

# Enhancing Maritime Competency: Integrating Technology, Soft Skills, and Mental Health in Training (Sub-theme: Skill Development for the Future: Addressing the Maritime Industry's Talent Gap )

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## Abstract

The maritime industry is undergoing rapid transformation driven by technological innovations, stricter environmental regulations, and evolving global trade dynamics. As a result, there is a growing demand for skilled maritime professionals capable of navigating modern systems and ensuring operational efficiency, safety, and compliance. However, significant gaps exist in the current training approaches, particularly in digital skills, environmental compliance, and safety protocols. This paper addresses the need for enhanced competency and skills development within the maritime workforce, identifying key factors contributing to the skills gap, such as rapid digitalization, stricter environmental regulations, and the lack of interdisciplinary research.

Additionally, it examines the limitations of traditional teaching methods, the shortage of faculty with expertise in advanced maritime technologies, and the importance of soft skills in leadership and teamwork. The paper proposes innovative training solutions, including the integration of simulators, virtual reality, and mental health programs, as well as promoting careers in critical yet underexplored areas like marine insurance and shipbuilding. By addressing these challenges, the maritime industry can cultivate a future-ready workforce capable of thriving in a fast-evolving landscape.

**Keywords-** *Maritime education, Digitalization in shipping, Attitude Issues, Soft skills training, Emotional Intelligence, Innovative training methods*

## 1. Introduction

The maritime industry is in the midst of significant

transformation due to technological innovations, stricter regulatory requirements, and evolving global trade patterns. As the industry grows increasingly reliant on advanced technologies and sustainable practices, there is a heightened demand for skilled professionals who can operate, maintain, and manage modern maritime systems. Competency and skills development has become essential to not only improving efficiency and safety but also ensuring compliance with international regulations and maintaining industry competitiveness.

This paper discusses the critical need to enhance skills and competencies within the maritime workforce, explores the gaps in current training approaches, and outlines potential solutions to address these challenges.

## 2. Factors Contributing to the Maritime Skills Gap

### 2.1. Technological Advancements and Digitalization

The rapid digitalization of the maritime sector, including the adoption of automated systems, smart shipping, and data-driven operations, has transformed the nature of work at sea and ashore. Indian maritime professionals must acquire new skills in areas such as:

- **Automation and Control Systems:** Ships are becoming increasingly automated, with digital navigation, engine monitoring, and cargo handling systems. Professionals need expertise in operating and maintaining these advanced systems.
- **Data Analytics and Cybersecurity:** As vessels become more connected, there is a growing reliance on data analytics for operational decision-making. Additionally, the need for cybersecurity skills is

critical to protect ships from cyber threats.

To remain competitive in the global market, Indian maritime professionals must continuously update their technical knowledge and digital competencies to keep pace with these technological advancements.

## 2.2. Stricter Environmental Regulations

With the International Maritime Organization (IMO) implementing stricter environmental regulations, such as the sulphur cap and carbon reduction targets, Indian maritime professionals must be equipped with the knowledge and skills to comply with these requirements. Upskilling is essential in:

- **Environmental Compliance and Sustainability:** Professionals need to understand and implement sustainable practices, such as energy-efficient ship operations and emissions reduction techniques.

- **Alternative Fuels and Green Technologies:** Familiarity with emerging technologies like LNG, hydrogen fuel, and electric propulsion systems is necessary to ensure compliance and support India's efforts toward greener shipping.

## 2.3. Enhancing Safety and Operational Efficiency

The safety of maritime operations depends on the competency and preparedness of professionals at sea and in port. Upskilling in safety protocols, emergency response, and crisis management is critical to reducing accidents and ensuring the well-being of seafarers. Additionally, increasing operational efficiency through better management practices, including crew leadership and decision-making in high-pressure situations, is key to improving overall performance.

## 3. Gaps in Maritime Education and Training

### 3.1. Lack of Core Research in Maritime Technology

Most of India's maritime institutions focus heavily on operational training, navigation, and regulatory compliance for seafarers, while less emphasis is placed on research and development (R&D). Unlike institutions like the Indian Institutes of Technology (IITs) and National Institutes of Technology (NITs), which are recognized for their research excellence, maritime academies have historically lacked the infrastructure and faculty expertise necessary to drive core research in maritime technology.

In India, the allocation of funds toward maritime R&D has been relatively limited compared to global maritime leaders such as Norway, Japan, and South Korea, which have well-established research ecosystems. The scarcity of dedicated maritime research centers in India also hampers the nation's ability to develop indigenous technologies for areas such as:

- Ship design and optimization

- Autonomous vessels and robotics
- Renewable energy sources for shipping
- Advanced navigation and communication system

In leading maritime nations, strong collaboration between industry and academia has been instrumental in driving innovation and technological advancements. However, in India, the maritime industry and academic institutions often operate in silos, with limited interaction between the two sectors. As a result, research conducted at universities and technical institutions may not align with the practical needs and challenges faced by the maritime industry.

