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## **Abstract**

The shipping industry is one of the safest and most connected industries in the world. It has strict hierarchies based on the ship's master's authority. However, the effectiveness of rigid hierarchies has been called into questions by the growing complexity of operations, digital change and a more diverse workforce. This thesis analyzes the possibility of team based organizational models as an alternative or supplement to traditional shipping systems. It emphasizes the unique attributes of team-based organizations , their operational, safety and employee welfare benefits, the challenges of their adoption in hierarchical maritime settings and the influence of multiculturalism and globalization on their success

The study employs a qualitative synthesis of organizational theory , resilience engineering and highly reliability organization (HRO) principles, alongside an examination of maritime actual case studies , safety investigations and contemporary analyses of digital and cultural dynamics in shipping.

The findings indicate that team -based organizations differ from hierarchies by emphasizing decentralized authority, collective decision making and mutual accountability. Some of the benefits are better crisis adaptation , safer outcomes through open communication and cross monitoring and more participation and well-being for seafarers. Still, key challenges remain, including the captain's established power under international law, conservative corporate culture, the risk of information overload, cybersecurity threats, and discrepancies in digital connection. Multiculturalism is considered to be both a benefit and a challenge. Diversity in crews can offer unique viewpoints ,however communication gaps and different cultural norms can create challenges regarding coordination and decision making process as well.

The thesis argues that hybrid models(those that preserve hierarchical clarity while encouraging teamwork) offer the most practical solutions. Theoretically , the study broadens the use of resilience and High Reliability Organization (HRO)principles in maritime contexts. Practically it provides suggestions to shipping companies aiming to improve safety, their operations and the seafarers' welfare in a constantly increasing globalized and and tech- driven sector.

**Keywords:** team-based organizations, shipping, hierarchy, high reliability organizations, multicultural crew.

## **Methodology**

This research adopts a qualitative approach to examine the potential and challenges of implementing team-based organizational models in shipping companies. The study combines an extensive literature review, theoretical synthesis, and case-based analysis to provide a comprehensive understanding of the topic. It draws on frameworks such as classical organizational theory, contingency theory, sociotechnical systems, resilience engineering, and High Reliability Organization (HRO) principles. Data were sourced from peer-reviewed journals, academic books, IMO guidelines, industry reports, and case studies illustrating hierarchical and team-based structures. The analysis involved comparing organizational models, integrating theoretical insights with practical examples, and identifying key advantages, limitations, and contextual factors influencing adoption.

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# 1.Introduction

The maritime industry, which plays a vital role in global trade and worldwide connectivity, is constantly adapting to economic fluctuations, technological improvements and changing workforce demands. As international trade networks are becoming more connected, the performance of both vessels and shore based teams becomes increasingly crucial to a shipping company's competitive advantage. As a result, many businesses are using management and operational models that emphasize adaptability, efficiency and sustainability. One such approach is the adoption of Team-based organizational structures.

Team-based organizations prioritize collaboration among personnel grouped around projects, functions and operational goals unlike the traditional hierarchies lines, where decisions are centralized and are made often from top to down (Cohen & Bailey, 1997). This structural approach is different from the traditional pyramid structure, where decisions are usually made at the top and flow down. A team based approach spreads out power and responsibility more evenly, letting people from other departments interact with each other in more dynamic ways and encourages more direct communication and response.

However the marine industry is a unique and very hard place to set up teams-based structures. Shipping companies work in many different places, time zones and legal systems. Their headquarters can be on land or on ships. The industry's diverse and multilingual workforce also makes this more complicated, which can make working together even harder or easier. Even though crew members, superintendents technical managements and operations teams are all connected, they often work alone. So putting in place cross-functional, team-oriented systems could make not only operations more efficiently, but also communication between people, safety standards and the organization's ability to overcome challenges.

Several factors are driving the shift toward team based work. First, the fact that logistics and compliance are getting more complicated means that problems need to be solved together. Teams arrangements make it easier to deal with operational problems like port congestion, vessel repairs and last minutes allocations to rules. Second, globalization and the use of technology have made competition fiercer, so being innovative and quick to respond are important ways of measuring performance. Team-based settings encourages creativity by bringing together people with different points of view and motivates people to think outside

of the box(Delarue et al.,2008). Third, younger professionals entering the industry , often expect their companies to be less complicated , provide them more freedom and make them feel like they are all working towards the same goal. These changes in culture and are more likely to show up in employee expectations in team-based settings(Boardmix, 2023).

Despite the advantages , switching to a team-based model in marine situations , there are also some problems.In organisations with deeply rooted command chains , people may not approve possible changes ,especially if roles and responsibilities have been clearly defined for a long time and command or controlled structures are common.Also using team-based methods means spending a lot of funds on training leaders, being aware of different cultures and learning how to handle disagreements.Without these enabling mechanisms, the potential for enhanced collaboration and innovation may result into ineffectiveness.

This thesis aims to critically analyze the implementation of team-based organizational structures within the shipping industry, focusing on both theoretical and practical aspects. It examines how such models affect operational performance, communication dynamics , safety culture and adaptability in maritime contexts.It analyzes contemporary literature on organizational theory and maritime management, evaluates industry case studies and employs empirical examples to elucidate the benefits and drawbacks of team-based approached in shipping.

In particular , the following questions will be addressed.

-What are the most important parts of team-based organizations and how do they differ from the usual hierarchies in shipping companies ?

-What benefits can team-based organizations provide in terms of shipping operations, safety, and employee management ?

- What problems or limitations come up when using team-based solutions in a marine environment that is usually hierarchical ?

-How do multicultural dynamics and global operations influence the effectiveness of team-based work in the shipping industry ?

Qualitative case studies,literature review and theoretical analysis are combined in this study.The tehsis is structured to provide a comprehensive understanding of the topic ,commencing with a literature review on team-based organizations and advancing to an analysis of the theoretical foundations of such frameworks.The pros and cons of using team-

based methods in shipping are explained in the next sections with real examples to back them up. The study concludes with a synthesis of the findings and recommendations for additional research and practical implementations.

Ultimately this dissertation contributes to a broader discussion on the modernization of maritime organizational practices by offering a realistic evaluation of how shipping enterprises could leverage collaboration as a competitive advantage in an increasingly complex global landscape.

## **2. Theoretical Framework**

The implementation of team-based structures in maritime firms requires a solid grasp of organizational theory. Several frameworks help explain why teams work, where they struggle, and how they should be set up. This chapter investigates significant ideas, ranging from classical organizational models to current paradigms, that influence the use of team-based organizations in the marine setting.

### **2.1 Classical Organizational Theory and its Development**

Classical organizational theory, linked to Max Weber's work (1947), treats bureaucracy as the most logical and efficient kind of organization. Many shipping organizations still follow these ideas, which include strong hierarchies, clearly defined jobs, centralized authority, and rule-based processes. While such systems are good at maintaining control and predictability, they can be slow to change and may hold back innovation in fast-moving global markets.

Team-based models break from this pattern. Rather of depending on permanent hierarchies, they promote flexibility, horizontal communication, and forming teams as need change. Burns and Stalker (1961) argue that organizations should adopt more organic forms in dynamic settings, rather than mechanical structures that are appropriate for stable circumstances. This fits shipping, which faces constant uncertainty, ranging from weather delays to geopolitical crises.

## **2.2 Contingency Theory**

Contingency theory, as stated by Lawrence and Lorsch (1967), holds that the most successful organizational structure is determined by the unique environment in which a firm works. There is no single 'best' structure. Contingency theory suggests that firms with high uncertainty i.e., international logistics, environmental rules, and cybersecurity— benefit from decentralized, flexible setups like team-based models such as team-based models. Teams provide quick information interchange and decision-making close to where the work happens, which is essential for handling varied and rapidly changing environments at sea and ashore.

## **2.3 System Theory**

Systems theory is a frequently used paradigm for understanding team-based activities. Systems theory (Bertalanffy 1968), sees organizations as open systems made up of connected parts that work together to accomplish shared goals. In this approach, a team is seen as a subsystem that interacts with other subsystems and the external environment.

Shipping firms are good candidates for systems-level analysis. A vessel is a highly integrated system that includes engineering, navigation, hospitality (on cruise ships), and safety, all of which must function together. Team-based approaches facilitate this by encouraging holistic thinking and breaking down silos. This technique also allows for feedback loops, which improves organizational learning and adaptability (Senge, 1990)

## **2.4 Sociotechnical Systems Theory (STS)**

Sociotechnical Systems theory provides a framework for comprehending team-oriented organizations within technological contexts. Trist and Bamforth (1951) create STS while studying coal mining operations. They show that the best results come when the social and technical systems are built at the same time.

In shipping it is very important for operations to work well that crew behavior and technological systems (like ECIDS-navigation, engine room automation and cargo monitoring) work together. STS encourages work designs that let team members be independent, work together and help each other. Bridge Resource Management (BRM) is

based on this idea. Crew members work together to handle navigation duties using both technology and their own judgement(IMO,2010).

## **2.5 Human Relationships and Behavioral Theories**

The Human Relations Movement, which began in the twentieth century with the Hawthorne Studies (Mayo, 1933), focused emphasis on the social dynamics of labor. According to these research, they pointed that people perform better when they feel valued and involved. This supports current team-based methods that prioritize participation, empowerment, and interpersonal interactions.

These concepts may be seen in attempts to enhance onboard welfare, promote diversity and inclusion, and introduce peer-support systems on lengthy trips. Behavioral theorists such as McGregor (1960) differentiated between authoritarian and participative approaches. Team-based approaches fits Theory Y which favors trust, delegation, and self-motivation.

## **2.6 Organizational Learning and Knowledge Management.**

Team-based organizations promote organizational learning, a notion explored extensively by Argyris and Schön (1978). According to their idea of single-loop and double-loop learning, teams enable both by creating space for discussion and testing ideas.

Nonaka and Takeuchi (1995) developed the SECI model (Socialization, Externalization, Combination, and Internalization) that explains how knowledge is generated and exchanged in companies. Shipping businesses that use cross-functional teams, such as safety investigation boards or project management units, explains how knowledge is created and shared. The information acquired from an event is shared with team members, recorded, merged with existing data, and turned into updated safety procedures.

## **2.7 Leadership and Team Effectiveness Theories**

Leadership plays a critical role in the development of team-based businesses. Tuckman's (1965) model of group development (forming,storming,norming and

performing) is still useful in understanding how teams improve over time. Good leadership guides teams through these steps.

Captains and chief engineers often hold leadership positions in the marine industry, although in team-based organization leadership is distributed. Transformational leadership, which emphasize a clear vision, inspiring others and offering individual support (Bass, 1985), plays a significant role. Shipping companies that adopt transformational leadership styles often see improved teamwork ,higher job satisfaction among employees and better safety results (Hetherington, Flin & Mearns 2006).

## **2.8 Cross-Cultural Management Theory**

Given that the majority of seafarers come from different countries , understanding cross-cultural management is crucial. Hofstede's(2001) cultural dimensions theory and Trompenaars & Hampden-Turner's(1998) model of national cultures help explain how cultural differences form the way teams interact.

Shipping teams often face issues related to communication styles, power distance expectations and handling disagreements. By using these models, companies are able to create guidelines, training programs and conflict resolution strategies that fit to multicultural teams.

## **2.9 Psychological Safety and Team Climate.**

Psychological safety, defined as a common view that a team is safe to speak up,take risks and express themselves without embarrassment or fear of punishment(Edmondson, 1999).It has become a main factor in order to ensure strong team performance.Without it, individuals are unlikely to communicate their concerns and new ideas or even confess mistakes which are vital in high-risk contexts such as shipping.

Research on high-reliability companies (Weick and Sutcliffe, 2001)underscores the necessity of transparent communication , intentional decision making and resilience – attributed that flourish in psychological secure teams.Safety briefings, open conversations

after tasks and encouraging people to report about possible mistakes without fear of being punished, create a positive team environment on board.

## **2.10 Institutional Theories and Organizational Legitimacy**

Finally, institutional theory investigates how the rules, norms and expectations of the larger institutional environment affect the way organizations are set up (DiMaggio and Powell 1993). Compliance with international rules (such as SOLAS, ISM Code, and STCW) and industry standards guides how shipping teams are formed, trained, and assessed.

Shipping businesses that use team-based structures may earn legitimacy and stakeholder confidence, especially if the structures are linked to improved safety, environmental performance, or crew welfare. Institutional forces may also foster isomorphism, in which corporations adopt team arrangements to remain competitive or satisfy authorities.

## **2.11 High-Reliability Organization (HRO) Theory.**

High-Reliability Organizations (HROs) work under high stakes where failure has serious results, yet they manage to execute safely and effectively. Weick and Sutcliffe (2001) describe five basic characteristics of HROs as : a concern with failure, a tendency to oversimplify, sensitivity to operations, a commitment to resilience, and respect to knowledge. These characteristics are strongly related to the ideas of team-based organizations in shipping.

Safety is a top priority in maritime operations, especially on vessels such as oil tankers, LNG carriers, and passenger ships. The deployment of team-based procedures, including as frequent debriefings, incident simulations, and collaborative safety audits, is consistent with the HRO strategy. A core element of team-based structures is respecting and recognizing operational expertise – such as allowing the crew who have the most relevant information and insight on a situation to make choices regardless of their rank.

## **2.12 Resilience Engineering & Adaptive Systems**

The area of resilience engineering is closely related to HRO theory since it focuses on how business can adapt to shocks and also how they recover from them. According to Hollnagel, Woods, & Leveson (2006) resilience entails predicting, monitoring, reacting and

learning as well as absorbing shocks. Teams are the foundation of resilient operations, particularly when they are given the free will to adjust independently within established boundaries. For shipping businesses this might include developing team-based emergency response strategies that enable shore and abroad individuals to collaborate swiftly during disasters. Team-based structures improve organizational resilience and decrease systemic risks by promoting a flexible and learning culture.

### **2.13 Complexity Theory and Nonlinear Dynamics.**

Shipping firms work in very complex settings shaped by geopolitics, climate change, digital technology and market fluctuations. According to complexity theory, organizations are dynamic and nonlinear systems with emergent traits. In this situation, inflexible command structures may become frangible, while team-based organizations have the adaptability needed to prosper in the face of complexity.

Teams serve as localized decision making centers, able to adapt to changes in real time rather than waiting for directions from central authorities. This flexibility allows faster reactions to disturbances such as port delays, cyber attacks, and unexpected crew illnesses. Furthermore, team diversity improves the system's ability to lead to more creative solutions when new problems arise..

