding to the already heavy use of coastal and ocean environments is a rapidly growing suite of *emerging* ocean industries, the promising beacons in what is increasingly referred to as *the blue economy*. According to the OECD (2016), "these emerging ocean industries include: offshore aquaculture; deep- and ultra-deep water oil and gas exploration and production; renewable ocean power (wind, tidal, wave, thermal conversion, salinity gradient energy); marine and seabed mining for metals and minerals (particularly poly-metallic nodules and in seafloor massive sulphides); maritime safety and surveillance; marine biotechnology; high-tech marine products and services; cruise tourism; and ocean monitoring, control and surveillance."

Attention is being devoted to the emerging ocean-based industries in light of their high potential in terms of growth, innovation, and contribution to addressing global challenges such as food security, environment and climate change, and our transition to a more sustainable global energy system (The Economist 2015).

Science, technology, and innovation will play a significant role in realizing this potential.

11.7 Science, Technology, and Innovation

One of the most important drivers behind the development of ocean industries is science, technology, and innovation (Borja et al. 2016). New knowledge and a growing range of technologies are gradually pervading every maritime sector, where they are adopted and adapted, triggering yet further innovation (OECD 2016). Innovations in advanced materials, subsea engineering and technology (particularly energy), sensors and imaging, satellite technologies, computerization and big data analytics, autonomous systems, biotechnology and nanotechnology—every sector of the ocean economy—stand to be affected by these technological advances (OECD 2016).

These advances are allowing us to go further out and deeper into the ocean frontiers, exploring the greatly unknown high seas and deep-ocean bottom ecosystems and opening economic opportunities for (hopefully sustainable) exploitation of deep-sea oil and gas, poly-metallic minerals, biotechnology, and other goods considered essential for a growing ocean economy. Yet we know far too little about the life-sustaining and resource-providing physical-chemical-biological ocean ecosystem, particularly the deep sea that is changing before our eyes at an unprecedented rate due to human demand and pressure and diminishing in capacity to provide the goods and services we need for a growing population and more prosperous global society (United Nations 2016).

Fundamental understanding of the ocean—its properties and behaviour, its health, its role in climate change, and its influence on weather—is essential for understanding and managing ocean ecosystems (GESAMP 2015). Equally, it is a vital prerequisite for the sustainable operation of all ocean-based industries. Yet the vast majority of the ocean remains unexplored; only about 15% of the global ocean floor has been mapped in high resolution, and much of that is in the national exclusive economic zones rather than in international waters (OECD 2016). We know even less about the living marine resources of the deep and remote ocean basins. Encouragingly, two important initiatives to improve our understanding of the world ocean, its living and nonliving resources, its structure, its diversity, and its value are contributing substantially to our growing understanding and knowledge base to enable us to make more informed decisions.

The Census of Marine Life was an unprecedented 10-year (2000–2010) international scientific collaboration undertaken by some 2700 scientists from around the globe to assess and develop a baseline of the diversity, distribution, and abundance of marine life (Costello et al. 2010). The Census produced the most comprehensive global inventory of known marine life, from microbes to whales, ever compiled, establishing a baseline against which future ocean change can be measured. Census scientists discovered and formally described more than 1200 new

marine species, with another 5000 undergoing formal description. The Census also supported the development of the World Register of Marine Species that has identified roughly 250,000 marine species that are now recorded by scientists, with another three-quarter of a million species yet to be identified. Despite these impressive discoveries, the Census concluded that we have only scratched the surface of what remains to be learned about what lives and may live in the world's ocean.

Bathymetric information is used to ensure the safe passage of ships, to forecast the paths of typhoons and hurricanes and the effects of climate change, and to understand the distribution of undersea mineral resources. Unfortunately, this essential information is largely lacking. To address this significant gap in our understanding of the ocean, the Nippon Foundation and the Guiding Committee of the General Bathymetric Chart of the Oceans announced in 2016 the launch of a major project to map the topography of 100% of the world's ocean floor by 2030 (Nippon Foundation 2016). Having all of this information available in a complete map of the ocean floor will not only allow for the sustainable use of the ocean; it will also enhance human safety.

