

UNIVERSITY OF PIRAEUS



DEPARTMENT OF MARITIME STUDIES

**MSc in Sustainability and Quality in
Marine Industry**

**COMPETENCE MANAGEMENT SYSTEM:
APPLICATIONS IN SHIPPING COMPANIES**

Aurela Gjini

Dissertation

Submitted to the Department of Maritime Studies of University of Piraeus in partial fulfillment
of the requirements for the degree of MSc in Sustainability and Quality in Marine Industry

Piraeus

February 2025

DECLARATION OF AUTHENTICITY

“The person, who submits the Masters’ dissertation is fully responsible for the definition of the fair use of the material, which is based upon the following factors: the purpose and nature of the use (commercial, non-profitable or educational), the nature of the material which is used (part of the text, boards, shapes, pictures or maps), the percentage and the significance of the part, which is used in comparison to the whole, under copyright text, and of the possible consequences of this use in the purchase or the overall value of the under copyright text.”

EVALUATION COMMITTEE

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

The members of the Committee are:

- Chatzinikolaou Stefanos (Supervisor)
- Daniil Georgios
- Tselepides Anastasios

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

ACKNOWLEDGMENTS

I would sincerely like to thank Professor Stefanos Chatzinikolaou who advised me to take on such an interesting and upcoming subject as my Thesis and for guiding me with patience and understanding from the beginning until the completion of it. I would like to thank the members of the supervising committee for their valuable contribution and also special thanks to all our Academic Lecturers of MSc Program in Sustainability & Quality in Marine Industry, for assisting us throughout the academic year and for transferring to us valuable knowledge.

Last but not least, I would like to thank my sisters and my parents for their constant love and support and my partner, George, for always being there for me.

ABSTRACT

The main purpose of this thesis is to analyze how Competency Management Systems work, their systematic development and their application for more than four decades in the Human Resources Departments of the Companies, and more specifically their application in the Shipping Companies, both for their ashore staff and also on board crew.

This thesis attempts to study the application of these systems in Shipping Companies through the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), taking into account the technical skills that seafarers should have according to their rank. However, in addition to the technical skills of seafarers, non-technical skills, also known as “soft skills” are being studied based on the requirements of Tanker Management and Self-Assessment 3 (TMSA 3), which play a decisive role in the safety and efficiency of operations of tankers vessels.

In addition, reference is made to assessment methods for competence and the behavioral assessment proposed by Oil Companies International Marine Forum (OCIMF) and the International Association of Tanker Owners (INTERTANKO).

Lastly, based on all of the above, ways are proposed for the successful implementation of Competence Management Systems (CMS), the objectives of these systems, their implementation (resources, skills identification, tools, and evaluations), the monitoring and improvement of them, as well as the integrating them into already existing systems.

Keywords: Competency management system, shipping, human resources, crew, International health organization (IMO), technical skills, soft skills, tanker, Tanker Management and Self-Assessment 3 (TMSA 3), Oil Companies International Marine Forum (OCIMF), International Association of Tanker Owners (INTERTANKO).

ΠΕΡΙΛΗΨΗ

Ο κύριος σκοπός αυτής της εργασίας είναι η ανάλυση των Συστημάτων Διαχείρισης Επάρκειας Προσόντων, η συστηματική ανάπτυξη τους και εφαρμογή τους για παραπάνω απο τέσσερις δεκαετίες στα Τμήματα Ανθρώπινου Δυναμικού των Εταιρειών, και πιο συγκεκριμένα η εφαρμογή τους στις Ναυτιλιακές εταιρείες, τόσο στο προσωπικό γραφείου όσο και στα πληρώματα.

Η εργασία αυτή επιχειρεί να μελετήσει την εξέλιξη των συστημάτων αυτών στις Ναυτιλιακές εταιρείες μέσα από τις απαιτήσεις της Διεθνής Σύμβασης για τα Πρότυπα Πιστοποιητικών Εκπαιδύσεως και Τηρήσεως Φυλακών των Ναυτικών (STCW) λαμβάνοντας υπόψη τις τεχνικές ικανότητες που θα πρέπει να κατέχουν οι ναυτικοί ανάλογα με θέση τους. Πέρα όμως από τις τεχνικές δεξιότητες των ναυτικών παραθέτονται και μη τεχνικές δεξιότητες με βάση τις απαιτήσεις Διαχείρισης και Αυτοαξιολόγησης Δεξαμενόπλοιων 3 (TMSA 3), γνωστές και ως οριζόντιες ή «μαλακές» δεξιότητες, οι οποίες παίζουν καθοριστικό ρόλο στην ασφαλή και αποτελεσματική λειτουργία των δεξαμενόπλοιων.

Επιπλέον, γίνεται αναφορά στις μεθόδους αξιολόγησης ικανότητας με βάση την αξιολόγηση συμπεριφοράς που προτείνεται από το Διεθνές ναυτιλιακό φόρουμ Εταιρειών Πετρελαίου (μια εθελοντική ένωση εταιρειών πετρελαίου που ενδιαφέρονται για την αποστολή και τερματισμό αργού πετρελαίου, προϊόντων πετρελαίου κ.α. γνωστή με το ακρωνύμιο OCIMF) και την Διεθνής Ένωση Πλοιοκτητών Δεξαμενοπλοίων (INTERTANKO).

Τέλος, με βάση όλα τα παραπάνω προτείνονται τρόποι για την πετυχημένη εφαρμογή των Συστημάτων Διαχείρισης Επάρκειας Προσόντων, αναφέρονται οι στόχοι του συστήματος, η εφαρμογή τους (πόροι, προσδιορισμός δεξιοτήτων, εργαλεία, αξιολογήσεις), η παρακολούθηση και βελτίωση των συστημάτων αυτών καθώς και η ενσωμάτωση τους σε ήδη υπάρχοντα συστήματα.

Λέξεις κλειδιά: Σύστημα διαχείρισης ικανοτήτων, ναυτιλία, ανθρώπινο δυναμικό, πληρώματα, Διεθνής οργανισμός υγείας, τεχνικές δεξιότητες, μαλακές δεξιότητες, δεξαμενόπλοιο, Διαχείρισης και Αυτοαξιολόγησης Δεξαμενόπλοιων 3, Διεθνές ναυτιλιακό φόρουμ Εταιρειών Πετρελαίου, Διεθνής Ένωση Πλοιοκτητών Δεξαμενοπλοίων

TABLE OF CONTENTS

CHAPTER 1	8
1.1 INTRODUCTION	8
1.2 Competence Management systems (CMS) – origin, development and applications in the broader industryING	10
CHAPTER 2	13
2.1 Competence versus Competency – The differentiators	13
2.2 CMS in shipping companies	14
2.2.1 CMS for office personnel.....	17
2.2.2 CMS for onboard personnel.....	18
CHAPTER 3	21
3.1 Technical Skills as per STCW	21
3.2 Non-technical skills (TMSA3).....	22
3.3 Assessment methods for competence - Behavioral assessment proposed by OCIMF/INTERTANKO: Status and gaps	30
CHAPTER 4	34
4.1 Proposed CMS for onboard personnel.....	34
4.2 System objectives and targets	35
4.3 Implementation (resources, skills identification, tools, assessments).....	37
4.4 System monitoring and improvement.....	39
4.5 System integration into existing management systems	41
CONCLUSION.....	44
REFERENCES	Error! Bookmark not defined.

CHAPTER 1

1.1 INTRODUCTION

Competence management is the systematic development of human resources in organizations and competence management systems shall report this systematic development (Jurgen Dorn, Markus Pichlmair, 2023). These systems are designed to manage and monitor the competencies of the workforce, track employee certifications, and ensure that the right personnel with the appropriate skills are assigned to specific tasks and positions. In the shipping industry, competence management systems play a crucial role in ensuring the smooth and efficient operation of shipping businesses.

Competence Management Systems (CMS) have been utilized in the shipping industry for several years. However, the adoption and implementation of such systems may vary among different companies and regions. CMS is a structured approach to managing and evaluating the competence of seafarers and shore-based personnel in the maritime sector.

The International Maritime Organization (IMO) has been actively promoting the use of CMS to ensure the competency of personnel working in the shipping industry. The IMO's Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW Convention) sets out the international standards for training, certification, and watchkeeping for seafarers (IMO, 2023). It recognizes the importance of competence management and requires shipping companies to have effective systems in place to assess and maintain the competence of their personnel.