### **2.14 Distributed cognition and shared mental models.**

A large amount of research in cognitive science supports the function of teams in handling information complexity. Hutchins (1995) shows that cognition can be spread across people and tools. Navigation and safety roles in marine operations are shared by human actors (captains, officers, and engineers) and technical instruments (radars, ECDIS, engine monitoring systems).

Team-based businesses succeed at developing shared mental models—a common understanding of roles, objectives, and circumstances. This alignment enhances coordination, decreases mistakes, and enables faster reaction. To guarantee safety during a docking maneuver, the bridge crew must have a shared knowledge of the vessel's movement, the pilot's orders, and the environmental circumstances.

## **2.15 Emotional Intelligence and Social Capital for Teams**

Emotional intelligence (EI) and social capital development both have an impact on team performance. Goleman (1995) defines emotional intelligence (EI) as the capacity to manage, notice, comprehend and utilize emotions positively. High EI teams are better at conflict resolution, empathy and cooperation. In the maritime business, where crew members live and work together for long periods of time, emotional intelligence may have a substantial influence on morale, mental health and team cohesiveness.

Nahapiet and Ghoshal (1998) define social capital as the networks, rules and trust that help people cooperate and coordinate. When teams form strong interpersonal relationships and trust, they become more resilient, inventive and adept at information sharing. This is especially crucial in multicultural marine crews where misunderstandings may occur without a solid relationship base.

## **2.16 Agile Organization Theory**

Agile philosophy which originated in software development but is now being applied to a greater range of organizational situations, advocates ideas such as repetitive progress, customer participation and adaptability (Beck et al. 2001). Agile approaches focus on teams that are self-organized and adjust to their processes regularly. Shipping businesses that follow agile concepts often form cross-functional teams to tackle issues like as fleet scheduling, regulatory compliance, and IT system development. Agile boards, stand-up meetings, and sprint reviews are tailored to match marine deadlines. While entirely agile transformation may be uncommon in conventional ship management organizations, hybrid models that include agile teams for innovation initiatives are becoming more frequent.

## **2.17 Strategic HR Management (SHRM)**

Human resource practices need to be aligned closely with organizational strategy in team-based enterprises. Strategic Human Resource Management (SHRM), as described by Wright and McMahan (1992), stresses the integration of HR strategy with long-term business objectives. In the context of team-based models, HR is critical in recruiting for collaborating fit, implementing incentive systems that reward team results and developing leadership pipelines.

Maritime HR departments that apply SHRM principles engage in team-building seminars, psychometric tests and leadership development. They also recognize the values of crew pairings and rotation plans in maintaining high-functioning aboard teams over time.

## **2.18 Tech Integration and Digital Teamwork**

The increasing importance of digital technology in shipping, from predictive maintenance to autonomous systems, needs new types of collaboration. Virtual teams collaborate across countries using platforms like Microsoft Teams, Slack or custom ship management software.

Virtual teaming presents unique problems, such as time zone disparities, fewer nonverbal indications and cybersecurity threats. Powell, Piccoli and Ives (2004) stress the value of trust, communication richness and clear goals in virtual teams. Maritime companies must customize their digital tools and team norms to allow smooth cooperation across seas.

## **2.19 Change Management and Organizational Development.**

Implementing a team-based structure is frequently a significant organizational adjustment. Lewin's (1947) three-stage model (unfreezing, altering and refreezing) is still used as a basis for transition management. Kotter (1996) elaborated on this, developing an approach that emphasizes vision, coalition building and short-term gains.

In a conservative and regulated shipping industry, change management must handle cultural opposition, regulatory compliance and operational continuity. Team-based pilots or staggered rollouts enable firms to test models, get feedback and fine-tune techniques before the full-scale adoption.

## **2.20 Organizational Identity and Team Cohesion.**

Finally, the identity of an organization—how its members perceive and define its mission and values— influences the formation of productive teams. Albert & Whetten (1985)

found that corporate identity impacts employee commitment, strategic direction and openness to change.

Team cohesiveness increases when the organizational identity is strong and linked with the teams' objectives. Teams in maritime enterprises that communicate a clear objective (i.e. crew wellbeing, digital innovation, sustainability) are more likely to internalize common values and work efficiency. Individual motivation, team dynamics and corporate purpose all work together to create resilient and adaptable organizations.

### **3. Literature Review**

The notion of team-based organization has developed significantly over the last few decades, starting with the fundamental work of organizational theorists such as McGregor (1960), who criticized authoritarian, control-driven organizations in favor of more participative, democratic workplace models. As corporations dealt with globalization and the need for flexibility, team-based structures emerged as viable alternatives to conventional hierarchies. In this part, we look at the wide body of research that informs our knowledge of team-based organizational models, their components, and their applicability to maritime situations.

Cohen and Bailey (1997) offered a comprehensive definition of team-based work, classifying teams into work teams, parallel team, project teams and management teams. These categories show how teams are set up based on how hard work is, how long it will last and what are the organization's goals. Sundstorm et al. (2000) enhanced existing models by integrating novel variables, including team interdependence, authority structure and decision making autonomy. In their analysis, effective teams exhibit elevated levels of cohesiveness, clear objectives alignment and collective accountability.

Katzenbach & Smith (1993) characterized performance teams as groups that possess a strong sense of purpose, mutual accountability and members with complementary skills. These concepts are particularly important in maritime environments, where operations like navigation and emergency response are high-stakes and require both individual skill and teamwork. The implementation of Bridge Resource Management (BRM) systems, which

fosters dispersed decision-making and collaborative problem solving aboard boats,demonstrates the importance of these features(IMO 2010).

In the broader field of organizational behavior, team-based structures have been linked to increased creativity,job satisfaction, and organizational learning. Delarue et al.(2008) conducted a meta-analysis of more than thirty empirical studies and found that collaboration enhances organizational performance, especially in areas that require complex problem solving and significant adaptability. These findings support the application of team-based models in dynamic sectors such as shipping, where decision-making is often decentralized due to the physical separation between ships and shore-based offices.

Hackman's (2002) research on team effectiveness is another important addition to the literature.It highlights five important things that must be in place for to consider a team as successful .A clear direction , a structure than enables success , a supportive organizational framework, skilled team members and guidance to help teams deal with problems.Similar characteristics are observed in operations that involve multidisciplinary groups, such as those focused on vessel repair or crisis management that must coordinate to achieve common goals while adapting to unforeseen circumstances.

In addition , sociotechnical systems theory(Trist and Bmforth ,1951) provides an essential lens for evaluating group based structures.According to this idea , organizations function as interconnected systems composed of social and technological elements.In effect this implies that technological tools and human cooperation must be adapted together to achieve optimal performance.In case of shipping, technology such as integrated bridge systems ,automated logistics and digital communications are successful only when combined team coodrination and job clarity.

Multiculturalism also shapes teamwork. Hofstede's (2001) research on cultural factors, notably individualism vs. collectivism, power distance, and uncertainty avoidance, has proved useful in understanding how heterogeneous teams perform. Understanding these characteristics is critical for boosting teamwork and decreasing friction in shipping, since crews are often made up of individuals from various national and cultural backgrounds. According to Spinnaker Global (2015), in order to fully profit from multicultural teams, shipping businesses must invest in intercultural training and dispute resolution solutions.

The research also identifies many typical challenges to the effective deployment of team-based systems. Resistance to change, a lack of clear leadership, insufficient training,

and ineffective communication channels are highlighted as obstacles (Delarue et al., 2008; Hackman, 2002). These issues got worse in marine environments by the physical and communicative distance between stakeholders. For instance, onshore management may have specific time visibility of vessel circumstances resulting in coordination failures unless effective communication mechanisms are settled.

Team-based methods have received some institutional backing in marine rules and international standards. The International Maritime Organization's emphasis on human element integration, safety culture, and team training, as exemplified by the STCW (Standards of Training, Certification, and Watchkeeping) conventions, demonstrates a recognition of the importance of collaboration in achieving maritime safety and performance outcomes (IMO, 2010).

An emerging body of research studies the hybridization of organizational structures, in which team-based units function inside larger hierarchical organizations. Mintzberg's (1979) taxonomy of organizational configurations includes the "adhocracy," a flexible, team-driven form ideal for innovative work. Shipping businesses, especially those involved in fleet growth, sustainability programs, or digital transformation, are increasingly forming cross-functional teams to solve these specific requirements while maintaining conventional reporting lines for regulatory and financial monitoring.

The COVID-19 pandemic rekindles interest in team resilience and virtual collaboration, thereby augmenting the literature on distributed teamwork. Kniffin et al. (2021) examined the impact of remote work dynamics, psychological safety, and trust on team outcomes. These results show that shipping companies with teams on distant shores and crews all around the world need to invest in communication technologies, digital literacy and flexible rules that make it easier for people to work together at different times.

The idea of team-based organizations has received considerable attention in both academic and professional settings, especially as businesses move away from traditional hierarchical structures toward more flexible and collaborative models. This transition really matters in fast-paced settings like the shipping industry.

Modern scholarship builds on Cohen and Bailey's (1997) basic classification of teams into work, project, parallel and management teams. Also, it stresses how team boundaries are becoming more flexible. In many shipping companies, teams work together even though they

are in different areas , time zones and cultures.This geographic and functional dispersion heightens the necessity for frameworks that embrace such diversity.

West's (2012) model of effective team innovation is a significant addition to the literature.It identifies inputs(like organizational support), mediators (like communication) and outputs (like performance ) in team processes.When applied to a shipping industry , these factors indicate that innovation is not an incidental occurrence but rather a consequence of intentional structural and relational strategies. For example a cross-functional safety team may use structured debriefs and checklists to ensure thorough communication - practices that enhance both innovation and reliability.

Salas, Sims,and Burke (2005) outline what really makes a team work well , especially under pressure.They highlight five key elements : strong leadership , monitoring each other's performance, stepping in to help when needed, maintaining flexibility and a common sense of purpose.Such characteristics do not stand alone.They are based on trust and a shared understanding of the task at hand.At sea where things can rapidly change and the stakes are high , such as in emergencies , cargo operations or crew handovers, these qualities are not just useful , they are essential.

The role of team reflexivity—the extent to which team members collectively reflect on objectives, strategies, and processes—has also been emphasized by Schippers, Den Hartog, and Koopman (2007). Their findings suggest that reflexivity positively impacts team outcomes, particularly in environments characterized by uncertainty or change. In shipping, where voyages often require adjusting course due to unforeseen circumstances, reflexivity enables teams to reevaluate priorities and redistribute responsibilities in real time.

Burke and his team(2006), investigated how well teams adapted in high-pressure fields such as aviation and healthcare and their findings offer valuable insights in maritime world that must function reliably despite environmental volatility.Bruke and his colleagues assert that teams possessing clearly delineated roles coupled with adaptable execution strategies exhibit superior responses to stressors-principles that reflect organizational structure of bridge teams on vessels.

Marks, Mathieu, and Zaccaro(2001) introduced that team processes are episodic and go through cycles like transition (planning) and action (execution). Grasping rhis temporal aspect is essential for enhancing team structures in shipping where regular watch cycles,maintenance schedules and regulatory audits generate repetitive phases of activity.

Katzenbach and Smith's (2005) work on team basics and discipline is another important piece of research. Their focus on complementary skills, dedication to a shared goal, and mutual accountability is in line with what the International Maritime Organization (IMO) says about crew cohesion and shared safety responsibility. For instance, the ISM Code stresses how important teamwork is for safe operations by saying that everyone, from the captain to the ordinary seaman, has a role to play in reducing risk.

Research on team diversity has yielded inconclusive results. Some researchers, including Milliken and Martins (1996), caution that superficial diversity (e.g., ethnicity, age) may initially impede team performance due to communication obstacles or conflict. But deeper-level diversity, like different values, beliefs, and areas of expertise, has been shown to improve problem-solving and creativity, especially when it is well-managed. Structured communication protocols and cultural competency training can help reduce tension and make the most of diversity in maritime crews where people come from different countries speak different languages.

Erez and Gati (2004) put forward a multilevel model of culture in organizations that shows how global, national and organizational cultures work together. For shipping companies that employ crews from many countries, it is crucial to make sure that global safety culture and local values are in harmony. Studies show that when leaders, lead with inclusiveness and encourage open and honest conversations, teams are much more likely to come together around shared goals. Even when people come from different cultural backgrounds.

The role of technology in shaping team dynamics has become more significant. Olson (2000) reviewed the literature on computer supported collaborative work (CSCW) and found that technological affordances like video conferencing, shared dashboards and asynchronous communication can have a big impact on team cohesion and productivity. Electronic Chart Display and Information Systems (ECDIS), digital logbooks and integrated bridge systems are some tools shipping industry uses which help shore and vessel teams work together in real time.

Recent advances in artificial intelligence (AI) and predictive analytics have further changed the way employees work together in shipping, and not only. These tools have enabled teams to predict maintenance needs, monitor fuel efficiency and navigate with more accuracy. While AI systems can reduce cognitive workload, experts warn that AI systems must be designed and used to support, not to replace human judgement (Endsley, 2018).

Decision making models should rely on teams that integrate AI feedback with crew judgement to avoid excessive dependence on automation.

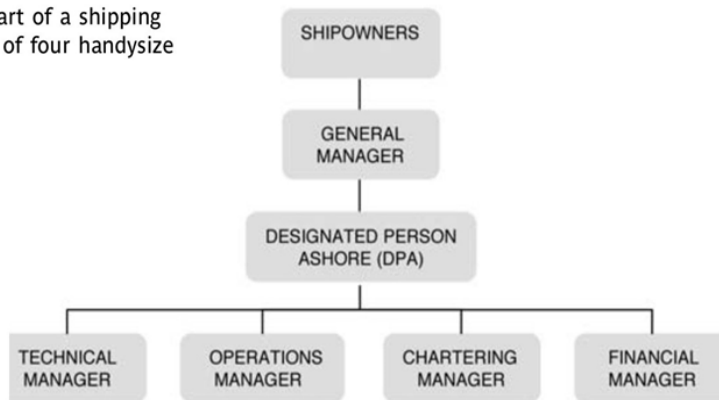
In conclusion, the augmented literature supports the idea that team-based frameworks, when suitably crafted and endorsed, significantly improve organizational results in the shipping sector. Researchers have consistently emphasized the importance of teamwork as a key strategic advantage, drawing from both classic theories about group dynamics to recent studies on virtual teamwork and managing diversity. Even though with the right setup, a team's success does not happen automatically. It requires ongoing investments in communication, leadership and the ability to adapt to changing conditions.