While our advances in science, technology, and innovation in recent years are impressive and our resulting knowledge, understanding, and appreciation of the ocean are vastly improved, technology is only an aid, not a replacement for good governance (Borja et al. 2016). We cannot place our hope on being saved through discovery and innovation or relieved of our present-day responsibilities to make the hard choices that are increasingly upon us in an expanding global ocean economy.

11.8 The Ocean's Natural Capital: Ecosystem Goods and Services

We have two accounting systems for the ocean. One is traditional, well established, and based on good numbers. The other is relatively new, still developing, and slow to be fully accepted and adopted. We have become reasonably good at calculating the monetary value of the ocean economy, in terms of its contribution to GDP, employment, and, indirectly, social well-being. But our accounting of the inherent values that the ocean's ecosystem goods and services—the ocean's natural capital—provide is still rudimentary, incomplete, and very conservative (Eppink et al. 2016; Yun et al. 2016). The two accounting systems are not treated equally, and we have witnessed those values that are not quantified, are not protected and sustained, mere externalities in our development of the ocean economy.

Thus, any definition of the ocean economy is incomplete unless it also encompasses nonquantifiable natural stocks and nonmarket goods and services that coastal and ocean ecosystems provide to humanity. Rigorous inclusion of the value of ecosystem assets and services in quantitative assessments is a new research field that only in recent years has begun to attract more significant interest and find its

Table 11.1 Marine and coastal ecosystem services

Ecosystem service	Definition	Marine and coastal examples
Supporting	Ecosystem functions that support and enable the maintenance and delivery of other services	Photosynthesis, nutrient cycling, soil, sediment, and sand formation
Regulating	Natural regulation of ecosystem processes and natural cycles	Water regulation, natural hazard weather regulation, carbon sequestration, shoreline stabilization
Provisioning	Raw materials, food, and energy	Raw materials (e.g., seabed deposits, such as manganese nodules, cobalt crusts and solid massive sulphides, sand, pearls, diamonds), food production (e.g., fisheries and aquaculture), energy (e.g., offshore wind, ocean energy, offshore oil, and gas), genetic resources (source of unique biological materials and processes of industrial interest)
Cultural	Benefits related with experiences of natural environments	Tourism, recreation, spiritual values, education, aesthetics

Source: Adapted from De Groot et al. (2002)

way into our overall mindset and ocean accounting system. Ecosystem services range from tangible to intangible. They are often separated into *goods* and *services* (De Groot et al. 2002). As Table 11.1 indicates, marine and coastal ecosystem services can be divided into four categories: supporting, regulating, provisioning, and cultural. In addition, there are nonuse values, called "option" value—the value of knowing that we are maintaining the potential to provide ecosystem services in the future—and "existence" value, which reflects the value of the ecosystem services due to their mere existence, independently of anyone's current or future uses of these services; wilderness areas fit this category. How do we include these values in our economic accounting of the ocean economy?

We value the provisioning services that the ocean provides—raw materials (e.g., seabed aggregate and mineral deposits), food production (fisheries, aquaculture), energy (offshore wind, ocean energy, oil, and gas), and genetic resources—but undervalue (and now degrade) the other services that the ocean provides—the supporting services (photosynthesis, nutrient cycling, sand formation), regulating services (carbon sequestration, shoreline stabilization), and cultural services (tourism, recreation, aesthetics). Softer, nonuse values, such as option and existence values, are considered even less.

Estimates of the size of the benefits of marine ecosystem services suggest that they are considerable. Costanza et al. (2014) and Pendleton et al. (2016) estimate the value of ecosystem services provided by coral reefs and tidal marshes and mangroves alone at around $352,000/ha/year and $194,000/ha/year, respectively. The Global Ocean Commission estimates the global economic value from seafloor carbon sequestration to range between USD 74 billion and USD 222 billion per year

(GOC 2016). Looking to the future, valuation of ecosystem goods and services must be considered a cornerstone in any effective strategy for managing the balance between human activity and the health of the ocean, the essence of our current sustainability agenda, and a key challenge in ocean governance.