Over the years, as technology and best practices have evolved, shipping companies have increasingly adopted CMS to enhance safety, efficiency, and compliance in their operations. CMS help identify competency gaps, address training needs, and maintain high standards across the workforce.

Based on my professional experience as a Crew operator for almost 5 years, an overview of how competence management systems are relevant to the shipping business is as per below:

1. Crew Competence and Training: Shipping companies rely on skilled and competent crew members to operate vessels safely and efficiently. Competence management systems help track the training, qualifications, and certifications of crew members, ensuring they meet

the required standards set by international maritime regulations, such as the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW).

2. **Safety and Compliance:** The shipping industry is subject to strict safety and environmental regulations. Competence management systems assist in maintaining compliance by ensuring that crew members are adequately trained in safety procedures, emergency response protocols, and environmental protection measures.
3. **Performance and Efficiency:** Competent and well-trained crew members are more likely to perform their duties effectively, leading to increased operational efficiency. Competence management systems can track performance metrics, identify areas for improvement, and implement training programs to enhance productivity.
4. **Risk Management:** In a high-risk environment like shipping, having competent crew members reduces the likelihood of accidents and incidents. Competence management systems contribute to risk management by ensuring that crew members possess the necessary skills and knowledge to handle challenging situations.
5. **Crew Rotation and Planning:** Shipping operations often involve long voyages and crew rotations. Competence management systems help in planning crew rotations by matching the right personnel to specific voyages based on their competencies and experience.
6. **Training Needs Analysis:** These systems can conduct training needs analyses to identify gaps in the crew's skills and knowledge. Based on the analysis, targeted training programs can be developed to address those gaps and improve overall competence levels.
7. **Certification and Documentation Management:** Competence management systems maintain a central repository of crew members' qualifications and certifications. This makes it easier for shipping companies to ensure that all crew members' documents are up-to-date and valid.
8. **Adherence to Industry Standards:** With rapidly changing regulations and industry standards, competence management systems help shipping companies stay up-to-date with the latest requirements and ensure that their crew members are trained accordingly.

Overall, competence management systems are vital tools for shipping businesses to enhance safety, efficiency, and compliance while effectively managing their human resources. By maintaining a competent workforce, shipping companies can better navigate the challenges of the industry and deliver their services with high levels of professionalism and reliability.

1.2 COMPETENCE MANAGEMENT SYSTEMS (CMS) – ORIGIN, DEVELOPMENT AND APPLICATIONS IN THE BROADER INDUSTRYING

Competence Management Systems (CMS) first emerged as essential tools in Human Resource area and later on was used from various industries to manage and optimize workforce competencies, skills, and qualifications. They help organizations identify and address competency gaps, improve employee performance, and ensure that the right people with the right skills are in the right positions (Lindgren, 2004). Tracking down the origin, development, and applications of CMS in the broader industry would help understand why they are so important to personnel and Companies regardless of the Industry.

As previously mentioned above, the concept of Competence Management Systems has its roots in the field of human resource management and organizational development. The focus on competencies began to gain traction in the latter half of the 20th century. Key milestones in the development of CMS include Competency-Based Education (CBE), Total Quality Management (TQM) (Mohammad Tahla, 2004), ISO and other standards and advancements in information technology.

More specifically, Competency-Based Education (CBE) is the foundation of competency management can be traced back to the emergence of competency-based education models, which started to gain prominence in the 1970s. CBE emphasized the acquisition and demonstration of specific skills and knowledge, rather than traditional educational models based solely on time spent in a classroom.

Total Quality Management (TQM) is a movement that gained prominence in the 1980s and 1990s and emphasized the importance of workforce competencies in achieving quality outcomes. Organizations began to recognize that employee skills were crucial for delivering superior products and services. The history of total quality management (TQM) began initially as a term coined by the Naval Air Systems Command to describe its Japanese-style management approach

to quality improvement (History of Total Quality Management, 2023). An umbrella methodology for continually improving the quality of all processes, it draws on knowledge of the principles and practices of:

- The behavioral sciences
- The analysis of quantitative and non-quantitative data
- Economics theories
- Process analysis

Another key milestone in the development of CMS is the International Organization of Standardization (ISO) and other standards (Fonseca, Domingues, 2017). Mainly ISO, but also other industry-specific standards (such as Green Mark and IEMA) encouraged organizations to adopt competency management practices. It is worth mentioning that ISO 9001, includes requirements related to employee competence and training.

Lastly, advancements in information technology helped the development and widespread adoption of information technology and learning management systems in the 1990s and 2000s provided the technological infrastructure needed to implement robust CMS.

Competence management systems find applications in broader various industries, including but not limited to Oil and Gas industries, healthcare, manufacturing, aviation, education, IT and software development, construction and so on.

In the oil and gas sector, CMS helps manage the competencies and certifications of personnel working on rigs and other offshore installations. Safety-critical roles require specific skills and qualifications, which competence management systems track and verify (Jain and Ogle 2015). In the healthcare industry, these systems ensure that medical professionals maintain the necessary credentials and skills to provide high-quality patient care. They also assist in managing training and certifications for different medical procedures (Kak N, Burkhalter B, Cooper, 2023).

When it comes to manufacturing sector, CMS aids in identifying and addressing skill gaps among workers to enhance production efficiency and product quality. It can also support workforce planning and talent development initiatives (Le, Ly, 2017). Respectively in the aviation industry, CMS is crucial for tracking and managing the competencies of pilots, air traffic controllers, and

maintenance personnel. Compliance with safety regulations is heavily reliant on a competent workforce (Aviation Maintenance Human Factors, 2017).

In the IT sector, CMS helps assess and enhance the technical competencies of software developers, IT support staff, and other technology professionals and also ensures teams stay up-to-date with the rapidly evolving technologies (Kashirin, Semenov, Ostrovskaya, Kokuytseva, Strenaluk, 2023). Also, CMS can be used in Education and more specifically at Universities. Competence management systems at universities could be used for storing, evaluating and reasoning about competencies of students (Dorn & Pichlmair, 2007).

2.1 COMPETENCE VERSUS COMPETENCY – THE DIFFERENTIATORS

"Competence" and "competency" are terms that are often used interchangeably, but they have distinct meanings and implications, especially in certain contexts like human resources and skill assessment.

The term competence refers to the overall ability of an individual or an organization to perform tasks, solve problems, and achieve specific goals successfully. It is a broad term that encompasses critical skills, knowledge, and experience, behaviors relevant to a particular domain or role, and it is associated to best practices specific to define tasks leading to optimal accomplishment of organizational goals or enhanced organizational performance (Gilbert, 1996). Competence can be enhanced through suitable interventions, such as on-the-job training, learning and development activities that are job specific and focused on enhancing organizational excellence.

Competency refers to specific skills, knowledge, and behaviors that an individual possesses and can apply effectively in a given context or situation. Competencies are more specific and measurable than competence and they refer to the intrinsic knowledge, skills, attitudes, and behaviors (KSAB) of top performers in any field, discipline, industry or institution and replicate them in others through suitable learning and development interventions. Thus competencies are defined in the context of an individual and refer to the inborn traits and behaviors of an individual. Competencies can be polished through suitable learning interventions and can be defined as knowledge, skills, mindsets and through patterns result in great performance. (Dubois, 1998)

Competence implies a broader and more general capability to perform well in a particular area or field. For example, a person might be competent in project management, which means they have a good understanding of the principles and practices of project management, whereas competency refers to a narrower set of skills or attributes that contribute to an individual's overall competence. In the context of project management, competencies may include skills like risk assessment, stakeholder management, and task scheduling.

Regarding measurement, competence can be challenging to quantify precisely because it involves a combination of various factors like knowledge, skills, attitudes, and experience. It is often

assessed through performance evaluations, self-assessments, or feedback from peers and supervisors.

Competency on the other hand is more measurable and specific, making it easier to assess and develop. Organizations often use competency models that outline the essential competencies required for specific roles, which helps in evaluating employee performance more objectively.

As for the development, competence requires a more comprehensive approach, focusing on enhancing the overall capability of individuals or organizations within a specific domain or industry. In the contrary the development of competency is easier, since it involves specific skills and knowledge. Training programs can be designed to address particular competencies and improve an individual's performance in that area.