### **3.1 Overview of Shipping Companies and Organizational Forms**

#### **3.1.1 Hierarchical vs Team-Based Organizational Approaches in Shipping**

Hierarchical organizational forms have been the norm in the shipping industry for a long time. In *'Management of Shipping Companies'*, Theotokas (2018) describes how shipping companies are traditionally structured with clear, high chains of command, clear divisions between on shore management and maritime activities, defined departmentalization (fleet operations, crewing, technical, commercial) and strong managerial control over strategy and operational decisions. The hierarchical structure serves several practical purposes in shipping: clarity of responsibility (especially for safety, regulatory compliance, navigation), rigid reporting lines that ensure accountability both at sea (ship master, chief engineer) and on land; and risk management, which in an industry exposed to many risks, demands strict controls and standardized decision-making. Theotokas emphasizes the importance of these features in maintaining functional stability in volatile external environments (freight markets, regulation, weather risk).

Figure 5.2 Organisation chart of a shipping company operating a fleet of four handysize bulk carriers



*Theotokas, I. (2018) Management of shipping companies*

However, in recent years, scholars and practitioners have begun to examine the potential advantages of more team-based, flatter or hybrid organizational forms, especially with pressures for agility, digitalization, efficiency, and improved human resource outcomes. A team-based approach refers to methods where decision-making is more distributed, tasks are assigned to multi-disciplinary teams, communication paths are less rigid, and empowerment is granted to lower organizational levels. In shipping this might translate to greater autonomy of shipboard teams, cross-functional project teams across shore-based departments (e.g., technical + commercial + operations working together), and shared leadership.

Comparative advantages of hierarchical models in shipping include discipline, clarity and regulatory compliance; hierarchical forms align with the safety and legal imperatives of maritime operations. Theotokas(2018) notes that in many shipping companies, departmentalization and reporting structures are designed to safeguard safety standards (ISM Code, regulatory oversight), and ensure that ship masters and technical officers follow orders that are traceable and auditable. Hierarchy also supports scalability: large fleets, multiple business units (e.g commercial, technical, crewing) often require formal managerial layers to coordinate across time zones, legal jurisdictions, and modes of ownership/flagging.

On the other hand, team-based structures can offer a range of advantages: increased responsiveness to market changes (spot freight, changes in fuel regulation, environmental requirements), faster problem solving (when cross-functional teams can address an issue without waiting for “up-the-ladder” approvals), improved employee engagement, and improved innovation (for instance, in adopting technology, or safety improvements). Recent research in maritime HRM points out that digitalization and emerging tech are reshaping the industry, requiring more collaboration, shared decision-making, and real-time coordination. When teams have autonomy, they may be more motivated, and more capable of adapting in unpredictable conditions, whether it’s a sudden storm, a port delay, or market shock.

Nevertheless, shifting from hierarchy to team-based or hybrid models in shipping is not straightforward, and presents challenges. First, there is role ambiguity. When autonomy increases, there may be uncertainty over who makes which decision, which can compromise safety in critical moments. Secondly, the culture of shipping (sea-based patriarchy, strict chain of command on board) tends to resist flattening. Thirdly, coordination costs can increase: many teams working in parallel must communicate frequently, which may slow down decision making or introduce duplicate efforts unless carefully managed. Fourthly, legal and insurance frameworks in shipping often rely on hierarchical accountability; introducing shared or distributed leadership models means these structures must align with regulatory frameworks.

Empirical work on Greek shipping companies (Lazakis et al., 2023) explores actual organizational configurations and finds that while many firms retain hierarchical structures, some have started to adopt hybrid departmental forms combining traditional functional departments with cross-departmental teams, especially for technology adoption, environmental regulation compliance, and crewing. These hybrid forms recognise that neither pure hierarchy nor pure team-based structure is sufficient: the need to maintain firmness in safety and compliance demands hierarchy; the need for adaptability and innovation pulls toward team-based forms.

Thus, the literature suggests that shipping companies are increasingly considering organizational forms that retain hierarchical safeguards but embed team-based practices (shared leadership, cross-functional teams, empowerment) where possible, particularly in shore offices, and for problem solving rather than critical operational authority.

### **3.1.2 Unique Structural Challenges in Shipping: Autonomy of Ships vs Shore-Based Coordination**

A major distinguishing feature of shipping companies is that ships are geographically remote, semi-autonomous operational units, often operating under harsh conditions, and separated by time, distance and communications delays from shore management. This creates structural and managerial challenges that influence what organizational forms are viable.

In *Management of Shipping Companies*, Theotokas (2018) notes that each ship effectively is a small, self-contained organization at sea, with its captain (master), deck officers, engineer officers, and crew responsible for navigation, safety, technical operations, cargo operations, and emergency response. The sea-going team must follow regulations, company policies, and technical instructions, but must also make real-time decisions in response to weather, port conditions, emergencies. The shore office (or headquarters) is responsible for strategic oversight, commercial decisions, fleet scheduling, crew recruitment and welfare, finance, insurance, compliance, and maintenance planning. The separation between ship and shore raises a central question: how much autonomy onboard, and how much centralized control ashore?

Communication is a first challenge: ships are remote, sometimes with limited or delayed communication. Regulations and emergencies require immediate decision-making on board; shore offices cannot micromanage every event. Thus, organizational forms that allow some distributed decision authority are necessary. However, such autonomy must be embedded within strong reporting and accountability systems. For example, Theotokas describes how safety management systems (SMS) and the International Safety Management Code (ISM Code) require companies to have formal procedures, audits, documentation, which act as control levers over ship operations (Chapter9).

Another challenge is that ships operate in very diverse jurisdictions (flag, port states), with differing legal, regulatory, environmental, and labor regimes. This spatial and legal dispersion implies that the organizational structure must accommodate local compliance, risk exposure, and sometimes differing shore oversight. Centralisation helps ensure uniform compliance, but may reduce flexibility to adapt to local conditions.

Complexity of fleet composition — fleets may include different ship types (bulk, container, tanker, LNG, etc.), each with distinct technical, safety, crewing, cargo handling, and operational profiles. Specialized teams or departments are often needed for each fleet segment, both ashore (technical, crewing, safety specialists) and at sea (engineers, navigators specific to vessel type). But cross-fleet innovation (e.g., in environmental technologies, autonomous features) may be better addressed through team-based or matrix arrangements, combining expertise from multiple fleet types.

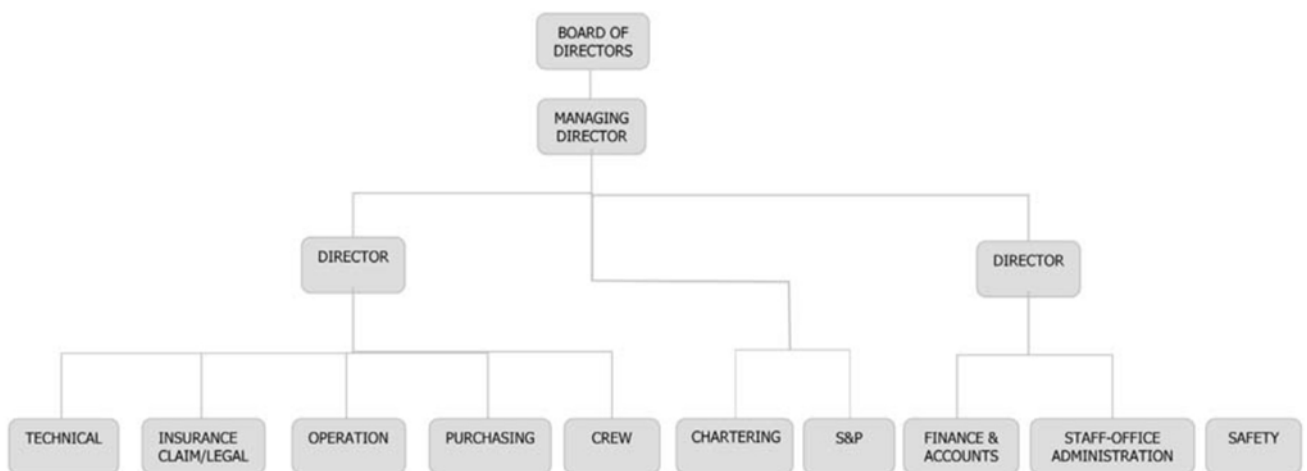


Figure 5.5 Organisation chart of a shipping company operating a fleet of 19 tankers and bulk carriers

*Theotokas, I. (2018) Management of shipping companies*

Crew management introduces another layer: ships have crews that often change periodically; crews are multicultural; morale, safety culture and training must be managed both by shipboard leadership and shore offices. The autonomous nature of crews at sea underscores the importance of recruiting, training, and maintaining shared values and mental models across the fleet; but shore offices must provide consistent policies, support, and oversight.

Operations scheduling and commercial demands also impose coordination constraints: shore offices plan schedules, charter contracts, port calls, maintenance, fuel bunkering, etc., while ships must adhere in real time. High external uncertainties (weather, port congestion, regulatory changes) mean that decisions made at sea may need to diverge. An organization

must build in flexibility. Team-based or hybrid forms may allow for more real-time mutual coordination (ship/shore) rather than rigid vertical control.

Finally, the cost of delay or error is high in shipping (safety incidents, environmental disasters, economic loss). That tends to push organizations to be risk-averse, favour redundancy, formal control, and hierarchical oversight. Thus, even when team-based forms are adopted, hierarchy tends to persist in critical safety and compliance areas (decision rights over emergency response, navigation, liability).

Thus, the shipping industry's structural setting ships as semi-autonomous units, shore offices as coordinators in many domains, geographic and regulatory dispersion, fleet variety, high stakes of mistakes, means that pure team-based or flat forms face serious constraints. Hybrid structures that keep hierarchy where needed and grant team autonomy where useful are the most realistic path.

### **3.1.3 Globalization and Its Impact on Organizational Choices in Shipping**

Globalization—closer links between markets, trade flows, regulatory regimes, and technologies—has been a central driver reshaping shipping organizations over recent decades. Theotokas (2018) argues that globalization raises competition, demands scale, forces innovation, and adds pressures (market volatility, regulation, fuel/environmental standards, labour supply), all of which force shipping companies to rethink their organizational forms.

A clear sign of change in the shipping industry is the way companies have expanded into multinational operations. Today, many firms work across different legal systems, fly flags of convenience, hire crews from various national backgrounds, and navigate a wide range of port and regulatory environments. To handle this complexity, shipping companies often set up regional offices or form partnerships in different parts of the world. They rely on decentralized decision-making so that local teams can respond quickly to specific conditions. In areas like chartering or commercial operations, decisions about contracts, port arrangements, fuel supply, and regulatory compliance often require local authority to avoid delays and inefficiencies.

At the same time, globalization has increased the demand for integrated logistics and supply chain coordination. The line between traditional shipping companies and logistics providers is becoming less distinct. Many large operators, especially in container shipping, now offer full-service logistics-from port to final destination -including intermodal transport and complete supply chain solutions. This shift calls for tighter coordination between departments such as operations, logistics, customer service, and documentation. As a result, structures like cross-functional teams, matrix setups, and integrated logistics units are becoming more widespread across the industry.

Another impact is digitalization and global information systems: with global tracking, remote monitoring, big data analytics, automated scheduling and predictive maintenance, the ability for shore offices to monitor ships in real time has improved. These advances allow shore officers to monitor ships in real time, improving central oversight while enabling decentralized decision-making (e.g. allowing ships to adjust to local conditions supported by data rather than waiting for instructions). This shift also requires new skills and HR practices including shared mental models, cultural competence, and digital literacy across ship and shore. Recent literature highlights that one of the main challenges in maritime HR management is adapting to digitalization, as new technologies demand closer interaction between ship and shore, cross-unit coordination, and faster learning.

Global market volatility and changing environment rules regimes, also force organizational agility. The IMO (International Maritime Organization) regulations, sulphur dioxide emissions, decarbonization goals, environmental reporting, ballast water management etc., vary globally and over time. Shipping companies operating globally must adapt organizationally: define teams or units that monitor compliance, manage change, and coordinate with local authorities. In many cases, these units cut across existing departments, perhaps reporting directly to senior management, making the organizational structure more matrix-like or horizontal for these functions.

Globalization also pressures for efficiency and cost reduction, which often lead to outsourcing or partnering. Ship-management, technical maintenance, crewing, port agency services or documentation are often outsourced to specialist third parties. This means that internal organizational forms must integrate with external partners, which demands coordination, clear interfaces (contractual, administrative) and sometimes shared leadership or joint teams across entities. Theotokas devotes considerable attention to outsourcing of ship management (Chapter 10), showing how firms make strategic decisions about which core

functions to retain in-house and which to delegate externally.

Moreover, globalization increases workforce diversity too: multinational crews, regulatory environments, socio-cultural expectations, shore staff from varied backgrounds must handle cross-cultural issues. Shared leadership, training, strong safety culture, communication protocols become more critical.

Finally, globalization has increased the amplitude and frequency of external shocks: global financial crises, fuel price volatility, pandemics (COVID-19), supply chain disruptions. These shocks force shipping companies to be adaptive. Hierarchical structures tend to respond more slowly; team-based or hybrid structures can allow faster local action. Studies (e.g. on supply chain resilience) shows that firms operating globally benefit from more decentralized, team-led decision making to respond to disruptions (Theotokas et al., 2024 -Ali, I., et al., 2024).



Figure 6.6 Network structure

*Theotokas, I. (2018) Management of shipping companies*

### 3.1.4 Synthesis: How Hierarchy, Autonomy, and Global Pressures Intersect

From the foregoing, one can see that the organizational form shipping companies adopt is not binary (hierarchy vs team-based) but rather a spectrum. A number of key dimensions determine where along that spectrum a particular company or unit will lie:

- **Criticality / risk in the task:** Safety, navigation, engineering are less likely to be devolved—they remain more centralized, while commercial or environmental innovation units more likely to be team-based.
- **Distance and communication lag:** Ships at sea require autonomy; shore offices can be more centralized but must communicate clearly and have emergency protocols.
- **Regulatory differences:** Variation in local regulation pushes firms toward decentralized or regional units, though core policy or safety remains centralized.
- **Technological capability:** Real-time communication, data analytics, remote monitoring permit more decentralized, team-based operations without losing control.
- **Culture and legacy:** Companies with long history of hierarchical culture may resist flattening; crew hierarchy alone is a powerful cultural force.
- **Size and fleet diversity:** Bigger and diversified fleets seem to require more complex organizational forms: hybrid, matrix, with both functional departments and project/innovation teams.
- **External turbulence:** When markets, regulation, environment change quickly (fuel costs, environmental rules, pandemics), more flexible, team-based or hybrid structures increase resilience.