11.9 Drivers and Pressures

There are several important demographic, economic, social, environmental, technological, and governance trends, as well as major uncertainties and risks, that are influencing world developments and, by extension, that of the ocean economy and marine ecosystem health. The OECD (2016) reports that a wide range of global trends and macrofactors are set to influence the longer-term development of the ocean economy. We can expect that their combined effect will cut both ways. While on the one hand many of them hold out the promise of expanding economic, social, and health-related opportunities through ocean use, on the other they point to a further increase in the pressures already weighing heavily on the ocean's capacity and health.

At the heart of expansion in the ocean economy are population growth, urbanization, and migration to and development of coastal areas, as well as rising incomes and the growing middle classes with higher-end dietary choices and consumer appetites. Aging populations will also continue to favor coastal areas for vacation and/or retirement homes and motivate the medical and pharmaceutical communities to accelerate marine biotechnological research into new drugs and treatments. The OECD predicts that as consumers, the growing, more prosperous, and aging populations will stimulate seaborne freight and passenger travel, shipbuilding, and marine equipment manufacturing, as well as exploration for offshore oil and gas reserves. Geopolitically, the shift in the center of gravity of economic activity toward emerging and developing countries is projected to raise considerably the share of South–South trade in the next two decades, resulting in significant increases in shipping in those parts of the world (UNCTAD 2016).

By 2050, up to 2 billion people will join the 7.4 billion of us already on the planet (United Nations 2016). This increase will take place almost entirely in developing countries and some emerging economies. It is reported that the size of the aggregate population in the developed world is likely to remain largely unchanged, but it will be increasingly older. Regardless, all of these additional people, as well as those of us already here, need to be fed, accommodated, employed, serviced, and protected.

Since the turn of the twentieth century, there has been a growing trend of migration toward coastal areas and, more recently, urbanization. The UN Atlas (2010) records that, today, about one in every three people on the planet lives within 100 km of the coast and 44% of the world's population (more people than inhabited the entire globe in 1950) currently live within 150 km of the coast. Overall, average population density in coastal zones is three times higher than the world average (Crawford Heitzmann 2006). In deltas and floodplains—those areas most exposed

to sea-level rise, more intense storms, and flood risk—the population is expected to increase rapidly—by 50% between 2000 and 2030 (Neumann et al. 2015).

More than half of the world's population is now living in urban areas. By the middle of the twenty-first century, the urban population will have doubled to almost 6.5 billion, 66% of the world population. Almost all urban growth will occur in cities of the developing regions of the world, with nearly 90% occurring in Asia and Africa. The majority of the world's megacities[1] are situated on the coasts. Increasing concentrations of populations in proximity of the sea are set to place mounting strain on coastal ecosystems in particular.

11.10 Degradation of Ocean Natural Capital

We are pursuing a blue economy in an ocean environment that has diminished capacity to provide for the heavy and increasing demand. And now, we are planning to take even more from an already stressed, depleted, and changing resource. The Global Ocean Commission (GOC 2016) identified several interconnected drivers of ocean decline, all of them related to economic development. These include the rising demand for fish, minerals, and oil and gas and the technological advances that support their exploitation; the decline in wild fish stocks due to overexploitation, illegal fishing, and habitat destruction; pollution by sewage, fertilizers, and plastic waste; and climate change with resultant biodiversity and habitat loss. The IUCN (2016) lists over 550 species of fishes and invertebrates as threatened.

Climate change is increasingly seen as the ocean's greatest overall threat (IPCC 2014) and a significant addition to all the other sources of stress on the ocean. The largest increase in the storage of heat and of anthropogenic carbon emissions in the climate system over recent decades has been the ocean. Ocean thermal expansion and accelerating glacier melting have been the main culprits in the rise in mean sea levels in the twentieth century. Overall, the ocean is now warming, rising, acidifying, deoxygenating, and stratifying (Laffoley and Baxtor 2016). Further, ocean currents are shifting, resulting in biodiversity and habitat loss. Doney et al. (2012) reports that the impacts of climate change on marine biodiversity have already resulted in either a loss or degradation of 50% of salt marshes, 35% of the mangroves, 30% of coral reefs, and 20% of seagrasses worldwide. These trends are expected to continue (United Nations 2016).