Lastly, competence can be seen as a more general or long-term attribute that reflects an individual's overall capability in a broader context. Competency is often tied to specific tasks or responsibilities within a role. Individuals can have varying levels of competency in different areas even if they are generally competent in their field.

In summary, competence is a broader and more general term that describes an individual or organization's overall ability to perform well in a particular domain. Competency, on the other hand, is more specific and refers to the particular skills, knowledge, and behaviors that contribute to an individual's competence. Both concepts are important in assessing and developing the capabilities of individuals and organizations.

2.2 CMS IN SHIPPING COMPANIES

Competence management systems for office personnel are software tools or frameworks designed to assess, track, and develop the skills and abilities of employees working in office environments. These systems aim to ensure that employees have the necessary knowledge and expertise to perform their jobs effectively. Implementing a competence management system in a shipping company can be a complex process, but it is essential for ensuring the safety, efficiency, and compliance of the company's operations.

Maritime transport is the backbone of global trade, around 11 billion tones being carried in 2018 (UNCTAD 2019). The cargoes are shipped in over 90,000 vessels that constitute an environment in which over 1.6 million seafarers work (ICS 2020).

Given its global nature, shipping is very susceptible to macroeconomic trends and influences. The most recent one being the outbreak of COVID-19, which greatly affected Shipping Industry by causing interruptions in ordinary ship and crew rotations. Physical dimensions and equipment on board are affected by environmental regulations and tightened competition. General trends including increasing the size of vessels and the level of automation have reduced crew numbers in relative terms. Having fewer people onboard increases the workload and broadens the roles of those who remain (Caesar et al. 2020). Trading patterns are also changing as steps are being taken to reduce the number and duration of port calls—to increase efficiency. All these developments underline the need for flexibility and social skills among present-day seafarers. Crews are notably multi-national, the major suppliers being China and the Philippines (ICS 2020). Managing everyday operations in such an international environment requires constantly increasing levels of competence skills.

Following the interview with Ms. Noela Paragiou, Training Manager of Navios Shipmanagement, there are steps that have been proven efficient to help establish a competence management system in order for all employees either ashore or on board crew to achieve top performance.

1. **Assessment of Training Needs:** Conducting a thorough assessment of the shipping company's training needs is required in order to identify the different roles and responsibilities within the organization, and determine the specific competencies required for each role. This step involves analyzing existing job descriptions, identifying skill gaps, and understanding industry regulations and standards.
2. **Competence Framework Development:** A competence framework that outlines the required skills, knowledge, and behaviors for each position in the company will need to be created. This framework will serve as a foundation for developing training programs and assessing employees' competence levels.
3. **Training Program Development:** Based on the competence framework, training programs that align with the identified needs need to be designed and developed. These programs may include on-the-job training, classroom sessions, e-learning modules, simulation

exercises, and practical hands-on experiences. The training needs to be comprehensive and cover all relevant aspects of the job.

4. **Training Delivery:** Implement the training programs and ensure that all employees receive the necessary training. The shipping company may need to involve internal trainers or external training providers, depending on the complexity of the training requirements.
5. **Assessment and Evaluation:** Regularly assess and evaluate employees' competence levels to measure the effectiveness of the training programs. Use various assessment methods, such as written exams, practical evaluations, and performance reviews, to determine if employees meet the required competence standards.
6. **Competence Records Management:** Establish a system for managing and maintaining competence records for each employee. These records should include details of completed training, qualifications, certifications, and any other relevant information related to their competence.
7. **Performance Management and Feedback:** Integrate competence management into the company's performance management process. Provide employees with regular feedback on their performance and offer support if there are any gaps in their competence.
8. **Continuous Improvement:** Competence management is an ongoing process. Continuously review and update the competence framework and training programs to stay aligned with industry best practices, regulations, and changes within the company.
9. **Communication and Awareness:** Ensure that all employees are aware of the competence management system and its importance. Communicate the benefits of the system and encourage employees to actively engage in their own professional development.
10. **Compliance and Reporting:** Ensure that the competence management system complies with industry regulations and standards. Keep track of the training records and be prepared to provide reports and evidence of competence when required by external authorities.
11. **Management Support:** Obtaining support from senior management is crucial for the successful implementation of a competence management system. Ensure that management is committed to the process and allocates appropriate resources for its execution.

As per Ms. Paragiou, by following these steps, Navios Shipmanagement has established a robust competence management system that enhances safety, efficiency, and overall performance within the organization.

2.2.1 CMS FOR OFFICE PERSONNEL

In order to evaluate the role of CMS in larger companies, we interviewed Ms. Maria Elissavet Papageorgiou, HR Specialist. As per Ms. Papageorgiou, CMS play a crucial role in talent development, performance improvement, and workforce planning. Ms Papageorgiou was able to highlight some key features and components that are typically found in competence management systems for office personnel, such as competency framework, skills assessments, individual development plans, training and learning management, as per below:

1. **Competency Framework:** A well-defined competency framework is the foundation of any competence management system. It includes a comprehensive list of the skills, knowledge, behaviors, and attributes required for each role within the organization. These competencies are typically aligned with the company's goals and values.
2. **Skills Assessment:** The system should allow for the assessment of employees' skills and competencies. This can be done through self-assessment, manager assessments, or 360-degree feedback from colleagues and peers. This process helps identify gaps in employees' skill sets and areas for improvement.
3. **Individual Development Plans (IDPs):** Based on the assessment results, the system should facilitate the creation of personalized Individual Development Plans (IDPs) for each employee. These plans outline specific training, learning, and development activities aimed at enhancing their competencies.
4. **Training and Learning Management:** The competence management system should integrate with the organization's training and learning management platforms. This integration allows employees to easily access relevant training resources and courses to address their skill gaps.
5. **Progress Tracking:** The system should provide tools to track employees' progress in their development plans. Managers and HR personnel can monitor how employees are improving their competencies over time.

6. **Performance Management Integration:** Integration with the organization's performance management system helps tie competency development to overall job performance. Employees can receive feedback on their competencies during performance evaluations, and improvements in competencies can be recognized and rewarded.
7. **Succession Planning:** Competence management systems can aid in succession planning by identifying potential candidates for future leadership positions based on their competency profiles.
8. **Analytics and Reporting:** The system should offer analytics and reporting capabilities to assess the overall competency levels within the organization, identify trends, and evaluate the effectiveness of the competency development initiatives.
9. **User-Friendly Interface:** A user-friendly and intuitive interface is essential to encourage adoption and regular usage of the competence management system by employees and managers.
10. **Data Security and Privacy:** As with any HR-related system, data security and privacy are of utmost importance. The system should adhere to best practices to protect sensitive employee information.

It is worth noting that the specific features and functionalities of competence management systems can vary depending on the vendor and the organization's needs. When selecting a system, it's essential to evaluate how well it aligns with your company's requirements and long-term goals for employee development.

2.2.2 CMS FOR ONBOARD PERSONNEL

A Competence Management System (CMS) for onboard personnel is a crucial tool used in the maritime industry to ensure that all crew members possess the required skills, knowledge, and qualifications to perform their assigned tasks and duties effectively and safely while onboard a vessel. This system helps shipping companies and vessel operators manage the competence of their crew members, monitor their training progress, and ensure compliance with international regulations and industry standards.

Key features and components of a Competence Management System for onboard personnel may include:

1. **Competence Profiles:** Create comprehensive profiles for each crew member that outlines their roles, responsibilities, required competencies, and specific training requirements. These profiles are tailored to different ranks and positions on the vessel.
2. **Competence Assessment:** Conduct regular assessments to evaluate each crew member's performance and competence in their designated roles. These assessments can be a combination of practical evaluations, written tests, and interviews.
3. **Training Needs Analysis:** Identify gaps in knowledge and skills among the crew members and determine the training courses or programs necessary to bridge these gaps. This analysis ensures that crew members receive relevant and timely training.
4. **Training Management:** Manage and track the training activities of individual crew members, including organizing courses, scheduling training sessions, and recording training completion.
5. **Certification Management:** Keep track of the expiration dates of certifications, licenses, and other qualifications required for specific roles and ensure timely renewal.
6. **Document Management:** Maintain a centralized repository for all relevant documents, including training records, certificates, and competence assessments.
7. **Reporting and Analytics:** Generate comprehensive reports and analytics to monitor the overall competence levels of the crew, identify trends, and make data-driven decisions to improve the efficiency and safety of onboard operations.
8. **Integration with HR Systems:** Seamlessly integrate the CMS with the Human Resources (HR) system to facilitate crew management, onboarding, and crew rotation processes.
9. **Compliance and Regulatory Requirements:** Ensure that the CMS aligns with industry regulations, international standards such as the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW), and other relevant guidelines.
10. **Accessibility:** Provide a user-friendly interface that allows both crew members and management personnel to access the CMS easily, view their records, and update information as needed.