Thus, modern shipping companies appear to adopt *hybrid organizational forms* presenting a hierarchical skeleton (for regulation, safety, core operations) while embedding team-based units or practices in areas requiring agility, human resource developing, cross-functional coordination, environmental compliance and lastly innovation.

### 3.1.5 Recent Evidence and Case Findings

Empirical evidence supports this hybrid trend. For example, Lazakis,(2023) in “Organizational structure configurations, their application in Greek shipping companies” find that many Greek shipowning and shipmanagement companies have begun to combine functional departments with cross-departmental project teams, especially in areas such as technical innovation, environmental compliance, ICT deployment, and safety management. These companies often maintain hierarchical control in core operations (ship technical, navigation, safety) but allocate more autonomy to teams in non-core or supporting functions.

Another recent article, “Challenges of maritime human resource management for the transition to shipping digitalization” (Theotokas, Lagoudis & Raftopoulou, 2024) shows that digitalization is forcing rethinking of organizational practices training and education, digital skills, and closer coordination between shore and ship require flatter communication channels, bilateral feedback, shared decision points, especially for non-critical technical issues.

Also, studies on port networks and global routes (e.g. Study on hierarchical structure of container port systems along South China Sea, 2024; Li et al., 2024 ) shows that hierarchy isn’t just an internal company feature; it’s also embedded in the broader shipping system. How ports are ranked and linked plays a major role in how shipping companies plan their routs,built partnerships and align their strategies.Although much of there search centers on the layout and structure of port networks, it still underscores an important idea.Hierarchical organization remains a core element in the way the global maritime industry operates.

Finally, the article “The role of shipping and logistics MNCs in economic development: a case study of how Maersk contributed to Vietnam’s ascendance to an export oriented economy” (Greve & Hansen, 2024) shows that Maersk’s organizational form, with decentralized regional operations combined with central strategy and oversight, has been key to its capacity both to scale and to respond to local challenges in Vietnam (e.g. infrastructure bottlenecks, regulatory changes, local markets). This dual structure allowed Maersk to deliver efficient logistics services, reduce transaction costs, and upgrade local capabilities.

### 3.1.6 Implications and Considerations for Team-Based Forms in Shipping

Given the tensions between autonomy (ship or team level) and hierarchical control, shipping companies need to be thoughtful when shaping their organizational structures, especially if they plan to adopt team-based or blended models. Several factors must be taken into consideration :

- **Clear delineation of decision rights:** what is the master's call, what sits with shore technical/safety, what belongs to cross-functional teams
- **Strong safety and compliance culture:** even in flatter structures, ensuring that safety, regulatory compliance and risk management keep clear lines of accountability and oversight.
- **Robust communication systems:** reliable communications between ship and shore, real-time data, clear reporting protocols, redundancy in channels.
- **Training and shared mental models:** ships with multinational crews require training in team work, shared understandings, and clarity about roles, especially under stress or emergencies.
- **Leveraging digital technologies:** remote monitoring, predictive maintenance, AI for scheduling, to reduce decision latency and support decentralized autonomy.
- **Organizational culture alignment:** efforts to foster trust, transparency, psychological safety, shared leadership in non-critical domains to support team-based works.

**Regulatory adaptation:** ensuring that internal organizational changes do not violate legal or safety obligations while new structures align with insurance, flag-port state rules and IMO convention.

### 3.1.7 Conclusion

In sum, shipping companies confront a trade-off between the stability, discipline and risk control afforded by hierarchical organizational forms, and the flexibility, responsiveness, innovation and engagement that team-based or hybrid forms can offer. The unique structural features of shipping -- ships as remote, semi-autonomous operating units, legal and regulatory dispersion, fleet heterogeneity, high stakes in safety and environmental risk -- place constraints on how flexible the

structure can be. Globalization makes both decentralized action and tight oversight more important. Recent empirical findings demonstrate that many shipping firms are moving toward hybrid organizational models: preserving hierarchy where essential (corporations, safety, compliance) while embedding team-based structures in supporting, innovation, logistics, and human relations functions. Designing and managing such hybrids well is now a central challenge and opportunity for modern shipping companies.

## **3.2 Contingency Theory for Shipping Organization**

### **3.2.1 Introduction**

Contingency theory has emerged as a cornerstone of organizational analysis in management studies, questioning the traditional premise that there is a universal "one best way" to structure businesses. The primary concept of contingency theory is that an organization's performance is determined by the fit between its internal structures and the external contingencies it experiences, such as size, technology, environment, and strategy (Donaldson, 2001). Contingency perspectives are effective tools for understanding why organizational forms differ between companies, why traditional hierarchies persist in some contexts, and why hybrid or team-based structures emerge in others.

According to Theotokas(2018), shipping corporations are complex socio-technical systems that must function across different jurisdictions, coordinate between autonomous ships and shore offices as coordinators, and adjust to volatile global freight markets. Such traits provide rich ground for contingency analysis. Because of the interaction between internal structures, human resource practices, and external surroundings, no single organizational model can ensure the success of all shipping businesses. Instead, businesses must connect their organizational decisions with the eventualities they face, such as fleet size, vessel specialty, technical competence, or external shocks like regulatory changes or global crises.

The sections that follow will explore how contingency theory applies to the shipping sector. We will look at its theoretical roots, how different contingency factors play out in shipping companies, and how elements like size, technology, strategy and environment shape organizational decisions. We will also consider the limits of this approach, especially in safety-critical areas where reliability is non-negotiable. Finally, we will draw on recent studies

to show how shipping firms are adapting their structures in response to digitization, globalization, and growing environmental demands.

### **3.2.2 Theoretical Basis for Contingency Theory**

Contingency theory arose in the 1960s as a counter to traditional organizational theory's rigidity, which prioritized efficiency via uniform management principles. Burns and Stalker (1961), Lawrence and Lorsch (1967), and Woodward (1965) made seminal contributions that emphasized the variety of organizational structures as well as the dependency of structural effectiveness on external and internal variables. Burns and Stalker differentiated between mechanistic structures that are appropriate for stable conditions and organic structures that are better suited to dynamic and unpredictable contexts. Lawrence and Lorsch built on this viewpoint by stressing differentiation and integration, demonstrating that businesses in increasingly uncertain contexts needed more distinct subunits and stronger integrative processes to be successful.

Kast and Rosenzweig (1985) used contingency views and systems theory to frame organizations as open systems that must align internal subsystems with external environmental contingencies. Donaldson (2001) went on to define the "fit" model of contingency theory, suggesting that misalignment between structure and circumstances leads to performance degradation. While the theory has been criticized for being unduly deterministic, it is still the mainstream paradigm for analyzing organizational variety and adaptability.

Because of their structural characteristics, shipping companies are an appealing target for contingency plans. As Theotokas (2018) points out, ships are geographically distributed and may operate under separate legal frameworks, whilst shore offices coordinate strategic, economic, and technical activity. The level of centralization, departmentalization, or autonomy that a corporation provides is greatly influenced by contextual factors such as fleet specialization, technology resources and market exposure.. As a result, contingency views are well-suited to the reality of marine management, which lacks a standard framework and instead employs a range of configurations adjusted to specific situations.

### 3.2.3 Contingency Dimensions for Shipping Organizations

One of contingency theory's advantages is its capacity to identify and operationalize particular contextual aspects that influence organizational design. Several dimensions are very important in transportation.

Size is one of the most commonly referenced contingent variables. Larger shipping businesses with diverse fleets often need more organized bureaucratic structures, including specialized divisions for technical management, chartering, crewing, safety, and finance (Pugh & Hickson, 1989). Smaller family-owned shipping businesses, which are still prevalent in Greece and abroad, often use flatter, more centralized structures, with owner-managers exercising direct control over both strategic and operational choices (Lazakis, 2023). Theotokas (2018) demonstrates that the degree of organizational complexity in shipping enterprises is substantially correlated with company size, since bigger fleets need coordination mechanisms and the adoption of formal processes to deal with rising administrative obligations.

Technology is another important contingency. Woodward (1965) illustrated the relationship between technical complexity and structural needs. In shipping, the kind of vessel operated (bulk carriers, tankers, container ships, LNG carriers) and the extent of onboard and shore-based digitization have a considerable impact on organizational structures. For example, corporations running LNG ships need highly specialized technical departments, while companies concentrating on tramp bulk cargo may have smaller organizations. Recent improvements in remote monitoring, predictive maintenance, and digital fleet management have changed organizational architecture, promoting more integration of technical, commercial, and IT tasks (Theotokas, Lagoudis, & Raftopoulou, 2024).

The environment is perhaps the most unpredictable contingency element in shipping. Freight markets are famously cyclical, driven by global economic circumstances, geopolitical events, and regulatory changes. Lawrence and Lorsch's (1967) approach implies that growing environmental unpredictability needs more adaptable, organic structures. During the COVID-19 pandemic, container lines were forced to rearrange teams in response to rapidly changing capacity needs and port difficulties (Notteboom & Haralambides, 2021). Similarly, the implementation of harsher environmental laws, such as the IMO 2020 sulfur quota, compelled businesses to develop cross-functional teams that included technical, commercial, and legal knowledge to assure compliance and minimize interr

Contingency alignment relies heavily on strategy. Firms pursuing differentiation strategies, such as those offering high-value logistics and integrated door-to-door services, often adopt more organic structures with more cross-departmental connectivity. In contrast, organizations seeking cost leadership strategies in bulk shipping may prioritize centralization and cost control. Theotokas (2018) emphasizes that strategic decisions in shipping—whether to specialize in bulk, liner, or passenger services, or to diversify into logistics—impose distinct organizational requirements, with liner companies typically having more complex structures due to the need for customer service and port terminal management .

Culture expands the scope of contingency theory in shipping. While not typically a focus of early contingency studies, organizational culture has an impact on the success of structural decisions. Theotokas (2018) demonstrates how cultural traditions in Greek family-owned shipping companies encourage centralized decision-making, even when business size suggests decentralization. Multicultural ship crews provide additional challenges since leadership and communication approaches must adjust to different cultural expectations (Progoulaki & Theotokas, 2010). Cultural fit therefore becomes an implicit contingency element that influences structural consequences.

### **3.2.4 Structural Responses to Contingency in Shipping**

Shipping businesses' structural adjustments to these contingencies take many different organizational shapes. On one end of the range are tiny, family-owned businesses with centralized, owner-driven systems. Such companies may hold just a few boats, allowing the owner or a small team of managers to supervise chartering, technical concerns, and financing directly. This arrangement is consistent with contingency forecasts, since the modest size and narrow scope eliminate the need for established bureaucracy.

On the opposite end of the spectrum are international shipping enterprises, which operate hundreds of boats across many sectors. Companies such as Maersk and COSCO need divisionalized or matrix structures that combine functional expertise (e.g., technical, commercial, logistical) with geographic or product-based divisions. Globalization and diversification initiatives need regional integration, which necessitates both centralised coordination and decentralised autonomy. Contingency theory describes how these

arrangements respond to the combined contingencies of growth, diversity and environmental instability.

Hybrid structures are becoming more popular, indicating the need to reconcile hierarchical control with flexibility. For example, many shipping companies have hierarchical control for safety and regulatory compliance, where accountability and documentation are crucial, while also employing cross-functional project teams to address innovation, environmental compliance, and digitization. Lazakis et al. (2023) explain this hybridization in Greek shipping enterprises, stating that it helps organizations to maintain the stability demanded by regulators while offering flexibility in areas that require quick adaptation.

### **3.2.5 Globalization, Digitalization, and Emerging Contingencies**

The globalization of shipping has increased the significance of contingency planning. According to Theotokas (2018), corporations currently compete in a context of increased rivalry, fast technological development, and shifting public expectations. Globalization complicates transportation firms by extending their global reach, diversifying their operations, and increasing the contingencies they must handle.

One expression is the expansion of international crewing methods, in which seafarers are hired from various locations to save money. This presents cultural and communication variables that must be addressed by structural design and human resource strategies (Daniels, 2017). Companies that fail to match their structures with these realities may have increased turnover, board disagreements, or safety risks.

Digitalization is another major threat. Blockchain technologies in logistics, real-time vessel monitoring, and predictive analytics are reshaping information flows inside maritime corporations. These technologies provide stronger central monitoring while simultaneously empowering decentralized decision-making at sea. As a consequence, systems that were previously based on sluggish reporting hierarchies are developing into more interconnected networks of ship and shore workers. According to Theotokas, Lagoudis and Raftopoulou (2024), digitization necessitates new HR practices, training programs, and more open communication channels to guarantee that seafarers and office employees can interact successfully in data-rich situations.

Environmental sustainability also brings forward new contingencies. Stricter

emissions rules, ballast water management aims, and decarbonization objectives need institutional adaptation by establishing specialist departments or cross-functional teams focused on compliance and innovation. Firms that misalign their structures with these constraints face not just regulatory fines but also reputational harm, as institutional theory suggests (Acciaro et al., 2024).

### **3.2.6 The Limits of Contingency Theory in the Shipping Context**

While contingency theory offers a valuable foundation, its use in shipping is limited. First, the theory's emphasis on structural fit may minimize the importance of agency, leadership, and route dependency. Many shipping enterprises are family-owned, and decisions may be influenced by owners' personal tastes rather than objective criteria. Theotokas (2018) recognizes this, adding that in Greek shipping, cultural norms often support centralized systems even when size or technology would suggest otherwise.

Second, contingency theory presupposes relatively steady interactions between variables and structures, while shipping environments are quite chaotic. For example, the COVID-19 pandemic demonstrated how unexpected shocks might disrupt accepted contingencies, requiring businesses to innovate outside established frameworks (Gong et al., 2022).

Third, contingency theory may underestimate the institutional and legitimacy factors that affect shipping corporations. Compliance with international norms, social expectations of environmental stewardship, and reputational considerations can impact organizational structures in ways that cannot be attributed purely to efficiency or fit.

Finally, the focus on structure may overshadow the significance of informal processes like leadership, trust, and psychological safety, which are essential in team-based seafaring settings. Contingency theory alone may not describe these processes, indicating the necessity to combine it with behavioral, cultural, and institutional views.

### **3.2.7 Conclusion**

Contingency theory provides an appealing perspective for examining organizational forms in shipping, reflecting the variety of structures and the relevance of alignment with contextual factors. In this sector, size, technology, climate, strategy, and culture all have a significant impact on how organizations are structured. Theotokas(2018) gives a thorough explanation of these processes, revealing how maritime corporations adapt their structures to meet both internal and external demands.

Recent study reveals that hybrid structures are becoming more common, indicating the necessity to reconcile hierarchical control with flexibility in unpredictable contexts. Globalization, digitization, and environmental regulation are new variables that need further adaptation, often driving organizations toward more integrative, team-based, or matrix structures.