We are also witnessing changes in fish stock composition and migration patterns (FAO 2016) and higher frequency of severe ocean weather events. The IPCC (2014) highlights that damage to harbors and ports due to sea-level rise could lead to overall economic losses of USD 111.6 billion by 2050 and USD 367.2 billion by the end of the century. Rising sea levels present a critical challenge,

[1]Megacities are defined as very large cities, typically those with a population of over 10 million people.

particularly in coastal areas that are inhabited by a large and growing proportion of the world's population and maritime infrastructure. The projected sea-level rise could inundate low-lying areas, submerge coastal marshes and wetlands, erode beaches, exacerbate flooding, and increase the salinity of rivers, bays, and aquifers.

11.11 Ocean Governance

The oceans (Atlantic, Pacific, Indian, etc.), the seven seas (Mediterranean, Yellow, Caribbean, etc.), the EEZs, the regional seas, the LMEs, the harbors and ports, the industrial estates—we divide the ocean into comprehensible and manageable pieces, perhaps helping us to grasp and understand the immense vastness of the ocean and to put in place legal frameworks that ensure rights, minimize conflict, and provide predictable regulatory and policy regimes. Our legal system draws nice straight lines in the ocean, but nature draws its own. The former, born out of UNCLOS, sets distance-specific lines from the coast and defines national rights and obligations for what has become national jurisdiction. However, legal clarity about rights and responsibilities in the ocean beyond national jurisdiction is still evolving. Yet natural marine processes, species, and ecosystems are not confined to maritime legal boundaries. The ocean is fluid and interconnected and its ecosystem boundaries are fuzzy, and changing. Many marine species live transboundary lives, ranging widely throughout and beyond national jurisdictions.

Ecosystem boundaries may be defined by the enclosing land masses of various seas (e.g., Mediterranean, Red, Baltic) or by coherent large ocean current systems and bathymetric features (e.g., Benguela Current and Costa Rica Dome). The implication of this is that what happens in one place may affect what happens elsewhere as pollutants and alien species are carried by ocean currents or vessels around the globe. So international shipping must simultaneously contend with both the legal/jurisdictional and the physical/ecological realities of the ocean and operate within a broader ocean governance framework.

What is ocean governance? Chang (2012a, b) defines it as "the relationship between a society and its government. The concept of governance, therefore, encompasses not only law and the public authorities, but also relates to government policies and its implementation … it comprises both a series of technical and generally well defined measures governing physical interactions between human activities and marine environment." Van Tatenhove (2013) adds that ocean governance includes "… the rules of collective decision-making where there is a plurality of actors and organizations and where no formal control system can dictate the terms of the relationship between them. The concept encompasses a set of official rules involving formal and informal institutions and a negotiation process between them, which function at different levels to ensure effective integrated management."

Beyond the conundrum of law vs. nature in ocean governance (i.e., straight legal vs. fuzzy ecosystem boundaries), we have managed the ocean and its resources sector by sector and use by use. While UNCLOS addresses virtually all ocean issues and established international norms for future ocean governance (Cicin-Sain and Knecht 1998), it generally provided little guidance to nations on how to govern ocean resources in an integrated way, how to deal with the effects of one use on the other uses (that is to say, cumulative effects), or how to bring ocean and coastal management together.

11.12 Sector-Based vs. Ecosystem-Based/Integrated Ocean Governance

Private utilization of the ocean and its resources is usually dependent on licenses or concessions from public authorities. National authorities have the power to allow private activities in areas under the jurisdiction of the coastal state, and the International Seabed Authority (ISA) can license activities in the area. But in international waters, private activities have much fewer controls.