Implementing a Competence Management System for onboard personnel can significantly enhance crew performance, minimize risks, and ensure that vessels operate safely and efficiently in compliance with industry regulations. It is essential to involve key stakeholders, including crew members, training experts, and management, in the design and implementation process to tailor the system to the specific needs of the organization and its vessels.

CHAPTER 3

3.1 TECHNICAL SKILLS AS PER STCW

The Standards of Training, Certification, and Watchkeeping (STCW) is an international convention established by the International Maritime Organization (IMO) to ensure that seafarers have the necessary skills and competencies to work safely and effectively on board ships. The convention sets out specific minimum requirements for the training and certification of seafarers in various roles. The technical skills required vary depending on the specific position or rank on the ship. Here are some of the key technical skills as per STCW for certain roles (Manila amendments to the STCW Convention and Code, IMO, 2010):

1. Navigational Skills (Deck Department):

- Proficient use of navigational instruments and equipment (Electronic Chart Display and Information System / ECDIS).
- Ability to interpret navigational charts and publications.
- Knowledge of ship handling and maneuvering techniques.
- Understanding of meteorology and its impact on ship operations.
- Radar and Automatic Radar Plotting Aid (ARPA) operation.

2. Engineering Skills (Engine Department):

- Knowledge of marine engineering systems, including propulsion, electrical, and auxiliary machinery.
- Proficiency in the operation and maintenance of shipboard equipment.
- Understanding of engine room watchkeeping procedures.
- Troubleshooting and problem-solving abilities related to engineering systems.

3. Cargo Handling Skills (Deck Department):

- Safe loading, stowage, and securing of cargo on board.
- Familiarity with different types of cargo and their handling requirements.

- Proper use of cargo handling equipment, such as cranes and forklifts.
4. Firefighting and Safety Skills:
 - Fire prevention and firefighting techniques.
 - Understanding of various fire detection and extinguishing systems on board.
 - Knowledge of personal safety and survival techniques, including the use of life-saving appliances.
 5. Communication Skills:
 - Efficient use of communication equipment, including radio and satellite systems.
 - Ability to use the International Maritime Language for effective communication.
 6. Medical First Aid Skills:
 - Basic knowledge of first aid and medical treatment.
 - Familiarity with medical equipment and supplies on board.
 7. Ship Security Skills:
 - Awareness of security threats and measures to prevent security incidents on board.
 - Understanding of the Ship Security Plan and implementation of security procedures.

These are just a few examples of the technical skills required for different positions on board a ship as per STCW. The convention covers a wide range of roles and responsibilities, and each has its own specific skillset and training requirements. Seafarers undergo rigorous training and assessments to meet these standards and ensure the safety and efficiency of maritime operations.

3.2 NON-TECHNICAL SKILLS (TMSA3)

Beside the above mentioned technical skills, seafarers (regardless of their rank or position on board of the vessel) are also required to have non-technical skills. More specifically, as per TMSA3, which refers to the Tanker Management and Self-Assessment (TMSA) third edition, that is a framework developed by the Oil Companies International Marine Forum (OCIMF) to assess and improve the safety and environmental performance of tanker shipping companies. Tanker

Management and Self-Assessment 3 includes guidelines and best practices related to various aspects of tanker operations, including both technical and non-technical skills (OCIMF, 2017).

Non-technical skills, also known as "soft skills" or "interpersonal skills," play a crucial role in the safe and efficient operation of tanker ships. These skills are essential for the crew to effectively work together, communicate, and manage critical situations. Some key non-technical skills emphasized in TMSA3 for the maritime industry consist of six competency domains:

1. **Teamwork:** Teamwork involves cooperation, collaboration, support and respect among crew members. It's crucial for tasks that require multiple individuals to work together harmoniously to achieve a common goal, such as mooring, cargo operations, or emergency response. The subcategories of teamwork are participation, inclusiveness and consideration of others, supporting others and conflict resolution.

When it comes to participation crew is actively encouraged to participate in team tasks, allow input and feedback from others and build rapport and establish common bond with other crew members. Each crew member is also encouraged to establish an atmosphere for open communication and participation and idea generation. In order to achieve the required standard for teamwork, crew is advised not to block communication, not to create barriers between crewmembers, not to compete with others and not to support individualistic or silo ways of working.

Regarding inclusiveness and consideration of others, crew is requested to help others feel appreciated, valued and included, be respectful and understanding, notice suggestions of other crew members and give detailed and constructive personal feedback. On the other hand, crew is advised not ignore suggestions of other crew members, not to show lack of concern regarding others peoples' feelings or lack of respect, not to show little appreciation of others' contribution to the team or treat some crewmembers more favorably than others.

As for supporting others, all crew are encouraged to help others in demanding situations and share their expertise when needed. For the safety and wellbeing of all, crew is advised not to hesitate to help their colleagues in demanding times and not to withhold information or be unwilling to share their knowledge.

Lastly, when it comes to conflicts resolution is required to keep calm, suggest solutions in order to resolve conflicts, and express their disagreement constructively by giving alternative or different perspectives. It should be avoided for crew to overreact emotionally in interpersonal conflicts, blame other crewmembers for the conflict and use challenging inappropriate language or behaviors. Crew should not be reluctant to find a compromising solution to a conflict in order for it to deescalate and should be as objective as possible during conflicts or disputes.

2. Communication and influencing: Effective communication is vital for safe and efficient operations on board a tanker ship. It involves clear and concise verbal and written communication, active listening, and the ability to convey information accurately to all members of the crew, including senior/line managers, colleagues and subordinates. The subcategories of communication and influencing are shared understanding, style of communication, feedback and persuasion.

When referring to shared understanding, all crew members should be able to clearly explain plans, expectations and roles to others, give clear and concise briefings and updates at appropriate times, ask questions and observe other to confirm their understanding and use all kind of communication methods, such as spoken, written, hand signals etc. in order to convey clearly the message to the intended recipients. They should avoid unclear briefings or providing updates at inappropriate time, not to check whether plans and expectations have been understood and not to encourage feedback or questions.

Regarding style of communication, language should be used appropriately (i.e. Clear phrasing, terminology and speed of delivery), cultural diversity should be acknowledged, the amount of communication appropriate for each situation should be understood and right medium should be used to deliver message (i.e. Face-to-face, radio, email etc.). Also, views and personal opinions should be clearly put forward all while listening to other. It should be avoided for crew to use inappropriate language or have a tone, to provide vague information and communication and to not consider the other persons culture diversity.

Also, when it comes to feedback, crew is encouraged to actively seek and ask for feedback and receive it constructively. Feedback should not be welcomed or viewed as negative review; hence crew should not act defensively or aggressively to it.

Lastly, persuasion should be applied in a way where others are influenced resulting in acceptance, agreement and/or behavior change, and be communicated in a way that elicits appropriate actions from others. Persuasion should not fail to gain buy-in to important messages or be about crew pushing their own agenda rather than acting in line with company's objectives.

3. **Situational Awareness:** Maintaining situational awareness involves being cognizant of the ship's surroundings, understanding the current conditions, and anticipating potential risks or hazards. By having situation awareness crew can develop effective strategies to manage potential threats. The subcategories for situation awareness are awareness of vessel systems and crew, awareness of external environment and awareness of time.

Regarding awareness of vessel system and crew, it is important for crew to monitor, cross-check and report changes in vessel system states, to monitor, probe and report signs of changes in the state or behavior of other crewmembers and acknowledge entries and changes to vessel systems. Crew should not avoid asking for updates regarding vessel systems and other crew, or fail to notice signal awareness of changing systems and/or signal awareness if crewmembers' deteriorating state or behavior.