However, contingency theory has limits when applied to shipping. It cannot completely account for the impact of ownership culture, institutional constraints, or unexpected global events. Scholars contend that contingency views should be supplemented by theories of organizational learning, resilience, and institutional legitimacy. Nonetheless, contingency theory is critical for understanding maritime businesses' strategic and structural decisions in a period of complexity and change.

## **3.3 Digitalization, Virtual Teams, and Remote Coordination**

### **3.3.1 Overview: From e-Navigation to Enterprise Platforms**

Over the last two decades, marine operations have shifted from ship-centric decision-making to digitally coordinated ship-shore ecosystems. The IMO's e-Navigation vision promoted "harmonized collection, integration, exchange, presentation, and analysis of marine information on board and ashore," with a strong focus on the human element (Costa, 2018; Lützhöft, 2007; see also "e-Navigation and the Human Element," 2014). Building on this basis, shipping companies today use enterprise solutions to transmit vessel telemetry, noon reports, mechanical data, navigational status, weather and commercial KPIs into integrated dashboards accessible to cross-functional, shore-based teams. The academic and commercial

literatures refer to this scenario as "digitization in maritime logistics," "maritime informatics," or "digital transformation" (Fruth & Teuteberg, 2017; Raza et al., 2023).

Two design shifts stand out. First, satellite connection and standardized interfaces enable data pipelines to interconnect bridge systems, engine-room automation, and cargo monitoring with shore portals, allowing workers to get real-time or near-real-time assistance. Second, collaboration layers (ticketing systems, chat, video, and shared documents) enable technical, commercial, and safety workers to work together as virtual teams on each vessel or journey. In many firms, this has resulted in a hybrid organizational design where legal command remains with the master, but decision-support is spread among distant experts who collaborate to provide situational awareness and problem-solving. The end result is that ships become moving nodes in a wider socio-technical network (Fruth & Teuteberg, 2017; Costa, 2018).

MANAGEMENT OF SHIPPING COMPANIES

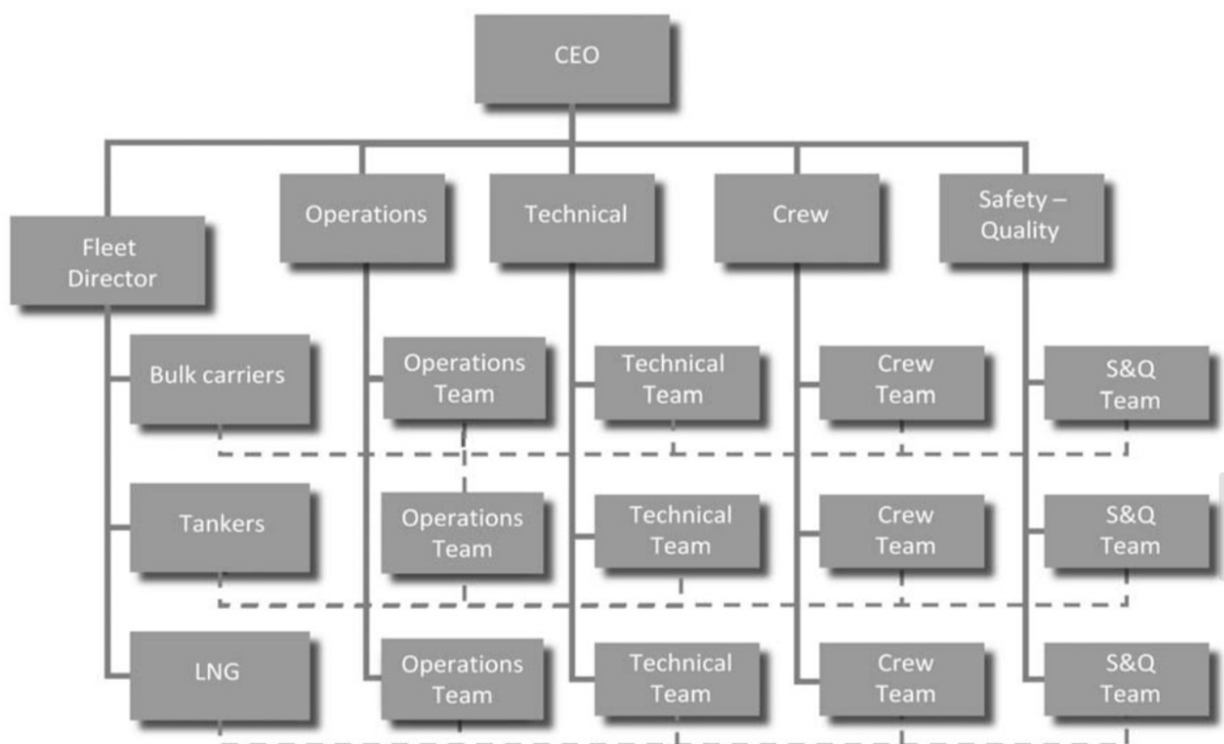


Figure 6.3 Matrix approach

### **3.3.2 Remote monitoring and fleet performance hubs**

A visible consequence of recent technological shifts in shipping is the rise of remote monitoring centers (RMCs) and fleet performance hubs, often housed within broader operations control rooms." These hubs collect sensor data (e.g., fuel flow, shaft power, speed through water, hull fouling proxy), weather and sea-state data, and commercial schedules to help with fuel-efficient routing, emissions reporting, and maintenance planning. Recent research offer analytics frameworks and machine-learning algorithms for detecting underperformance in comparison to "sister" vessels or localized operating envelopes (Bui et al., 2021; Yan et al., 2024). On the navigational side, the concept of remote support has evolved alongside research into shore control centers (SCCs) for higher levels of automation, where operators supervise and intervene in multiple vessels, with competence profiles and human-system interfaces tailored to remote operations (Saha et al., 2023; Lamm et al., 2022; Porathe, 2022).

Although most of the SCC work is prompted by Maritime Autonomous Surface Ships (MASS), many of their principles are increasingly relevant to conventional fleets. Alarm triage, multi-vessel monitoring, mode awareness, and unambiguous authority transfer procedures are all essential components of MASS SCCs as well as today's fuel-efficiency or safety monitoring rooms. What ties these developments together is the concept of distributed cognition—where human expertise and digital systems work in tandem—and the ongoing need to keep operators meaningfully engaged through prioritized, actionable information rather than overwhelming data streams (Veitch et al., 2021; Porathe, 2022).

### **3.3.3 How Digital Platforms Connect Ships and Shore Teams in Practice**

In day-to-day operations, integrated fleet systems enable three recurring cooperation patterns. First, exception-driven support: the ship's systems provide warnings for aberrant fuel usage, lubricating oil trends, exhaust temperatures, or navigation anomalies, which are automatically recorded in shore systems for engineers or superintendents to review. Second, planned optimization cycles: shore teams run daily/weekly checks on voyage plans, weather routing, and charter-party compliance, then advise the master, who weighs local conditions. Third, near-miss reports, permit-to-work records, and inspection results are digitally documented and integrated with training and maintenance data, enabling for fleet-level learning and targeted interventions (Fruth & Teuteberg, 2017; Raza et al., 2023).

Fuel and emissions management demonstrate the practical advantages of such connection. Advanced analytics can compare boats to predicted power curves, detect hull and propeller fouling, and suggest speed or trim changes. When models are calibrated for local circumstances and human interpretation remains strong, data-driven techniques have potential for increasing energy efficiency (Bui et al., 2021; Yan et al., 2024). Simultaneously, stricter carbon-intensity rules and the expansion of voluntary reporting have boosted the need for reliable, time-stamped data, motivating ship-shore data integration (Yan et al., 2024).

### **3.3.4 Advantages: transparency, punctuality, and cross-functional cooperation.**

The key advantage mentioned in the research is transparency. Data once trapped in logs or siloed systems is now available to many stakeholders, decreasing information gaps between ships, technical departments, and commercial teams (Fruth & Teuteberg, 2017; Raza et al., 2023). This enables crews to get real-time or near-real-time assistance, as well as engage with professionals for troubleshooting and trip optimization. During disturbances such as port congestion, weather changes, and equipment degradation, virtual teams may swiftly converge, modeling scenarios and exchanging artifacts (routes, checklists, risk assessments) in a shared workspace.

The second advantage is quicker learning at scale. Digital incident reporting and analytics allow fleet-wide detection of recurrent weak signals and the spread of best practices. When shore teams can examine trends across boats, the organization progresses from one-

time adjustments to systemic improvements, such as addressing prevalent failure modes associated with certain operational profiles or environmental circumstances. These feedback loops are consistent with safety culture ambitions and growing high-reliability concepts in shipping (Raza et al., 2023).

Finally, digitization reduces documentation friction. Automated data collection generates reports for charterers, regulators, and class societies, saving up time for both ship and shore people to work on higher-value duties. With stable links and usable interfaces, crews report clearer rationale for proposed changes (Costa, 2018; Bui et al., 2021).

### **3.3.5 Risk I: Information overload, mode awareness, and the human factor**

Despite these advances, the literature continually cautions that more data does not not always mean better decisions. Classic human-factors research on bridge automation shown how badly curated information may reduce situation awareness, encourage over-reliance on automation, and cause to accidents—the Royal Majesty grounding is a classic case (Lützhöft and Dekker, 2002). Similar issues exist on today's bridges and in shore rooms, such as increasing alarms, various displays with contradictory logic, and competing goals between commercial and navigational safety.

Information overload, such as too many warnings, poorly prioritized dashboards, and excessive messages, may raise cognitive burden and obscure vital information. Studies on bridge design and usability reveal continuing contradictions between stakeholder interests, with SOLAS V/15 human-centered objectives not always being met in reality (Danielsen et al., 2022). The issue is exacerbated in remote environments when a single operator watches numerous vessels: maintaining vigilance may be difficult, and mode confusion may occur if systems do not show states, limits, and authority boundaries (Saha et al., 2023; Lamm et al., 2022; Veitch et al., 2021).

These concerns highlight a common principle: digital transformation must be human-centered. Interfaces and processes must emphasize the "human element," harmonizing information display with user objectives, training, and workload. E-Navigation research stresses that design should be driven by user demands and team cooperation, rather than technology for its own sake (Costa, 2018; "e-Navigation and the Human Element," 2014).

### **3.3.6 Risks II: cybersecurity, data integrity, and organizational vulnerability.**

As ships and offices become more closely tied, the attack surface grows. Research show that maritime cybersecurity is improving, although there are still difficulties such as IT/OT segregation and navigation and cargo system vulnerabilities (Bolbot et al., 2022; Martínez et al., 2024). Remote monitoring and control capabilities are extremely sensitive: hacked credentials, improperly setup remote access, or supply-chain vulnerabilities may all lead to interruption.

Bolbot et al. (2022) and Martínez et al. (2024) recommend multilayer defenses such as network segmentation, intrusion detection, continuous monitoring, and competence development for both ships and shore workers. From an organizational viewpoint, cybersecurity is not simply a technological problem, but also one of governance and resilience. Because team-based remote coordination often spans departmental boundaries, role clarification for incident response, backup communication routes, and fail-safe operating modes are critical. The more real-time communication, the more the firm must prepare for graceful degradation—what happens when connection fails, data integrity is questioned, or a distant service is jeopardized.

### **3.3.7 Risks III: the digital divide, connection limits, and crew wellness.**

Research and industry surveys point to a growing digital divide between vessels and fleets with stable, affordable broadband access and those with limited or costly connections. This gap creates disparities not only in operational support but also in crew welfare (Tang et al., 2022; Professional Mariner, 2024; Seatrade Maritime, 2024; Riviera, 2024). When bandwidth is unreliable, shore-based teams may unintentionally design workflows that assume constant connectivity, placing undue pressure on crews to respond to asynchronous requests or input data that cannot be reliably transmitted at sea.

Connectivity and crew well-being are closely linked. During the COVID-19 pandemic, studies found that reliable internet access helped reduce feelings of isolation, improved communication with loved ones, and lowered the risk of chronic fatigue. In contrast, poor connectivity was associated with increased stress and mental strain (Pauksztat et al., 2021, 2022; Radic et al., 2020 -Sampson & Ellis, 2019). At the same time, connectivity can

introduce new challenges—such as expectations to complete online training during rest periods, or tensions arising from unequal access between ranks or across different vessels (Bugis, 2022).

For organizations adopting virtual team models, it's essential to consider how connectivity policies and costs affect both operational effectiveness and the crew's experience. Issues of fairness, workload, and retention are all shaped by how digital access is managed across the fleet.

### **3.3.8 Synthesis: Implications for Team-Based Organization in Shipping**

Taken together, the research demonstrates that digitization has permitted a practical kind of team-based organization between ship and shore. Virtual teams are most successful when platforms give shared situational awareness, metrics are interpretable, and authority is clearly defined. Performance gains, particularly in fuel efficiency and schedule reliability, can be achieved when models are tailored to local operating contexts and embedded in collaborative routines rather than imposed as opaque directives (Bui et al., 2021; Yan et al., 2024; Raza et al., 2023).

The disadvantages—information overload, cyber danger, and uneven connectivity—are not only technological issues, but also pose organizational concerns. Effective mitigation strategies include disciplined alarm management, human-centered interface design, remote collaboration training, and clear escalation ladders that respect the master's legal authority while leveraging shore expertise (Lützhöft & Dekker, 2002; Danielsen et al., 2022; Saha et al., 2023). According to Bolbot et al. (2022) and Martínez et al. (2024), cybersecurity needs joint effort from IT,OT, and operational teams.

Finally, the digital divide highlights a strategic choice: shipping companies that invest in robust connectivity and crew-centric policies will get the benefits of virtual teaming while maintaining morale and retention levels. Organizations that underinvest in connection risk establishing a two-tiered workforce and undermining the very cooperation that their platforms are designed to encourage (Sampson & Ellis, 2019; Tang et al., 2022). In summary, digitalization does not inherently provide team effectiveness, rather it provides team effectiveness when the human element, security, and equality are included into the system from the start.

## **3.4 Resilience, Dependability, and Complexity in Shipping Organizations**

### **3.4.1 Introduction**

The shipping business is widely recognized as one of the most high-risk and volatile industries in the global economy. Ships operate in environments marked by uncertainty, severe weather conditions, unpredictable human behavior and geopolitical tensions. In such a setting, safety and reliability are defined not only as the ability to prevent accidents, but also as the ability to adapt, recover and maintain acceptable functioning under stress. Scholars in resilience engineering (Hollnagel, 2014), high-reliability organizing (Weick & Sutcliffe, 2015) and complexity theory (Dekker, 2011) have introduced models that move beyond linear theories of accident causation. These viewpoints are increasingly being applied to maritime situations, where organizational structures, especially team-based arrangements may either strengthen or weaken the ability to endure to unexpected challenges.