A plethora of different bureaucracies are usually in charge of handling the permitting for different uses and users, but they tend not to cooperate well, if at all (Cicin-Sain et al. 2015). Sectoral policies tend to be well established in government, have powerful traditional modes of governance, as well as deeply entrenched constituencies and interest groups that strongly resist what they perceive will be a loss of power and unimpeded authority to represent and advance their sector.

But as emerging ocean industries have grown in importance and have spread across the globe, the challenge has become how to integrate them into existing, traditional sectoral, regulatory structures. There is no overall agency for ocean issues that can bring together the diverse actors from many entrenched sectoral interests, to work together for a shared resource that one party cannot achieve alone. Many countries find it difficult to give sufficient power, authority, and financial resources to interagency mechanisms, such as a national ocean council, because of political fear on the part of sectoral interests that their situation and predictable management structure might undergo change (UNEP 2016). Protecting the status quo is dominant.

Yet many UN agencies have made significant progress in reducing the impact of their sector on the marine environment and taken positive regulatory steps to make their contribution to ocean governance. For shipping, as the ocean environment becomes more complex, the international regulatory system under the leadership of IMO also becomes more challenging. It continually has to adjust to changing patterns of sea use, refocusing on existing regulatory gaps, responding to special demands of certain ship types, and taking account of new technologies and new environmental risks (IMO 2015).

The IMO's role in ocean governance began in its early days with the development of marine environmental protection conventions. Today, 21 of the 53 IMO instruments focus directly or indirectly on the marine environment. These treaties relate to virtually all known and potentially harmful impacts of ships on the marine environment, from chronic and acute oil spills, ship emissions, ballast water, ship strikes on whales, and more. IMO's contribution to ocean governance is reflected in the national and regional and multilateral nature of its treaties, such as MARPOL, which provides for Special Areas and Particularly Sensitive Sea Areas (PSSAs) protection, which is often of a regional or global nature. Today, 24 Special Areas and 15 PSSA designations exist to add additional mandatory protective measures to these globally recognized marine areas (IMO 2015). IMO and UNEP collaborate on the further development of marine protection instruments under the Regional Seas Programme, which encompasses most of the productive marine ecosystems of the world (UNEP 2016).

Another central UN agency, FAO, has progressively focused on strengthening measures to address overfishing and, more particularly, IUU (illegal, unreported, and unregulated) fishing on the high seas and in areas beyond national jurisdiction that often represent critically important deep-sea seamounts and coral reefs (FAO 2016). These FAO measures include the 1993 Code of Conduct for Responsible Fisheries, the precautionary approach codified by the 1995 UNFA, and the Responsible Fishery and Ecosystem Approach to Fisheries. These measures have been introduced into the fisheries management planning process of many major fishing nations (FAO 2016). The most recent initiative to reduce IUU fishing is the Port State Measures to Prevent, Deter and Eliminate IUU Fishing, which came into force in 2016. The latter Agreement also utilizes, in partnership with IMO, the application of the IMO vessel numbering scheme to all fishing vessels over 100 GT, which will improve the identification and implementation of enforcement measures against many IUU fishing vessels.

11.13 National and Regional Ocean Governance

Following the adoption (1982) and coming into force (1994) of UNCLOS, which provided the legal framework for the conservation and sustainable use of the oceans and their resources, states began to develop the enabling environment for its implementation by establishing maritime boundaries and national ocean policies (Cicin-Sain et al. 2015). These policies served the purpose of codifying the countries' main responses to the requirements of UNCLOS. During the same time period, most coastal nations continued to develop a variety of sectoral policies to manage different uses of the ocean (e.g., shipping, fishing, and oil and gas development), albeit separately. This may have been sufficient in times of resource abundance and few conflicts among ocean uses, but this time has long passed. Countries are now facing the important challenges and opportunities from new and emerging uses of offshore waters (e.g., offshore aquaculture, wind farming), which

necessitates the development of more elaborate and cross-cutting frameworks for national ocean policies.

> There is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its success, than to take the lead in the introduction of a new order of things.—Niccolo Machiavelli.