As for awareness of external environment, crew is encouraged to maintain awareness of the present state of vessel systems and environment (vessel's position, weather, shipping traffic etc.), contact outside resources if any environmental necessity occurs and share information about the environment with others. It could be a big threat to the environment and the safety of all crew on board, if crew fails to enquire about environmental changes and their impact on the vessel, is unaware of external environment, is not regularly and timely updated re vessel's position, weather or traffic, ignores external reports re environmental changes or changes of other vessels' status and if crew does not interrogate, verify or cross-check external information about the environment against information from internal vessel systems or crewmembers' reports.

Lastly, as for awareness of time, crew should be able to anticipate future states, upcoming threats and their consequences, discuss contingency strategies, use any available resource in order to manage threats and take timely and mindful actions. What should be avoided is for crew to be unable or unwilling to make predictions of future states and threats, to not

discuss the relationship between past and present/future events and be surprised by the outcome of events, having little or no contingency planning.

4. Decision making: Sound decision-making skills and readiness to make decisions and take actions are essential for handling routine operations, as well as emergency situations. This includes the ability to analyze information, assess risks, and make timely and appropriate decisions. The subcategories of decision making are problem definition and diagnosis, option generation, risk assessment and option selection, and outcome review.

When referring to problem definition and diagnosis, crew is expected to be able to gather information and identify any possible problems, to review causal factors and consult those with specialist expertise or local knowledge when required. In order to ensure safety on board, crew should clearly state or define the problem and not fail to diagnose it, should be able to discuss probable causes with other crewmembers and should not allow for commercial pressure (either real or perceived) to influence their actions. Also, they should not be making decisions without first recognizing or acknowledging their own limitations or lack of experience.

As for option generation, all crewmembers should be able to generate multiple responses to a problem, encourage idea generation, challenge existing norms and state alternative courses of action. They should not be focusing on a narrow range to respond to problems and not search for alternative ways of action.

Moreover, in regards to risk assessment and option selection crew should have the ability to assess and share the risks and benefits of different courses of action through decision, select the best response to a problem, confirm selected course of action and implement same in a timely manner and also consider option from external advisers (such as Pilot), but retain decision making responsibility and accountability. They should be able to adequately evaluate possible actions avoiding selecting a course of action without first having done a clear risk analysis. Crew should not fail to inform other crewmembers of decisions taken, should not have any difficulty making decisions when faced with complex or ambiguous data, should avoid constantly changing their decision when new information has not been presented and should not normalize risk.

Lastly, regarding outcome review, crew should check the outcome of a solution against goals or plans and should be able to review the quality of the decision made. They should not fail to check selected outcome against goal and should not show little consideration for the quality of decisions made.

5. Results focus: To focus on achieving desired results and what is the best way to achieve them. To take conscientious actions to do a specific task/job, using initiative and energy, while demonstrating flexibility and emotional toughness. The elements of this domain are initiative, determination, flexibility, emotional toughness and accountability and dependability.

As for taking initiative, crew should be able to identify what needs to be done and initiate appropriate action, implement new ideas and propose new ways to apply them, put extra effort to achieve objectives and challenge accepted risks, processes or measurements. Crew should not avoid doing any of the above, and should be able to accept additional responsibilities in the context of their role. Also, they should not avoid doing all but what is asked of them and should not need supervision to complete a routine task.

Regarding determination, all crewmembers are encouraged to push themselves and others to reach milestones, renew and increase efforts to achieve goals and solve problems, look for opportunities to help achieve team objectives and willingly put in extra time and effort in crisis situations. It is advisable for crew not to fail to sustain pace and progress over a period of time, to keep their performance at high standards and not to allow work to drift away from priorities.

When it comes to flexibility crew is expected to respond positively to change, embrace new ideas or practice to accomplish goals and solve problems, adapt to changing business needs, conditions and responsibilities, adapt their approach and methods to achieve solutions and results and to show others the benefits of change. It should be avoided sticking to outdated methods, putting off making changes and making little or no attempt to promote change positively.

As for emotional toughness, it is expected for crew to be able to recover quickly from setback and respond with increased effort, to persist in the face of difficulty and find other ways to complete a task, to handle high workloads, vague assignments, competing

demands, interruptions and distractions with composure. It is expected from crew to be calm and maintain focus in emergencies. It is advisable for crew not to constantly think about past failures, struggle to maintain focus in difficult situations, and fail to perform mentally or physically, panic, react inappropriately or with hostility to stressful situations.

Lastly, when it comes to accountability and dependability, crew is expected to effectively manage time and resources in order to accomplish tasks, prioritize from most to less important, take personal responsibility for the quality and the timeliness of work, achieve work with no need for supervision, follow instructions, policies and procedures, stay focused and meet productivity standards, deadlines etc. and acknowledge and correct mistakes by taking personal responsibility. Crew should have no difficulty using time efficiently, should not fail to prioritize or plan ahead, should not be slow to respond to priorities, should not be distracted or miss deadlines and should not defer authority and decision making to others.

6. **Leadership and Managerial skills:** Leadership skills are necessary for officers and senior crew members to guide and motivate their teams. Effective management ensures that tasks are delegated appropriately, resources are allocated efficiently, and the ship operates smoothly. The elements of this domain are setting direction, empowerment, authority and assertiveness, providing and maintaining standards, planning and coordination and workload management.

Regarding setting direction, it is required for crew to communicate clearly their expectations, to consider the long-term needs prior to committing to a course of action and act on clear on strategies and work programs. On the other hand, failing to create direction for the team and demonstration of lack of knowledge to wider issues may lead to serious communication problems on board.

Moreover, when it comes to empowerment, crew should support each other in order to have a level of independence at their assigned jobs, should be crew an open talk environment with clear and direct flow of information, should encourage others to acquire new skills and develop themselves, recognize and appreciate other's contributions to the team, develop respectful relationships with other crew members, care about their welfare and finally create a feeling of achieving goals and results together as a team.

Micromanaging, lack of support to one's initiative, lack of motivation and appreciation towards other crewmembers should be avoided. Also, taking credit for others' achievements and delegate without giving responsibility or authority.

In addition regarding authority and assertiveness, each crew member should aim to create a culture that enables challenge and participation all while maintaining command authority. Crew is encouraged to review and raise concerns regarding plans of actions, create a trusting environment where all crew can feel safe to openly share lack of knowledge, take decisive actions, take command when necessary and advocate for their position. Inappropriate language or bad behaviors should be avoided, as well as blaming the crew for things that went wrong. No crew should be left to cope alone in difficult situations or tolerate behavior that negatively affects the performance, development or morale of others.

In order to provide and maintain standards, crew should demonstrate high ethical and moral standards, ensure compliance with Company's policies and procedures and intervene when and if necessary. Each crewmember should use appropriate tools and notifications when dealing with non-routine operations and challenge existing processes in order to find new innovative ways to improve team's work and vessel's operations. Every person should avoid being a poor role model by not complying with existing policies and procedures or set standards that are unclear, not realistic or way to challenging to comply with.

Regarding planning and coordination, crew is expected to organize tasks and resources, set achievable goals, make plans and set measurable milestones with quality timescale and quality standards. Shared understanding and participation is highly encouraged among all crewmembers and delegation in order for top performance to be achieved. Also, monitoring plans for achieving targets and reviewing plans and intention as clear as possible are an important tool for proper planning and communication. Changing plans without crew being informed or strictly following plans without understanding current circumstances may lead to bad planning and wrong coordination among crewmembers.

Lastly, for high performance to be achieved roles and responsibilities need to be clearly predefined for both normal and abnormal situations including workload assignments. Crew should prioritize and manage primary and secondary operational tasks, distribute tasks appropriately among the crew and balance the needs of every team member. In order to

maintain safety standards on board and for vessel's operation to be smooth, it is very important for each crew member to understand when they or another member of the team is being work overloaded, is showing signs of stress and fatigue and to act promptly to assist. Lastly, crew is encouraged to use any available external or internal resources in order to complete assigned tasks on time. Inadequate workload planning, delegating work unequally across the team, set unrealistic deadlines and lack of awareness or consideration could put too much pressure on crew and could result to disastrous consequences.