This section of the study reviews how resilience engineering applies to maritime incidents, looks at the role of teams in responding to crises, examines how HRO principles can benefit shipping operations and considers how complexity influences decision-making at sea. The section concludes by bringing together evidence that suggests companies that use team-based structures tend to be more resilient and better equipped to handle disruption than those relying solely on hierarchies.

### **3.4.2 Resilience Engineering and Marine Accidents**

Resilience engineering defines safety as the capacity to perform under changing circumstances rather than the absence of failure (Hollnagel et al., 2006). Hollnagel (2014) identified four essential qualities of resilient system: Anticipating, monitoring, responding, and learning. These ideas have been used in the marine sector to better understand how ships and personnel respond to unpredictable and unforeseen issues.

Several marine disaster assessments have emphasized the importance of resilience, especially in how crew members make local adjustments to keep operations running smoothly. Hetherington, Flin, and Mearns (2006) argue that most of marine accidents are caused by human and organizational factors, which are often linked to poor communication or lack of flexibility when facing unexpected challenges. Accidents like collisions, groundings

and engine breakdowns often happen when normal performance, usually helpful, meets stress and structural constraints that push the system above its ability to adapt (Lundh & Rydstedt, 2016).

The Functional Resonance Analysis Method (FRAM) and other tools have been used in marine settings to model the different kinds of work that people do every day and how they affect both success and failure. Praetorius et al. (2015) demonstrated the application of FRAM in the examination of vessel traffic services, highlighting how subtle alterations in routine operations can result in systemic vulnerabilities. Banda et al. (2019) similarly applied resilience metrics to maritime operations, asserting that a focus solely on “what went wrong” overlooks the numerous adaptive strategies utilized by crews to maintain safety.

Case studies of incidents, such as the grounding of the Costa Concordia in 2012, elucidate concepts of resilience. Investigations uncovered not only individual errors but also systemic inflexibility, communication breakdowns, and missed opportunities for adaptive solutions (Liu et al, 2015). A resilience perspective underscores that enhancing safety necessitates enabling teams to adapt flexibly, rather than merely ensuring adherence to procedures.

### **3.4.3 Teams and Adaptive Responses to Maritime Crises**

Teams are crucial for resilience as they embody the capacity to emphasize, comprehend and collaborate during the crisis. Research on Bridge Resource Management (BRM) indicates that when teams engage in practices like checking each other's actions, providing mutual support and preserve open communication they become more capable of handling crisis effectively (Cavaleiro et al. 2020). The International Maritime Organization made BRM training mandatory, recognizing flexible teamwork and cooperation can help to reduce hierarchical rigidity and improve management of crisis that may arise.

There are empirical evidence that support this viewpoint. Grech, Horberry and Smith (2002) showed that teams with advanced communicational patterns are more likely to recognize weak signs of failure. Heterington et al (2006) discovered that failures in team coordination were the major factors that occurred in a high percentage of marine incidents. Strong teams practices, where everyone has a voice in decision-making and are not afraid to speak up, even to challenge authority, has been linked to better outcomes during emergencies.

Examples from the navy and merchant shipping highlight the importance of teams in adaptive responses. Organized exercises and cooperation between various departments, allow sailors to re-distribute responsibilities during difficult situations , increasing the chances of survival.(Roberts & Bea 2001).In commercial shipping team adaptation has been reported in response to incidents of pirate attacks , when personnel were able to secure themselves and their ships through rapid job reassignment and shared decision-making.(Hamad, 2016)

Resilience engineering theory highlights that teams are not just process executors but they are also drastic safety makers. Their ability to reinstruct rules, to innovate under pressure and convey power is essential for resilience. However , such an adaptation requires a culture of psychological safety(Edmondson,2019), where crew members are free to express and communicate concerns without the fear of being judged in an area where shipping , with its hierarchical traditions and ethnic crews, continues to face problems (Sampson& Ellis 2019)

#### **3.4.4 High Reliability Organization (HRO) Features in Shipping**

The concept of High Reliability Organization (HRO),which was established through research on US Navy aircraft carriers and nuclear power plants(Roberts, 1990 Weick & Sutcliffe, 2015)outlines a group of management principles that help organizations perform with minimal errors, even in hazardous areas.Five pinciples are central:(a)concern for failure, (b)reluctance to simplify interpretations,(c)sensitivity to functions,(d)commitment to resilience and (e)respect to knowledge(Weick & Sutcliffe, 2015).

Shipping companies, particularly those operating tankers or passengers ships ,there has been a clear effort to practice these HRO principles.For instance the focus on damage is reflected in near-miss reporting systems and the concocts of safety drills, although under-reporting still remains a challenge(Bhattacharya, 2012).Risk assessments and scenario planning help to avoid simplify,encouraging a deeper examination of complicated contexts. Operational awareness reveals itself in the continual monitoring of bridge, engine room and cargo spaces,which is often supported by digital technologies. Regular exercises and drills for emergencies such as fires,collisions or abandoned ship demonstrate a strong recilience commitment. Lastly , respect for expertise too , especially in Bridge Resources Management(BRM) training, where junior officers are encouraged to speak up if they notice mistakes , even if that means challenging the captain.

Roberts and Bea (2001) pointed that HROs are successful not because they eliminated all mistakes, but because they contained these problems before they spread. In shipping, this kind of constraint often depends on how quickly and effectively teams can detect irregularities and raise the alarm. The problem is to reconcile HRO principles with maritime law, which gives ultimate authority to the master of the ship. While this legal hierarchy can not be avoid, team-based organizational strategies may guarantee that real-time choices are guided by knowledge and expertise rather than just ranking (Lundh & Rydstedt, 2016).

### **3.4.5 Complexity Theory and Global Shipping System**

Shipping does not operate in isolation, but rather as part of a global logistics network. Non-linearity, emergence and unpredictability are key concepts in complexity theory (Dekker, 2011). Disturbances in one part of the system can spread internationally as illustrated by the grounding of the Ever Given in Suez Canal in 2021 which temporarily blocked the flow of goods and brought around 12% of global trade to a pause (Cotterell et al, 2021). Such incidents highlight the vulnerability of connected systems, where redundancy is limited and delays spread rapidly.

In terms of complexity, hierarchical organizations are unsuitable for navigating extremely unpredictable settings because they rely on consistent cause-effect linkages. Instead, decentralized, team-based structures improve adaptive capacity by allowing for local improvisation and quicker feedback loops (Comfort et al., 2010). According to complexity science, resilience develops from flexible, dispersed cooperation rather than rigid control.

Recent research on marine logistics during the COVID-19 emphasize this idea. Notteboom & Haralambides(2020) described how port closures, crew transition issues, and changes in demand forces shipping companies to constantly adapt. Companies that had more collaborative networks between ships, shore offices, and partners performed better in terms of operations. Thus, complexity theory emphasizes the need for team-based that enables resilience in the face of global volatility.

### **3.4.6 Evidence for Resilience in Team-Based Shipping Organizations**

Team-based structures have proven to be highly effective in enhancing resilience in the shipping industry. According to Hetherington et al, 2006, approximately 80% of maritime accidents are caused due to human error, which is often associated with poor cooperation between crew members. In contrast, research in well-functioning teams shows that they are

better equipped to identify and mitigate errors before they escalate. Liu et al.,2015 also demonstrated that flexible team practices can effectively help overcoming the shortcomings of rigid procedures and poor planning, reducing the likelihood of crisis.

This viewpoint is reflected in real examples. In tanker operations, joint safety committees have encouraged more open risk reporting and fostered a culture of learning (Bhattacharya,2012).In container shipping, digital tools that support ship-shore communication have helped crews respond more quickly to fuel efficiency targets and environmental regulations(Fruth & Teuteberg, 2017).Moreover,training programs such as BRM which emphasize teamwork and shared responsibility ,have also been linked to a reduction in maritime accidents(Cavaleiro et al., 2020).

Resilience, however, is not innate. Team-based arrangements may cause coordination overload if responsibilities are not clear,especially in ethnic teams with varying communication styles (Sampson & Ellis, 2019). Furthermore, resilience is dependent on trust, shared mental models, and organizational learning, which necessitates ongoing investment in training and culture (Edmondson, 2019). Nonetheless, research regularly shows that inflexible hierarchies without opportunities for dispersed knowledge are less adept of dealing with upheaval than hybrid, team-based systems.

Resilience engineering, HRO theory, and complexity science contribute to understanding vulnerabilities and adaptive capacity of shipping companies.Maritime accidents show that failures are often caused by systemic fragility and poor adaptive capacity, rather than by a single error.Teams are essential for resilience because they provide the collective intelligence needet to anticipate, monitor, react, and learn under stressful situations. HRO concepts are inextricably linked to good shipping practices , especially when authority is balanced with expertise.In high-risk and unpredictable environment like global shipping,complexity theory reminds us the need for team and distributed cooperation in order to overcome and be prepared to face any uncertainty.Success depends on teams sharring responsibilities , staying flexible and working together to make smart decisions.

The data suggests that team-based organizations show great resilience to disruptions compared to strictly hierarchical structures,provided they foster effective communication,psychological safety and a culture of learning. For shipping companies facing more complex risks,such as climate change and cyber attacks,incorporating resilience and

HRO concepts into team-based organizational forms provides a pragmatic approach to ensuring safe and reliable operations.

## **4. Conclusion**

### **4.1 Revisiting the Research Objectives and Questions**

This dissertation set out to examine how team-based organizational approach can be meaningfully applied within the maritime sector while addressing a critical distinction that emerged through academic guidance: team-based organizational structures are applicable onshore maritime settings, whereas shipboard operations must maintain formal chain of command due to legal, regulatory and safety reasons. Therefore, this thesis does not propose the replacement this hierarchy chain of command at sea. Instead, it draws an important line between two areas of focus :

- (a) team-based organizational models that apply to maritime companies that are based on land and,
- (b) practices that improve the teamwork and make it easier for individuals to work together on ships without changing the authority structures.

To tackle this refined focus, an interdisciplinary theoretical framework was utilized, incorporating classical organizational theory, contingency theory, sociotechnical systems thinking, resilience engineering, High Reliability Organizational principles (HRO), complexity theory and research on cross-cultural management and organizational psychology. Also comparisons were made with other high-risk industries such as off-shore energy and aviation, where similar challenges around safety, coordination and adaptability are common. This approach helped build an understanding of how team-based thinking can be applied effectively in maritime sector.

The research explored four main questions:

1. What defines a team-based organization, and how do such models contrast with the traditional hierarchical structures found in maritime companies?
2. In what ways might team-based approaches improve performance, safety culture, and human resource outcomes in the shipping industry?

3. What barriers or challenges arise when introducing team-based elements into a sector historically shaped by hierarchical norms?
4. How do multicultural workforces and the global nature of shipping influence the effectiveness of collaborative and team-based practices?

The following sections summarize the key conclusions to each question, leading to an integrated reflection on theoretical contributions, managerial implications, and areas for further research.

## **4.2 Characteristics of Team-Based Organizations vs Conventional Hierarchies**

The first research question examined the core features of team-based organisations and contrasted these with the established hierarchical structures that dominate maritime operations. Team-based organisations are typically characterised by flatter structures, decentralised authority, collective decision-making, shared accountability, and open communication across functional areas (Katzenbach & Smith, 1993; Edmondson, 2019). These models value collaboration across disciplines, encourage knowledge exchange, and seek to break down rigid departmental boundaries.

In the maritime context, however, a clear distinction is essential. Team-based structures can be introduced within shore-based maritime organizations—such as corporate headquarters, fleet management offices, and technical or crewing departments—where cross-functional cooperation is increasingly needed. These environments face fast-changing regulatory, commercial, technological, and sustainability pressures that benefit from integrative and collaborative organizational forms.

By contrast, the shipboard environment must remain firmly hierarchical. The master's authority is mandated under international maritime law, and the chain of command ensures clarity of responsibility, safety of navigation, legal compliance, and rapid decision-making during routine and emergency situations (Bhattacharya, 2012). Therefore, a vessel cannot be described or structured as a “team-based organization”, and this thesis does not advocate such a change.

What is appropriate onboard is the adoption of teamwork-enhancing practices that improve cooperation, communication, and shared situational awareness—without altering the command structure. Tools such as Bridge Resource Management (BRM) and Engine Room Resource Management (ERM) encourage respectful challenge, information sharing, and mutual monitoring, which mirror some of the behavioural elements of team-based working while preserving the hierarchical framework that maritime operations require.

In summary, the conceptual divide is as follows:

- Onshore → Team-based organisational models may be adopted.

Offshore → Only teamwork practices can be integrated, and always within the legal hierarchy.

### **4.3 Advantages of Team-based Organizations in Shipping**

The second study topic focused on the potential advantages of team-based structures in shipping, namely operational performance, safety, and human resource management.

Operational improvements (mainly onshore). For shore-based functions, adopting team-based organizational models can enhance flexibility, innovation, and responsiveness. The shipping sector is increasingly facing interdisciplinary struggles such as decarbonization, digital transformation supply chain disruptions and regulatory changes . Team-based structures allow commercial, technical, crewing, and safety professionals to collaborate more effectively, enabling faster problem-solving, better-informed decisions, and more resilient responses to unexpected events such as geopolitical disruptions or port bottlenecks (Fruth & Teuteberg, 2017; Raza, 2023).

Safety benefits (primarily offshore through teamwork behaviors). Although organizational structures cannot be decentralized at sea, applying team-based behavioral principles contributes to improved shipboard safety performance. Studies have shown that poor communication ,fixed authority structures and the limited shared situational awareness continue to play vital role in many marine accidents. These factors often hinder coordination and timely decision-making , especially in high pressure situations at sea. BRM, ERM, and crew resource management practices—rooted in team-based behavioral science—have demonstrated measurable improvements in hazard detection, decision quality, and collaborative crisis response (Cavaleiro et al., 2020).HRO alignment, especially awareness, resilience and operational sensitivity, further strengthens safety culture onboard (Weick & Sutcliffe, 2015).

Human resource benefits(relevant onshore and offshore in distinct ways). For onshore personnel, team-based structures can promote engagement, empowerment, professional development, and a greater sense of organizational purpose. Offshore, enhancing teamwork competencies can improve crew cohesion, reduce social isolation, support mental well-being, and foster psychological safety—factors that influence retention and performance (Sampson & Ellis, 2019). Shared learning mechanisms,such as team debriefs, joint training training across departments and participatory safety programs strengthen the connection between and land-based teams.With these strategies , knowledge is shared in a smoother way, allowing valuable lessons and experiences circulate more freely between crews and onshore teams(Banda et al.,2019).