Integrated ocean governance is exactly about introducing a new order of things. It is now clear that sectoral approaches to date have not been able to manage sustainably or prevent the negative trends in marine ecosystem health that we are witnessing (Cicin-Sain et al. 2015). In response to the growing pressures on ocean space and resources, recent years have seen a significant increase in the number of countries and regions putting into place strategic policy frameworks for better ocean management within their EEZs. Over the past two decades, a number of coastal nations have undertaken concerted efforts to articulate and implement an integrated vision for the governance of the entire ocean areas under their jurisdiction. There are at least 23 countries and four regions that have or are taking concrete steps toward cross-cutting and integrated national and regional ocean policies (Cicin-Sain et al. 2015).

There is now broad consensus, in both principle and practice, that we can no longer manage the ocean as we did traditionally—sector by sector, use by use (UNEP 2016). And, given this long history of sector-based approaches, current governance structures—which should be integrated in content and precautionary and anticipatory in ambit—are usually not well suited to handle the consultation and coordination tasks effectively across sectors. Thus, integrated ocean policy is established for the purpose of providing a coordinated approach to the management of the whole range of marine uses and activities across all maritime sectors for the protection of the social, economic, and environmental values within a nation's jurisdiction. Cicin-Sain et al. (2015) noted that integrated ocean policy can take the form of comprehensive legislation, a range of policy initiatives that are marine-related and legislatively based, or an executive directive for the adoption of an ocean or marine strategy. It is important to emphasize that integrated ocean policy does not replace sectoral policies related to the ocean but rather seeks to harmonize existing laws and policies, to reconcile conflicts, and to minimize duplication, inconsistencies, and overlaps in existing legislation or policy directives.

UNEP (2016) and Cicin-Sain et al. (2015) report that the objectives of national ocean policies commonly include achieving sustainable development (addressing all uses of the ocean); protecting ocean ecosystems, biodiversity, and vulnerable areas; promoting social and economic advancement; and ensuring maritime security. Some countries include protecting sovereign rights and ensuring freedom of the seas, restoring ocean health, promoting scientific knowledge of the ocean, and integrating, coordinating, or harmonizing existing sectoral arrangements for ocean and coastal governance. Overall, these policies recognize the interrelationship among marine ecosystems and multiple uses of the ocean and coasts. They do not aim to replace sectoral policies but strive to harmonize them and, in many cases,

also involve recommendations on improving particular sectoral policies. They recognize the common property nature of marine areas, responsibility to future generations, and duties of accountability and transparency. The evolution of national ocean policies often involves an initial foray into integrated coastal management (ICM)[2] and the eventual realization of a need to expand from the coast out, to include the entire EEZ, and to address multiple-use conflicts and issues through integrated management frameworks (Cicin-Sain et al. 2015; UNEP 2016). The member states of the UN system have responded over the decades to this evolution by introducing and supporting various regional approaches to ocean governance. Regional entities have a useful role to play in assisting states both in developing national ocean policies for their ocean zones as well as in articulating common approaches to the governance of particular ocean regions shared by various nations. Significant work to bring nations together to address common transboundary regional issues related to the coasts and ocean is also being carried out in many regions, through the Regional Seas Programme of UNEP,[3] the Large Marine Ecosystems (LME) projects or programmes led by the UNDP/GEF[4] and Regional Fisheries Management Bodies/Organizations led by FAO[5] (UNEP 2016).

The Global Ocean Commission (GOC 2016) recently concluded that many obstacles stand in the way of more effective integrated ocean governance. They add to the growing consensus that ocean governance is plagued by a patchwork of sectorally focused agencies and institutions, hampered by weak enforcement and compliance. The situation is exacerbated by a lack of legal clarity about economic activities in the ocean beyond national jurisdiction, as well as the potential of increased competition between states for access to the resources in the sea. There is also a lack of an equity framework for exploitation of genetic resources, which is the current focus of a UN initiative to address through a new convention (Long and Chaves 2015).