To conclude, from all the above it is understood that TMSA3 framework assesses and encourages the development of both technical and non-technical skills for all crewmembers in order to enhance the safety, efficiency, and environmental performance of tanker shipping companies. Maritime organizations typically focus on training, drills, and assessments to ensure that their crews possess the necessary non-technical skills to excel in their roles.

3.3 ASSESSMENT METHODS FOR COMPETENCE - BEHAVIORAL ASSESSMENT PROPOSED BY OCIMF/INTERTANKO: STATUS AND GAPS

Assessment methods for competence are essential in various fields, such as education, employment, and professional certifications, to evaluate an individual's knowledge, skills, and abilities. The assessment methods used may vary depending on the context and the specific competencies being assessed (Spencer, 1993). Observation is usually the main method of assessment but there are also a number of different methods that can be used to evaluate competence such as written, practical and oral examinations, observations, self-assessment and reflection, performance reviews, case studies, simulations and online assessments, explained as per below (OCIMF 2023).

- **Written Examinations:** These traditional tests assess theoretical knowledge and understanding of a subject or skill. They may include multiple-choice questions, short answers, essays, or problem-solving tasks.
- **Practical Examinations:** Practical assessments evaluate an individual's ability to perform specific tasks or skills. This can include hands-on activities, demonstrations, or simulations.

- **Oral Examinations:** Oral assessments involve verbal communication and can be used to evaluate an individual's understanding, problem-solving abilities, and communication skills.
- **Observations:** Direct observations of an individual's performance in real-life work activities on site or in a simulator (if in a simulator, the assessor should have received appropriate guidance in instructional techniques involving the use of simulators) can provide valuable insights into their competence.
- **Self-assessment and Reflection:** Individuals may be asked to evaluate their own competence and reflect on their strengths and areas for improvement. This method encourages self-awareness and metacognition.
- **Peer Assessment:** In peer assessment, individuals are evaluated by their colleagues or peers who have similar levels of expertise. This can be valuable in team-based environments.
- **360-Degree Feedback:** This assessment method involves gathering feedback from various sources, including supervisors, peers, subordinates, and customers. It provides a comprehensive view of an individual's competence and performance.
- **Performance Reviews:** In the workplace, regular performance reviews can be used to assess competence and set goals for improvement.
- **Case Studies:** Case studies present individuals with real-world scenarios that require them to apply their knowledge and skills to analyze and solve problems.
- **Simulations:** Simulations replicate real-life situations and allow individuals to demonstrate their competence in a controlled environment.
- **Online Assessments:** With the advancement of technology, online assessments have become popular, especially for assessing theoretical knowledge and specific skills.

When designing an assessment process for competence, it is essential to ensure that the methods used are valid, reliable, fair, and aligned with the specific competencies being evaluated. Additionally, it's crucial to consider the context and purpose of the assessment to make it relevant and meaningful for the individuals being assessed.

Behavioral assessment in the maritime industry is a critical aspect of ensuring safe operations and mitigating human error. The traditional focus has been on technical aspects and equipment reliability, but there is growing recognition that human factors play a significant role in maritime incidents.

While there is no specific joint proposal by OCIMF and INTERTANKO, current status and gaps can be highlighted regarding behavioral assessments in the maritime industry.

CURRENT STATUS

- **Industry Awareness:** There is an increasing recognition of the importance of behavioral assessments in enhancing safety within the maritime industry. Many companies have started considering the human element as a crucial aspect of their safety management systems.
- **Crew Resource Management (CRM):** Some shipping companies have implemented CRM training programs to improve communication, teamwork, and decision-making among the crew members. CRM is an essential part of the behavioral assessment process.
- **Reporting Systems:** Various organizations have set up confidential reporting systems to encourage seafarers to report incidents and near-misses related to human factors. These reports help in identifying patterns and areas for improvement.

GAPS

- **Standardized Behavioral Assessment Framework:** One of the significant gaps in the industry is the lack of a standardized behavioral assessment framework. There is a need for guidelines or best practices that shipping companies can follow to assess and manage the human factors effectively.
- **Training and Awareness:** While CRM training is beneficial, it may not be universally implemented across all companies and vessels. More extensive awareness and training programs on human factors and behavioral assessment are necessary for the entire industry.
- **Data Collection and Analysis:** Although there are reporting systems in place, the data collected may not always be utilized effectively to identify trends and assess human performance factors leading to incidents.

- **Integration with Safety Management Systems:** Integrating behavioral assessment tools and strategies into existing safety management systems can be challenging for some shipping companies.
- **Cultural and Organizational Challenges:** Addressing behavioral aspects and promoting a safety culture may require significant changes in the organizational structure and attitudes within some maritime companies.

It is crucial for organizations like OCIMF and INTERTANKO to work together to develop comprehensive and effective behavioral assessment frameworks that can be implemented across the industry.

4.1 PROPOSED CMS FOR ONBOARD PERSONNEL

Competence management systems play a crucial role in ensuring that a Company's workforce possesses the skills and knowledge necessary to achieve its goals. Enriching competence management systems on board involves improving and optimizing the processes and tools used to identify, develop, and assess the competencies of employees. By combining existing CMS and identifying gaps, potential opportunities for innovation and development can be uncovered.

Here under are some proposed ideas to enhance competence management systems, such as creating interactive learning platforms, continuously develop skill mapping and gap analysis, introduce a real-time feedback mechanism etc.

1. Implement interactive e-learning platforms that offer engaging and personalized learning experiences. These platforms can include multimedia content, simulations, and gamified elements to make learning more enjoyable and effective.
2. Develop advanced skill mapping tools that automatically analyze the current skills of employees and identify skill gaps. This can help in creating targeted training programs to address specific competency deficiencies.
3. Introduce a real-time feedback system where employees and managers can provide ongoing feedback on performance and competencies. This ensures that the competence management system is dynamic and responsive to changing skill requirements.
4. Integrate competence management with performance management systems to align individual goals and development plans with organizational objectives. This linkage helps in creating a more holistic view of employee performance.
5. Utilize artificial intelligence (AI) and machine learning (ML) algorithms to predict future skill requirements based on industry trends, technological advancements, and organizational goals. This enables proactive competency planning.
6. Develop mobile applications that facilitate on-the-go learning, allowing employees to access training materials and competency assessments anytime, anywhere. This is especially beneficial for remote or field-based employees.

7. Encourage peer-to-peer learning through collaborative platforms where employees can share their expertise and learn from each other. This can include discussion forums, mentorship programs, and knowledge-sharing initiatives.
8. Establish certification programs to formally recognize employees who attain specific competencies. This not only motivates employees but also provides a tangible way to measure and acknowledge their skill development.
9. Implement robust data security and privacy measures to protect sensitive employee information within the competence management system. Compliance with data protection regulations is crucial.
10. Design an intuitive and user-friendly interface for the competence management system to enhance user adoption. A system that is easy to navigate encourages employees to actively participate in their own development.
11. Empower employees to take ownership of their career development by providing them with tools to self-assess their competencies, set development goals, and track their progress over time.
12. Ensure seamless integration with other HR systems such as talent management, recruitment, and workforce planning to create a unified and comprehensive approach to human capital management.

By incorporating these ideas, all organizations and companies can create a more dynamic, responsive, and employee-centric competence management system that aligns with the evolving needs of the workforce and the organization.

4.2 SYSTEM OBJECTIVES AND TARGETS

Primary objectives and targets of a Competence Management System can vary depending on the specific needs and goals of the organization. Below are some of the most important objectives and targets:

- **Identifying Core Competencies:** The CMS aims to identify the key competencies required for various job roles within the organization. This involves defining the skills, knowledge, and behaviors necessary for successful job performance.