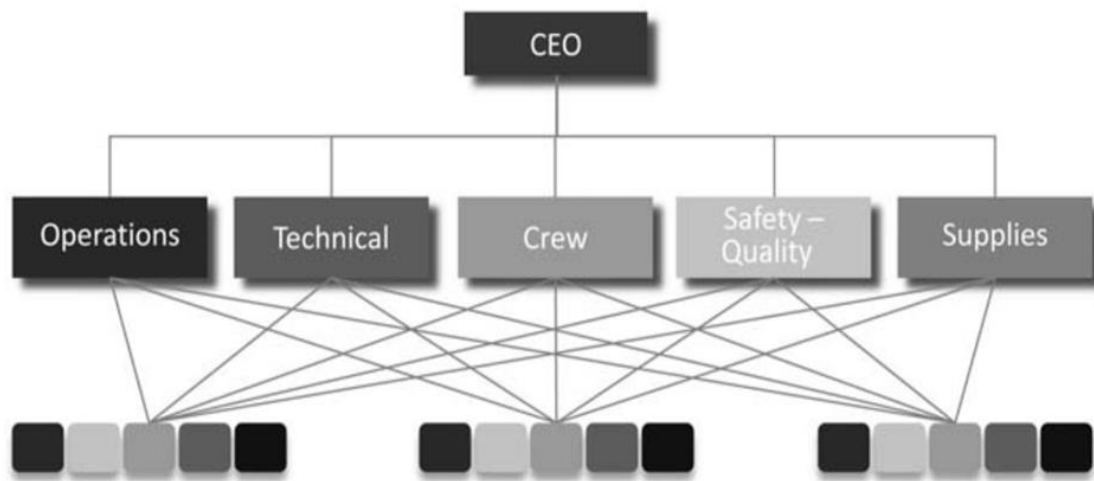


Figure 6.5 Team approach

*Theotokas, I. (2018) Management of shipping companies*

Overall, team-based models can strengthen organizational effectiveness onshore, while teamwork-strengthening practices offshore support safety, learning, and human welfare—without disrupting the shipboard hierarchy.

#### **4.4 Limitations and Obstacles in Hierarchical Marine Settings**

The third research question considered obstacles to applying team-based principles within a hierarchical governed sector. The most fundamental challenge is the difficulty of applying team-based models to shipboard context. Marine Law and ISM Code require a clear command hierarchy while the master continues to hold authority over navigations, safety matters and comply to maritime norms and regulations (Lundh & Rydstedt, 2016).

Another problem is information overload. As digitalization progresses, ships and shore crews are flooded with data, alarms and standard procedures. Without proper design, team-based coordination may overload mariners, raising rather than decreasing cognitive strain (Lützhöft & Dekker, 2002).

Cybersecurity and digital inequality also limit virtual collaboration. Remote monitoring systems increase attack surfaces (Bolbot et al., 2022), and unequal broadband availability creates a "digital divide" between well-connected boats and those with poor connection (Tang, Zhang, & Li, 2022). These inequities hinder the potential for egalitarian team-based cooperation.

Finally, organizational resistance to change is significant. Historically, shipping corporations have been cautious about implementing new arrangements. Senior officers may see team-based tactics as a challenge to their authority, whilst ethnic crews may struggle to reconcile different communication standards (Sampson and Ellis, 2019). Change management research highlights the need for gradual, hybrid adoption over wholesale restructuring (Costa, 2018).

#### **4.5 Multiculturalism, Globalization, and Team-Based Cooperation**

In the fourth research question the focus was on gaining a better understanding on how cultural diversity and globalization affect the success of teamwork and collaboration in shipping industry. The maritime sector employs a uniquely multinational workforce, drawing crew from diverse cultural, linguistic, and social backgrounds. This multiculturalism can be advantageous, providing a broader range of perspectives and experiences that strengthen problem-solving and adaptability. However, it can also create divergent expectations about authority, communication, and teamwork (Hofstede, 2001, Sampson & Ellis, 2019).

For example, seafarers from high power-distance cultures may hesitate to question or challenge senior officers, even when encouraged to do so, while those from low power-distance backgrounds may view open dialogue as normal and necessary for safe operations. If not acknowledged and managed proactively, these contrasting expectations can lead to miscommunication, reluctance to report concerns, or silence at critical moments. To bridge these cultural gaps, organizations can invest in structured communication tools, standardized phraseology, intercultural training, and psychological-safety initiatives that encourage respectful voice regardless of rank or nationality (Liu et al., 2015).

Globalization has also reshaped organizational dynamics. Shipping companies today operate across jurisdictions, regulatory systems, and time zones, often coordinating activities across dispersed offices and fleets. This requires fluid information exchange and collaboration across ship-shore boundaries. Virtual teams and digital platforms now play a larger role in enabling this coordination (Raza et al., 2023). Yet, globalization also exposes maritime organizations to inconsistent regulatory enforcement, market pressures, and cost-driven competition, which may push companies to maintain strict hierarchical control rather than embrace participatory practices.

Overall, diversity and global complexity create both opportunities and pressures. Collaborative practices are increasingly necessary to manage global operations effectively, but they must be intentionally designed to accommodate cultural realities and to ensure that inclusivity does not compromise clarity of authority at sea.

#### **4.6 Theoretical contributions**

This thesis contributes to several theoretical conversations within organizational scholarship. First, the findings reinforce contingency theory, demonstrating that no single organizational model is universally applicable across maritime contexts. The coexistence of hierarchical shipboard structures and more adaptive, team-based models onshore supports the view that organizational forms must align with situational requirements.

Second the study applies resilience engineering to the maritime sector by demonstrating that collaborative behaviors as opposed to structural decentralization, improve adaptive capacity in shipboard operations. It shows that resilience at sea develops through shared awareness, anticipatory thinking, and the ability to respond flexibly within the

boundaries of formal authority.

Third, the application of High Reliability Organization (HRO) principles highlights that achieving high performance in risk-laden environments depends not solely on compliance with rules, but also on cultivating alertness, teamwork, and distributed expertise. This thesis clarifies that such principles reinforce, rather than replace, the existing chain of command offshore.

Finally, insights drawn from complexity theory emphasize the interconnectedness of global maritime systems and the need for organizational adaptability. Shore-based team models and collaborative ship-shore interfaces are well-suited to handling complexity, emerging risks, and fast-moving external pressures.

#### **4.7 Management Implications**

For practitioners, various consequences emerge. Shipping firms should

- Adopt hybrid organizational structures that protect the captain's authority while encouraging collaborative decision-making onboard and beyond ship-shore barriers.

- Invest in training that builds teamwork, cross-cultural competency and creates a safe space for open communication, so that all everyone feels confident speaking up and contributing.

- Create digital platforms that promote shared situational awareness without overloading staff, while incorporating human-centered concepts into monitoring and reporting systems.

- Enhance cybersecurity and close the digital gap by enabling fair access to dependable connection for all boats.

- Promote organizational learning by implementing near-miss reporting, feedback loops, and knowledge-sharing networks that rely on team cooperation.

## **4.8 Prospects for Future Research**

Future study should strengthen the empirical foundation of these conclusions in a variety of ways. Longitudinal case studies of shipping businesses that use hybrid team-based structures may illustrate how such models grow over time. Comparative studies of vessel types (tankers, container ships, and cruise ships) might reveal if particular portions are better suited to team-based organization. Cross-cultural psychology research might provide light on how country cultures shape communication patterns in multinational teams. Finally, quantitative assessments of safety and performance data may give further evidence of a causal relationship between team-based activities and organizational results.

## **4.9 Final Reflections**

The central conclusion of this thesis is that the maritime sector cannot rely solely on traditional hierarchical models to navigate the complexities of modern shipping. At the same time, the realities of shipboard operations mean that full team-based organizational structures are neither feasible nor desirable at sea. The most resilient path for maritime organizations lies in a complementary approach: maintaining clear authority and command offshore while embracing collaborative, team-based models and cross-functional integration onshore.

When implemented thoughtfully, teamwork-enhancing practices support safety, learning, and well-being among seafarers, while onshore team models improve agility, innovation, and

organizational resilience. These dual approaches equip shipping companies to meet the demands of a rapidly of a rapidly changing industry shaped by digital transformation , global interdependence and a diverse workforce.

## References

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| Acciaro, M., Pietronudo, M. C., Ferretti, M., & Risitano, M. (2024, May)                          | Legitimacy and Innovation. Looking into the Maritime Industry. In <i>International Conference of the Digital Transformation Society</i> (pp. 395-399). Cham: Springer Nature Switzerland  |
| Albert, S., & Whetten, D. A. (1985)   | Organizational identity. In L. L. Cummings & B. M. Staw (Eds.), <i>Research in organizational behavior</i> (Vol. 7, pp. 263–295). JAI Press.  |
| Ali, I., et al. (2024)  | From disruption to innovation: The importance of the supply chain resilience. [ <i>Journal/Publisher information pending</i> ].   |
| Argyris, C., & Schön, D. (1978)   | <i>Organizational learning: A theory of action perspective</i> . Addison-Wesley.  |
| Banda, O. A. V., Kannos, S., Goerlandt, F., van Gelder, P. H., Bergström, M., & Kujala, P. (2019) | A systemic hazard analysis and management process for the concept design phase of an autonomous vessel. <i>Reliability Engineering &amp; System Safety</i> , 191, 106584.   |
| Bass, B. M. (1985)  | <i>Leadership and performance beyond expectations</i> . Free Press  |
| Beck, K., et al. (2001)   | <i>Manifesto for agile software development</i> . <a href="http://agilemanifesto.org">http://agilemanifesto.org</a>   |
| Bertalanffy, L. von. (1968)   | <i>General system theory: Foundations, development, applications</i> . George Braziller.  |
| Bhattacharya, S. (2012)   | The effectiveness of the ISM Code: A qualitative enquiry. <i>Marine Policy</i> , 36(2), 528–535. <a href="https://doi.org/10.1016/j.marpol.2011.09.004">https://doi.org/10.1016/j.marpol.2011.09.004</a>                              |
| Boardmix. (2023)  | <i>Team-based organizational structure: Pros and cons</i> . <a href="https://boardmix.com/knowledge/team-based-organizational-structure/">https://boardmix.com/knowledge/team-based-organizational-structure/</a>                     |
| Bolbot, (2022)  | Maritime cybersecurity: A systematic literature review and bibliometric analysis. <i>Ocean Engineering</i> , 257, 111460. <a href="https://doi.org/10.1016/j.oceaneng.2022.111460">https://doi.org/10.1016/j.oceaneng.2022.111460</a> |
| Bugis, S. M. (2022)   | <i>To what extent can fast-speed and affordable satellite internet on board ships positively impact seafarers?</i> [Master's thesis, Erasmus University]  |

|   |   |
|---|---|
|   | Rotterdam]. Erasmus University Thesis Repository.<br><a href="https://thesis.eur.nl/pub/64983/Bugis-Suhail.pdf">https://thesis.eur.nl/pub/64983/Bugis-Suhail.pdf</a>  |
| Bui, K. Q., (2021)  | Advanced data analytics for ship performance monitoring under localized operational conditions. <i>Ocean Engineering</i> , 235, 109411.<br><a href="https://doi.org/10.1016/j.oceaneng.2021.109411">https://doi.org/10.1016/j.oceaneng.2021.109411</a>                      |
| Burke, C. S., Stagl, K. C., Salas, E., Pierce, L., & Kendall, D. (2006) | Understanding team adaptation: A conceptual analysis and model. <i>Journal of Applied Psychology</i> , 91(6), 1189–1207.  |
| Burns, T., & Stalker, G. M. (1961)                                      | <i>The management of innovation</i> . Tavistock.  |
| Cavaleiro, S. C., Gomes, C., & Lopes, M. P. (2020)                      | Bridge resource management: Training for the minimisation of human error in the military naval context. <i>The Journal of Navigation</i> , 73(5), 1146-1158   |
| Cohen, S. G., & Bailey, D. E. (1997)                                    | What makes teams work: Group effectiveness research from the shop floor to the executive suite. <i>Journal of Management</i> , 23(3), 239–290.  |
| Comfort, L. K., Boin, A., & Demchak, C. C. (2010)                       | <i>Designing resilience: Preparing for extreme events</i> . University of Pittsburgh Press.   |
| Costa, N. A. (2018)   | <i>Human-centred design for maritime technology and e-navigation</i> (Doctoral dissertation, University of Southampton). CORE.<br><a href="https://core.ac.uk/download/pdf/198039565.pdf">https://core.ac.uk/download/pdf/198039565.pdf</a>                                 |
| Cotterell, J., Ash, R., & Sykes, R. (2021)                              | The Suez Canal blockage: Lessons in supply chain fragility. <i>Journal of Shipping and Trade</i> , 6(1), 1–15.  |
| Daniels, D. M. (2017)   | Effects on Multicultural Crews on Shipping Safety. <i>Unpublished Master's Thesis, California Maritime Academy, California</i> . Retrieved from <a href="https://scholarworks.calstate.edu/downloads/x059c828x">https://scholarworks.calstate.edu/downloads/x059c828x</a> . |
| Danielsen, B. E., Haavardtun, P., & Lützhöft, M. (2022)                 | Barriers to usability in ship bridge design: Stakeholder tensions and SOLAS V/15. <i>WMU Journal of Maritime Affairs</i> , 21(3), 287–314.  |
| Dekker, S. (2011)   | <i>Drift into failure: From hunting broken components to understanding complex systems</i> . CRC Press.   |
| Delarue, A., Van Hootegem, G., Procter, S., & Burrige, M. (2008)        | Teamworking and organizational performance: A review of survey-based research. <i>International Journal of Management Reviews</i> , 10(2), 127–148.   |