Despite the clear need for more integrated ocean management to address the interconnected nature of marine ecosystems, growing ocean economic activities, mounting pressures on ocean resources, and increasingly crowded ocean space,

[2]Integrated Coastal Management (ICM) is described as a dynamic process in which a coordinated strategy is developed and implemented for the allocation of environmental, socio-cultural, and institutional resources to achieve the conservation and sustainable use of the coastal zone.

[3]The Regional Seas Programme is an international collaborative approach launched in 1974 by UNEP to address the degradation of the seas by neighbouring countries in a collaboration to support the achievement of international environmental and development targets to protect the marine environment and its resources.

[4]The UNDP/GEF supported Large Marine Ecosystem (LME) programme is an approach to implementing ecosystem approaches to assessing, managing, recovering and sustaining resources and environments in relatively large areas of ocean space of 200,000 km^2 or greater, adjacent to the continents in coastal waters where primary productivity is generally higher than in open ocean waters. Today, there are 64 LMEs defined globally.

[5]Regional Fisheries Management Organizations are international bodies established by international agreements or treaties and made up of countries that share a practical and/or financial interest in managing and conserving fish stocks in a particular ocean region.

Cicin-Sain et al. (2015) sadly conclude that ocean governance is expected to continue to evolve along mainly sectoral lines rather than through comprehensive approaches. The legacy of largely sectoral approaches to ocean governance, at the expense of more holistic solutions, threatens to remain a serious impediment to efforts at more integrated ocean governance and management. The International Law Commission too observed over a decade ago (UN ILC 2006) an increased fragmentation in international law and governance. They described this fragmentation as "a process of diversification and expansion, whereby it has developed from a 'tool dedicated to the regulation of formal diplomacy' to one that is expected to 'deal with the most varied kinds of international activity, from trade to environmental protection, from human rights to scientific and technological cooperation."

11.14 Sustainable Oceans

There have been several significant international events over the past several decades that have focused on ocean affairs, provided high-level political support for and adopted international goals and targets on the ocean. The most recent highlights include the adoption of the United Nations 2030 Agenda for Sustainable Development (2016–2030) and its 17 Sustainable Development Goals, particularly Goal 14, which is explicitly focused on oceans; the Paris Agreement on Climate Change, now ratified, which commits nations to move toward a low-carbon economy; and agreement by member states at the UN to develop a legally binding instrument to conserve and sustainably use marine biological diversity of areas beyond their national borders (Long and Chaves 2015).

These recent successes build on a 45-year history of sustainable development summits (e.g., the 1992 UNCED, the 2002 World Summit on Sustainable Development (WSSD), and the 2012 UNCSD, also known as Rio + 20), which provided the opportunity for the global community to set ambitious and universal goals, to review past governance and management performance, and to fast-track management and conservation efforts in a more targeted way.

After several decades of concerted and cooperative effort by the international community, much knowledge has been generated, various issues have been addressed, promising governance and management frameworks and paradigms have been put forward, and a plethora of best practices have been identified and disseminated. Yet it is acknowledged that the pace at which governance and management of the ocean is proceeding does not match the pace of degradation of the marine environment and its resources (United Nations 2016).

11.15 Conclusion

What does this all mean for shipping operations? First is the acknowledgement that ships no longer rule the waves alone. Over the past very few decades, new and expanded ocean industries and activities have entered the ocean realm, and now a blue economy drive in most coastal nations is looking to introduce additional ocean uses that will add to the burden on ocean health and the challenge of increasingly complicated ocean governance. Many nations are already reprioritizing their ocean policies and strategies, giving increasing emphasis to emerging ocean uses that can add more to the economic output of the ocean and contribute more strongly to the achievement of urgent societal benefits and growing needs. Shipping will certainly remain a prominent component of the ocean economy, but it must continue to grow in and adapt to a more crowded and competitive ocean space, a worsening ocean environment with greatly diminished capacity to support multiple and growing social and economic needs, and a more integrated ocean governance regime with all the legal, jurisdictional, social, and ecological challenges this implies. The shipping sector needs to think beyond its sectoral focus and embrace its place in an evolving ocean space and cooperative ocean governance regime.

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