- **Assessing Employee Competencies:** The system should provide a structured and reliable process to assess the competencies of employees. This assessment can be conducted through various methods, such as performance evaluations, skill tests, self-assessments, and peer reviews.
- **Bridging Skill Gaps:** Once competency assessments are completed, the CMS helps identify skill gaps in the workforce. This allows organizations to develop targeted training and development programs to improve employee skills and performance.
- **Enhancing Performance:** The ultimate goal of the CMS is to enhance overall employee performance. By addressing skill gaps and providing opportunities for growth, the system contributes to increased productivity and efficiency in the organization.
- **Supporting Career Development:** The CMS can be utilized to create clear career paths and progression opportunities for employees. When employees see a transparent path for growth within the organization, it can lead to increased motivation and loyalty.
- **Ensuring Compliance and Quality Standards:** In some industries, certain competencies are required to meet regulatory standards or maintain quality assurance. The CMS helps ensure that employees possess the necessary qualifications to comply with these standards.
- **Succession Planning:** By identifying high-potential employees and their competencies, the CMS aids in succession planning. Organizations can groom and prepare individuals for leadership roles to ensure a smooth transition in case of key personnel departures.
- **Increasing Employee Engagement:** When employees feel that their development is being actively supported and that their skills are valued, it tends to improve engagement and job satisfaction.
- **Resource Allocation and Workforce Planning:** The CMS provides valuable data on the skills and capabilities of the workforce, enabling better resource allocation and strategic workforce planning.
- **Measuring the Effectiveness of Training and Development:** The CMS helps evaluate the impact of training and development initiatives on employee competencies and performance, allowing organizations to fine-tune their learning programs.

- **Enhancing Organizational Agility:** In rapidly changing industries, a CMS can be instrumental in ensuring that the organization can adapt to new challenges by continuously developing the required competencies.
- **Linking Competencies to Business Objectives:** The CMS aligns employee competencies with the organization's strategic goals, ensuring that the workforce is equipped to contribute effectively to achieving those objectives.

In summary, a well-implemented Competence Management System contributes to the overall success of an organization by aligning employee competencies with business objectives, fostering employee development, and ensuring the organization remains adaptable and competitive in the market.

4.3 IMPLEMENTATION (RESOURCES, SKILLS IDENTIFICATION, TOOLS, ASSESSMENTS)

Implementing a competence management system involves various steps and considerations to ensure its effectiveness. This system is designed to identify, assess, and develop the skills and resources of employees within an organization. Below is a proposed step-by-step guide on how to implement a competence management system:

- **Define Objectives and Scope:**

The objectives of the competence management system will need to be clearly defined and the scope of the system, including which departments, roles, and skill areas will be covered will need to be determined. Understanding the specific needs and goals of the organization to tailor the system accordingly is a key component.

- **Identify Competencies and Skills:**

To work with key stakeholders, such as HR, department heads, and subject matter experts, to identify the critical competencies and skills required for each role within the organization. These competencies should align with the organization's strategic goals and job requirements.

- **Resource Allocation:**

Appropriate resources for the implementation of the system to be allocated. This may include budget, personnel, time, and technological infrastructure. Investing in software or tools that can streamline the competence management process may be beneficial for the Company.

- **Select Competence Assessment Tools:**

Appropriate tools and methods for assessing employees' competencies to be chosen carefully, to be aligned with the competencies being measured and are user-friendly. This can include self-assessment, peer assessment, manager assessment, 360-degree feedback, skill tests, or performance evaluations.

- **Competence Profiles:**

To develop competence profiles for each job role, outlining the required skills and proficiency levels. These profiles serve as a reference point for employees, managers, and HR to understand the expected skill levels for each role.

- **Gather Skill Data:**

To collect data on employees' skills and competencies using the assessment tools chosen in Step 4. This data can come from various sources, such as surveys, interviews, training records, or performance evaluations.

- **Establish Skill Development Plans:**

Based on the assessment data, create individual skill development plans for employees. These plans should outline areas for improvement and the appropriate training or development activities needed to enhance their competencies.

- **Training and Development Opportunities:**

To provide employees with access to training and development opportunities that align with their skill development plans. This can include workshops, online courses, on-the-job training, mentoring, or coaching.

- **Monitor and Review Progress:**

To continuously monitor employees' progress in their skill development journey. Regularly review competence assessments and update skill profiles as necessary to reflect changing job requirements and organizational goals.

- **Integrate with Performance Management:**

Integrate the competence management system with the organization's performance management process. Linking competencies to performance evaluations can help align individual development with overall performance and business goals.

- **Communication and Training:**

To communicate the competence management system to all employees, ensuring they understand its purpose, benefits, and how it will impact their professional growth. Provide training on how to use the assessment tools and other components of the system effectively.

- **Feedback and Continuous Improvement:**

To gather feedback from employees and managers on the effectiveness of the competence management system. Use this feedback to make improvements and refine the system over time.

The competence management is an ongoing process, and the system should adapt to the changing needs of the organization and its employees. Regularly revisit and update competence profiles and skill development plans to ensure they remain relevant and impactful.

4.4 SYSTEM MONITORING AND IMPROVEMENT

A competence management system (CMS) is a structured approach to identify, assess, monitor, and improve the competencies of all employees. In order for a Company to properly implement a competence management system and to monitor and improve same, below step-by-step actions are proposed:

- **Define Competencies:** To start by identifying the key competencies required for each role within your organization. These competencies should align with the organization's strategic goals and the specific requirements of each job.

- **Assessment and Measurement:** To develop a method for assessing the current competencies of employees. This might include self-assessment, supervisor evaluations, peer assessments, or even formal tests and certifications. To use this data to create a baseline for each employee's competency level.
- **Gap Analysis:** To compare the assessed competencies with the required competencies for each role. This will help identify competency gaps, where employees may lack essential skills or knowledge.
- **Training and Development Plans:** Based on the gap analysis, create personalized training and development plans for each employee. These plans should address the identified competency gaps and help employees acquire the necessary skills.
- **Training Implementation:** Provide employees with the necessary training opportunities, which can include workshops, courses, seminars, online training, on-the-job training, and mentoring programs.
- **Monitor Progress:** Regularly monitor employees' progress in their training and development plans. Keep track of completed courses, acquired certifications, and improvements in competency levels.
- **Feedback and Coaching:** To provide continuous feedback and coaching to employees to support their learning and development journey. Regularly review their progress and address any challenges they may encounter.
- **Performance Evaluation:** Link competence management to the organization's performance evaluation process. To consider competency improvement as one of the evaluation criteria for promotions and salary increments.
- **Reward and Recognition:** To recognize and reward employees who actively engage in their competency development and demonstrate improved skills and performance.
- **Periodic Competence Review:** To conduct periodic reviews of the competence management system to assess its effectiveness. Identify areas of improvement and make necessary adjustments to enhance the system's efficiency.

- **Adapt to Changing Needs:** As the organization evolves, so will the required competencies. Continuously reassess the competencies needed in various roles and adjust the competence management system accordingly.
- **Utilize Technology:** To consider using software or tools that can facilitate competence management, track training progress, and generate reports on employee competencies.
- **Promote a Learning Culture:** Companies to foster a culture of continuous learning and development within their organization. To encourage employees to take ownership of their competency improvement and make learning a valued aspect of the workplace.

Organizations could create a robust competence management system that ensures employees are equipped with the necessary skills and knowledge to meet current and future challenges by continuously monitoring and improving the system. That will lead to a more competent and capable workforce, positively impacting the overall performance and success of the organization.

4.5 SYSTEM INTEGRATION INTO EXISTING MANAGEMENT SYSTEMS

Integrating a Competence Management System (CMS) into existing management systems is a strategic move to enhance employee performance, optimize skill development, and align organizational goals with individual capabilities. By integrating CMS, as per below integration process, into your existing management systems, you can ensure that employee competencies are effectively identified, assessed, and utilized across the organization.

- **Assessment of existing management systems** by reviewing and assessing the current management systems to understand their structure, processes, and data flows. Identify areas where competence management can be seamlessly integrated to ensure a smooth implementation.
- **Define objectives and requirements of the Competence Management System** by clearly defining the objectives of the organization integrating. Identify the competencies the organization to track and manage, such as technical skills, soft skills, certifications, qualifications, etc. Outline specific requirements to be met by the CMS to align with the organization's goals.