|   |  |
|---|--|
| DiMaggio, P. J., & Powell, W. W. (1983)         | The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. <i>American Sociological Review</i> , 48(2), 147–160.  |
| Donaldson, L. (2001)                            | <i>The contingency theory of organizations</i> . Sage Publications.  |
| Edmondson, A. (1999)                            | Psychological safety and learning behavior in work teams. <i>Administrative Science Quarterly</i> , 44(2), 350–383   |
| Edmondson, A. C. (2019)                         | <i>The fearless organization: Creating psychological safety in the workplace for learning, innovation, and growth</i> . Wiley  |
| Endsley, M. R. (2018)                           | From here to autonomy: Lessons learned from human–automation research. <i>Human Factors</i> , 61(1), 5–27  |
| Erez, M., & Gati, E. (2004)                     | A dynamic, multi-level model of culture: From the micro-level of the individual to the macro-level of a global culture. <i>Applied Psychology</i> , 53(4), 583–598   |
| Fruth, M., & Teuteberg, F. (2017)               | Digitization in maritime logistics—What is there and what is missing? <i>Cogent Business &amp; Management</i> , 4(1), 1411066.<br><a href="https://doi.org/10.1080/23311975.2017.1411066">https://doi.org/10.1080/23311975.2017.1411066</a>  |
| Goleman, D. (1995)                              | <i>Emotional intelligence</i> . Bantam Books   |
| Gong, D., Ren, L., Liu, S., & Yan, X. (2022)    | Compensation and coordination mechanisms on China's railway public transportation service. <i>Transport Policy</i> , 115, 101-112.   |
| Grech, M. R., Horberry, T., & Smith, A. (2002)  | Human error in maritime operations: Analyses of accident reports using the Human Factors Analysis and Classification System. <i>Maritime Policy &amp; Management</i> , 29(1), 61–75.   |
| Greve, M., & Hansen, M. W. (2024)               | The role of shipping and logistics MNCs in economic development: A case study of how Maersk contributed to Vietnam’s ascendance to an export oriented economy. <i>Journal of Shipping and Trade</i> , 9(4), 1–23.<br><a href="https://doi.org/10.1186/s41072-023-00161-w">https://doi.org/10.1186/s41072-023-00161-w</a> |
| Hamad, H. B. (2016)                             | <i>The East African community’s maritime domain: an innovative institutional framework</i> (Doctoral dissertation, University of Greenwich)  |
| Hetherington, C., Flin, R., & Mearns, K. (2006) | Safety in shipping: The human element. <i>Journal of Safety Research</i> , 37(4), 401–411. <a href="https://doi.org/10.1016/j.jsr.2006.04.007">https://doi.org/10.1016/j.jsr.2006.04.007</a>   |

|   |  |
|---|--|
| Hofstede, G. (2001)                                       | <i>Culture's consequences: Comparing values, behaviors, institutions, and organizations across nations</i> (2nd ed.). Sage.  |
| Hollnagel, E. (2014)                                      | <i>Safety-I and Safety-II: The past and future of safety management</i> . Ashgate  |
| Hollnagel, E., Woods, D. D., & Leveson, N. (Eds.). (2006) | <i>Resilience engineering: Concepts and precepts</i> . Ashgate, Aldershot  |
| Hutchins, E. (1995)                                       | <i>Cognition in the wild</i> . MIT Press   |
| IMO. (2010)   | <i>Bridge resource management: Guidance for ship operators</i> . International Maritime Organization   |
| Kast, F. E., & Rosenzweig, J. E. (1985)                   | <i>Organization and management: A systems and contingency approach</i> (4th ed.). McGraw-Hill  |
| Katzenbach, J. R., & Smith, D. K. (1993)                  | <i>The wisdom of teams: Creating the high-performance organization</i> . Harvard Business School Press   |
| Katzenbach, J. R., & Smith, D. K. (2005)                  | <i>The wisdom of teams: Creating the high-performance organization</i> . HarperBusiness  |
| Kotter, J. P. (1996)                                      | <i>Leading change</i> . Harvard Business School Press  |
| Lamm, A., (2022)  | Shore-based control center architecture for teleoperation of autonomous ships. In <i>Proceedings of the 19th International Conference on Informatics in Control, Automation and Robotics</i> (pp. 431–438). SCITEPRESS.<br><a href="https://www.scitepress.org/Papers/2022/112660/112660.pdf">https://www.scitepress.org/Papers/2022/112660/112660.pdf</a> |
| Lawrence, P. R., & Lorsch, J. W. (1967)                   | <i>Organization and environment: Managing differentiation and integration</i> . Harvard Business School Press  |
| Lazakis, I., (2023)                                       | Organizational structure configurations: Evidence from Greek shipping companies. <i>Maritime Policy &amp; Management</i> , 50(7), 883–901.   |
| Lewin, K. (1947)  | Frontiers in group dynamics. <i>Human Relations</i> , 1(1), 5–41   |
| Li, Y., et al. (2024)                                     | Study on the hierarchical structure of container port systems along the South China Sea: Relationships between port tiers and network functions. <i>Frontiers in Marine Science</i> , 11, 1339515.<br><a href="https://doi.org/10.3389/fmars.2024.1339515">https://doi.org/10.3389/fmars.2024.1339515</a>  |
| Lundh, M., & Rydstedt, L. W. (2016)                       | A static organization in a dynamic context—A qualitative study of changes in the work environment on board Swedish merchant ships  |

|   |   |
|---|---|
|   | 1980–2009. <i>Applied Ergonomics</i> , 55, 1–9.<br><a href="https://doi.org/10.1016/j.apergo.2016.01.005">https://doi.org/10.1016/j.apergo.2016.01.005</a>  |
| Lützhöft, M. H., & Dekker, S. W. A. (2002)            | On your watch: Automation on the bridge. <i>Journal of Navigation</i> , 55(1), 83–96. <a href="https://doi.org/10.1017/S0373463301001576">https://doi.org/10.1017/S0373463301001576</a>   |
| Marks, M. A., Mathieu, J. E., & Zaccaro, S. J. (2001) | A temporally based framework and taxonomy of team processes. <i>Academy of Management Review</i> , 26(3), 356–376   |
| Martínez, F., Larriba, Y., & Abie, H. (2024)          | Maritime cybersecurity: Protecting digital seas. <i>International Journal of Information Security</i> , 23(6), 1341–1365.<br><a href="https://doi.org/10.1007/s10207-023-00800-0">https://doi.org/10.1007/s10207-023-00800-0</a>  |
| Mayo, E. (1933)                                       | <i>The human problems of an industrial civilization</i> . Macmillan.  |
| McGregor, D. (1960)                                   | <i>The human side of enterprise</i> . McGraw-Hill   |
| Milliken, F. J., & Martins, L. L. (1996)              | Searching for common threads: Understanding the multiple effects of diversity in organizational groups. <i>Academy of Management Review</i> , 21(2), 402–433  |
| Mintzberg, H. (1979)                                  | <i>The structuring of organizations</i> . Prentice-Hall   |
| Nahapiet, J., & Ghoshal, S. (1998)                    | Social capital, intellectual capital, and the organizational advantage. <i>Academy of Management Review</i> , 23(2), 242–266  |
| Nonaka, I., & Takeuchi, H. (1995)                     | <i>The knowledge-creating company: How Japanese companies create the dynamics of innovation</i> . Oxford University Press   |
| Notteboom, T., & Haralambides, H. (2020)              | Port economics, management and policy in the COVID-19 era. <i>Maritime Economics &amp; Logistics</i> , 22(3), 329–352.<br><a href="https://doi.org/10.1057/s41278-020-00162-7">https://doi.org/10.1057/s41278-020-00162-7</a>   |
| Olson, G. M., & Olson, J. S. (2000)                   | Distance matters. <i>Human–Computer Interaction</i> , 15(2), 139–178.   |
| Paukstat, B., Grech, M. R., & Kitada, M. (2022)       | The impact of the COVID-19 pandemic on seafarers’ mental health and chronic fatigue: Beneficial effects of onboard peer support, external support and internet access. <i>Marine Policy</i> , 141, 105094.  |
| Porathe, T. (2022)                                    | Remote monitoring of autonomous ships: A quickly getting real scenario. In A. M. M. Soares & F. Rebelo (Eds.), <i>Advances in Human Factors in Transportation, AHFE 2022</i> (pp. 597–605). AHFE Open Access. <a href="https://openaccess-api.cms-conferences.org/articles/download/978-1-958651-36-0_79">https://openaccess-api.cms-conferences.org/articles/download/978-1-958651-36-0_79</a> |

|   |  |
|---|--|
| Powell, A., Piccoli, G., & Ives, B. (2004)                            | Virtual teams: A review of current literature and directions for future research. <i>The DATABASE for Advances in Information Systems</i> , 35(1), 6–36  |
| Praetorius, G., Hollnagel, E., & Dahlman, J. (2015)                   | Modelling vessel traffic service to understand resilience in everyday operations. <i>Reliability Engineering &amp; System Safety</i> , 141, 10–21.<br><a href="https://doi.org/10.1016/j.ress.2015.03.020">https://doi.org/10.1016/j.ress.2015.03.020</a>  |
| Progoulaki, M., & Theotokas, I. (2010)                                | Human resource management and competitive advantage: An application of resource-based view in the shipping industry. <i>Marine Policy</i> , 34(3), 575–582. <a href="https://doi.org/10.1016/j.marpol.2009.11.004">https://doi.org/10.1016/j.marpol.2009.11.004</a>  |
| Pugh, D. S., & Hickson, D. J. (1989)                                  | <i>Writers on organizations</i> . Penguin Books  |
| Radic, A., Lück, M., Ariza-Montes, A., Han, H., & Chambers, C. (2020) | Connected at sea: The influence of the internet and online communication on the well-being and life satisfaction of cruise ship employees. <i>International Journal of Environmental Research and Public Health</i> , 17(3), 937.  |
| Raza, Z., Woxenius, J., Vural, C. A., & Lind, M. (2023)               | Digital transformation of maritime logistics: Exploring trends in the liner shipping segment.<br><a href="https://www.sciencedirect.com/science/article/pii/S016636152200207X">https://www.sciencedirect.com/science/article/pii/S016636152200207X</a>   |
| Roberts, K. H. (1990)   | Some characteristics of one type of high reliability organization. <i>Organization Science</i> , 1(2), 160–176.<br><a href="https://doi.org/10.1287/orsc.1.2.160">https://doi.org/10.1287/orsc.1.2.160</a>   |
| Roberts, K. H., & Bea, R. (2001)                                      | Must accidents happen? Lessons from high-reliability organizations. <i>Academy of Management Executive</i> , 15(3), 70–79.<br><a href="https://doi.org/10.5465/AME.2001.5229613">https://doi.org/10.5465/AME.2001.5229613</a>  |
| Saha, R., (2023)  | Mapping competence requirements for future shore control centre operators. <i>Maritime Policy &amp; Management</i> , 50(7), 903–919.<br><a href="https://doi.org/10.1080/03088839.2021.1930224">https://doi.org/10.1080/03088839.2021.1930224</a>  |
| Salas, E., Sims, D. E., & Burke, C. S. (2005)                         | Is there a "Big Five" in teamwork? <i>Small Group Research</i> , 36(5), 555–599  |
| Sampson, H., & Ellis, N. (2019)                                       | <i>Seafarers' mental health and wellbeing</i> . Institution of Occupational Safety and Health. <a href="https://iosh.com/media/n0gpp31w/iosh-research-seafarers-mental-health-wellbeing-full-report.pdf">https://iosh.com/media/n0gpp31w/iosh-research-seafarers-mental-health-wellbeing-full-report.pdf</a> |

|  |   |
|--|---|
| Schippers, M. C., Den Hartog, D. N., & Koopman, P. L. (2007) | Reflexivity in teams: A measure and correlates. <i>Applied Psychology</i> , 56(2), 189–211  |
| Senge, P. M. (1990)  | <i>The fifth discipline: The art and practice of the learning organization</i> . Doubleday  |
| Spinnaker Global. (2015)                                     | <i>Managing multicultural teams in shipping</i> . <a href="https://spinnaker-global.com/1386_05-01-2015_managing-multicultural-teams/">https://spinnaker-global.com/1386_05-01-2015_managing-multicultural-teams/</a>   |
| Tang, L., Zhang, P., & Li, X. (2022)                         | Seafarers' mental health during the COVID-19 pandemic: An examination of supportive measures and their perceived effectiveness. <i>Marine Policy</i> , 138, 104984. <a href="http://www.sciencedirect.com/science/article/pii/S0308597X22003232">www.sciencedirect.com/science/article/pii/S0308597X22003232</a>                        |
| Theotokas, I. (2018)   | <i>Management of shipping companies</i> . Routledge   |
| Theotokas, I., Lagoudis, I. N., & Raftopoulou, K. (2024)     | Challenges of maritime human resource management for the transition to shipping digitalization. <i>Journal of Shipping and Trade</i> , 9(1),6.  |
| Trist, E., & Bamforth, K. (1951)                             | Some social and psychological consequences of the longwall method of coal-getting. <i>Human Relations</i> , 4(1), 3–38  |
| Trompenaars, F., & Hampden-Turner, C. (1998)                 | <i>Riding the waves of culture: Understanding diversity in global business</i> . McGraw-Hill  |
| Tuckman, B. W. (1965)  | Developmental sequence in small groups. <i>Psychological Bulletin</i> , 63(6), 384–399  |
| Uhl-Bien, M., & Marion, R. (2009)                            | Complexity leadership in bureaucratic forms of organizing: A meso model. <i>The Leadership Quarterly</i> , 20(4), 631–650   |
| Veitch, E. A., Kaland, , Alsos (2021)                        | Designing for resilient human–system interaction in autonomy: The case of a shore control centre for unmanned ships. In <i>Proceedings of the 23rd International Conference on Engineering Design (ICED21)</i> (pp. 1024–1033). Design Society. <a href="https://doi.org/10.1017/pds.2021.102">https://doi.org/10.1017/pds.2021.102</a> |
| Weber, M. (1947)   | <i>The theory of social and economic organization</i> . Free Press  |
| Weick, K. E., & Sutcliffe, K. M. (2001)                      | <i>Managing the unexpected: Assuring high performance in an age of complexity</i> . Jossey-Bass   |
| Weick, K. E., & Sutcliffe, K. M. (2015)                      | <i>Managing the unexpected: Sustained performance in a complex world</i> (3rd ed.). Wiley   |
| West, M. A. (2012)   | <i>Effective teamwork: Practical lessons from organizational research</i> (3rd ed.). Blackwell  |
| Woodward, J. (1965)  | <i>Industrial organization: Theory and practice</i> . Oxford University Press   |

|  |   |
|--|---|
| Wright, P. M., & McMahan, G. C. (1992) | Theoretical perspectives for strategic human resource management. <i>Journal of Management</i> , 18(2), 295–320   |
| Yan, R., Li, Z., & Wang, Y. (2024)     | Improving ship energy efficiency: Models, methods, and applications. <i>Applied Energy</i> , 361, 122838.<br><a href="http://www.sciencedirect.com/science/article/abs/pii/S0306261924005154">www.sciencedirect.com/science/article/abs/pii/S0306261924005154</a> |