- It is very important to select an appropriate Competence Management System that aligns with your organization's needs, size, and complexity. Attention to be paid for features such as competency assessment tools, skill-gap analysis, learning management integration, reporting capabilities, and user-friendly interfaces.
- Data Integration and Migration: Ensure that the CMS can seamlessly integrate with Company's existing management systems, such as HRIS (Human Resources Information System) or LMS (Learning Management System). If data migration is required, plan and execute it carefully to avoid data loss or discrepancies.
- Customization and Configuration are also important in order to tailor the CMS to fit your organization's unique requirements. Configure the system to accommodate the competency framework, job roles, hierarchies, and reporting structure within your organization.
- Training and Communication: Conduct training sessions for relevant stakeholders, including HR personnel, managers, and employees, to familiarize them with the CMS. Clearly communicate the benefits of the new system, how it will impact their roles, and emphasize the importance of accurate and timely data entry.
- Pilot Implementation and Testing: Before full-scale deployment, it is advisable to run a pilot implementation to identify any potential issues or areas for improvement. That way feedback can be gathered from users and make necessary adjustments to optimize the system's performance.
- Rollout and Support: Once the pilot phase is successful, roll out the CMS across the organization. Provide ongoing support and assistance to users to ensure a smooth transition and resolve any issues that may arise.
- Continuously monitor the effectiveness of the CMS and gather feedback from users. Regularly review and update competency frameworks and assessment methodologies to adapt to changing business needs and employee development requirements.
- Data Security and Compliance: To ensure that the CMS complies with data protection regulations and maintain appropriate security measures to safeguard sensitive employee information.

By following above steps and procedures Companies and Organizations could successfully integrate a Competence Management System into their existing management systems and create a more efficient and skillful workforce within their organization.

CONCLUSION

This thesis aims to showcase how essential are Competence management systems (CMS) for shipping companies due to the complex and dynamic nature of the maritime industry. These systems play a crucial role in ensuring the effective management of human resources, fostering a culture of safety, compliance, and continuous improvement. There are several reasons why competence management systems should be a part of every shipping company such as for safety and compliance purposes, for risk mitigation, for operational efficiency, career development, adaptability to technological advances, enhanced reputation and legal compliance.

The maritime industry is subject to stringent safety and compliance regulations. Competence management systems help ensure that the crew members possess the required skills, knowledge, and qualifications to operate and maintain vessels in compliance with international maritime standards and regulations. This, in turn, contributes to a safer working environment and reduces the risk of accidents and incidents at sea. Competent and well-trained personnel are better equipped to handle emergency situations and mitigate risks effectively. CMS helps identify gaps in skills and knowledge, allowing shipping companies to address these issues through targeted training programs. This proactive approach reduces the likelihood of accidents, injuries, and environmental incidents.

Moreover, a well-implemented competence management system ensures that the crew members are proficient in their roles, leading to increased operational efficiency. Competent personnel are more likely to perform their duties effectively, contributing to smoother operations, quicker response times, and better overall performance.

It is also important to note that employees in the maritime industry, like any other sector, appreciate opportunities for career development. CMS allows shipping companies to identify skill gaps and provide training programs, certifications, and advancement opportunities. This not only enhances employee satisfaction but also contributes to higher retention rates, reducing recruitment and training costs.

Also, as every other sector in our days, maritime industry is experiencing technological advancements, including the integration of automation and digital technologies. Competence management systems facilitate the continuous development of skills to adapt to these changes.

Ensuring that the workforce is technologically competent is vital for the successful integration of new technologies and maintaining competitiveness in the industry. Shipping companies with a strong focus on competence management demonstrate a commitment to safety, environmental responsibility, and operational excellence. This commitment enhances the company's reputation in the industry, making it more attractive to customers, partners, and regulatory bodies.

Last but not least, maritime regulations and standards require companies to demonstrate that their personnel are competent and adequately trained. A well-established competence management system ensures legal compliance, reducing the risk of fines, penalties, and legal complications.

In conclusion, competence management systems are integral to the success and sustainability of shipping companies. By investing in the continuous development of their workforce, shipping companies can navigate the challenges of the maritime industry more effectively, ensuring safety, compliance, and operational excellence.

BIBLIOGRAPHY

FOREIGN

- Phillips, J. J., & Phillips, P. P. (2016), Developing Human Capital: Using Analytics to Plan and Optimize Your Learning and Development Investments. American Society for Training and Development
- Venlys (2023), Venlys Maritime Specialization Services / Training Assessors for Competence Based assessment
- Dorn, Pichlmair , (2007), A competence Management system for Universities
- Lado, Wilson , (1994) Human resource systems and sustained competitive advantage: A competency-based perspective
- Cohen-Scali (2023) Competence Management and Adult Education
- Warier , (2023) Competency Management – The conceptual framework
- OCIMF, (2017) Tanker Management and Self-Assessment 3
- OCIMF, (2018), Behavioural Competency Assessment and Verification for Vessel Operators
- Nancy R. Tague (2023), The Quality Toolbox, Third edition
- Spencer, L. M., & Spencer, S. M., (1993) General Competence Assessment
- John Wiley & Sons (1993), Competence at Work: Models for Superior Performance
- De Pril, K., & Veldhoven, D. (2002). Competence Management: A Practitioner's Guide
- Institute of Chartered Shipbrokers, (2016), Introduction to Shipping, London, Institute of Chartered Shipbrokers
- Kak N, Burkhalter B, Cooper, (2021), Measuring the Competence of Healthcare Providers

WEBSITES

- Traditional and New Ways in Competence Management: Application of HR Analytics in Competence Management, (2023), Laura Johanna Karwehl, Simone Kaufeld
<https://d-nb.info/123161384X/34>
- Total Quality Management (TQM): An Overview, (2023),
Mohammad Tahla
<https://www.emerald.com/insight/content/doi/10.1108/08880450410519656/full/html>
- A Basic Skills Core Curriculum for the Manufacturing Industry, (2023), John Conrath
<https://files.eric.ed.gov/fulltext/ED339872.pdf>
- History of Total Management Company, (2023), American Society of Quality
<https://asq.org/quality-resources/total-quality-management/tqm-history>

- The Approach to Detection and Application of the Company's Technological Competences to Form a Business-model, (2023), A. A. Chursin, A. I. Kashirin, V. V. Strenalyuk, A. S. Semenov, A. A. Ostrovskaya, T. V. Kokuytseva

<https://iopscience.iop.org/article/10.1088/1757-899X/312/1/012003/pdf>

- Review of Maritime Transport, (2019), United Nations Conference of Trade and Development
https://unctad.org/system/files/official-document/rmt2022_en.pdf

- Crew Competence Management Systems, (2023), Stefanos Chatzinikolaou
https://www.intercargo.org/wp-content/uploads/2018/01/cms_intercargo_stfch_2_2018_final.pdf

- ISO 9001:2015 Edition - Management, Quality and Value, (2023), Luís Fonseca, José Pedro Domingues

https://recipp.ipp.pt/bitstream/10400.22/9677/1/ART_CIDEM_LMF_2017.pdf

- What is competence?, (2023), Paul Hager & Andrew Gonczi
https://www.researchgate.net/publication/232061493_What_is_competence

- Competence Management - As a tool to develop new managers, (2016), Tiia Hartikainen
<https://core.ac.uk/download/pdf/80990601.pdf>

- Competence Management and Human resource development, (2007), Ritva Laakso-Manninen Riitta Viitala

<https://www.theseus.fi/bitstream/handle/10024/97090/hrdweb.pdf?sequence=1>

- The 2010 Manila Amendments to the Seafarers' Training, Certification and Watchkeeping (STCW) Code, (2010)

<https://www.fnb.upc.edu/sites/default/files/secretaria/A-II-1.pdf>

- Measuring the Competence of Healthcare Providers, (2023), Neeraj Kak, Bart Burkhalter, and Merri-Ann Cooper

https://pdf.usaid.gov/pdf_docs/pnacm829.pdf

- A Competency Management Tool for SPE Members, (2015), Alok Jain, Ken Ogle
<https://onepetro.org/JPT/article-abstract/67/01/68/209253/A-Competency-Management-Tool-for-SPE-Members>

- Aviation Maintenance Human Factors (EASA / JAR145 Approved Organisations), (2023),
Civil Aviation Authority
<https://publicapps.caa.co.uk/docs/33/CAP716.pdf>

INTERBOOKS

- Maritime sector at verge of change: learning and competence needs in Finnish maritime cluster,
(2021), Vesa Kilpi, Tomi Solakivi, Tuomas Kiiski
<https://link.springer.com/article/10.1007/s13437-021-00228-0>

ARTICLES

- Design Principles for Competence Management Systems: A Synthesis of an Action Research
Study, (2004), Rikard Lindgren, Ola Henfridsson and Ulrike Schultze