Maritime technology research is often overshadowed by more prominent fields such as information technology, biotechnology, and renewable energy. As a result, fewer students and researchers in India are aware of or interested in pursuing careers or research in maritime technology. This lack of engagement at the grassroots level has contributed to a relatively small pool of talent dedicated to maritime R&D.

### 3.2. Limitations of Traditional Teaching Methods

The traditional teaching approach, while effective in many contexts, has several limitations. It often promotes passive learning, where students primarily receive information rather than engaging in active problem-solving or critical thinking. This can stifle creativity and independent thought. Traditional methods also tend to follow a one-size-fits-all model, failing to accommodate different learning styles and paces, which can lead to disengagement or frustration among students.

### 3.3. Lack of soft skill training

The significance of soft skills in the maritime industry has grown as seafaring roles extend beyond technical operations. Maritime professionals, especially those in leadership positions, must communicate effectively, work in diverse teams, and manage interpersonal conflicts. These soft skills are critical for maintaining safety, ensuring compliance, and fostering a cohesive working environment onboard ship.

In an industry marked by long periods of isolation, remote environments, and high-stress situations, soft skills such as emotional intelligence and stress management contribute to better teamwork and reduced workplace tensions. Furthermore, as shipping operations become more automated, human factors like communication and decision-making become increasingly essential for smooth operations and emergency responses.

### 3.4. Attitude Issues Among Seafarers

The attitude of delaying work, often associated with low motivation or dissatisfaction, can lead to reduced operational efficiency, increased safety risks, and delays in cargo handling or vessel maintenance. This not only affects the seafarers' productivity but also impacts the overall competitiveness of Indian seafarers in the global shipping market.

Superiority complex among seafarers can be a significant issue, affecting teamwork, communication, and overall workplace harmony onboard ships. Some seafarers, especially those with more experience or senior positions, may develop a sense of entitlement or superiority, believing they are above their peers. This attitude can manifest as condescending behaviour, lack of collaboration, or reluctance to share knowledge with less experienced crew members. Such behaviour disrupts the team dynamic, which is critical in the maritime environment where cooperation and mutual respect are essential for safety and efficient operations. Forming unions, while important for protecting workers' rights, can sometimes exacerbate these issues if the focus shifts from constructive negotiation to frequent demands or strikes that disrupt operations. Union-related conflicts may lead to prolonged negotiations, creating tensions between seafarers and management. In extreme cases, these situations can escalate, causing disruptions to shipping schedules and financial losses for companies.

Addressing this requires a balanced approach: improving working conditions, ensuring fair wages, and offering better mental health support for seafarers can reduce the inclination towards delaying work. Simultaneously, fostering a healthy dialogue between unions and management can ensure that grievances are addressed without affecting operations, promoting both labour rights and operational efficiency.

### 4. Innovative Training Programs and Curriculums

#### 4.1 Use of Simulators, Virtual Reality (VR), and Augmented Reality (AR) in Maritime Training

Simulators are a vital innovation in maritime education, allowing students to safely practice navigation, vessel handling, and emergency responses by recreating real-life sea conditions in a controlled environment. These platforms provide real-time feedback, offering hands-on experience without the risks inherent in traditional training.

In addition, Virtual Reality (VR) and Augmented Reality (AR) are increasingly integrated into training programs. VR allows students to explore ship environments and operations virtually, while AR provides interactive, step-by-step guidance for

equipment maintenance and troubleshooting, enhancing both technical and operational skills.

#### 4.2. Promoting Careers in Marine Insurance and Shipbuilding

Focusing on motivating students to pursue areas like marine insurance and shipbuilding is essential for the future of the maritime industry, as these fields play critical roles in global trade and maritime operations. With technological advancements, environmental regulations, and increasing complexity in marine risks, there is a growing need for professionals who can navigate the intricacies of ship design, construction, and insurance. Encouraging students to explore these areas not only ensures a steady supply of skilled professionals but also helps address the current talent gap in the industry. By integrating real-world applications, providing mentorship from industry experts, and offering cross-disciplinary learning opportunities, maritime institutions can ignite interest in these vital fields. A focus on marine insurance and shipbuilding also equips students with specialized knowledge that is in high demand, preparing them for rewarding careers that contribute to the safe, efficient, and sustainable future of the maritime sector.

#### 4.3 Fostering Emotional Intelligence

Emotional intelligence (EI) is crucial for seafarers due to the unique challenges they face, such as long periods of isolation, working in confined spaces with multicultural crews, and dealing with high-stress environments. Here's how EI impacts the maritime profession:

- 1. Managing Stress and Loneliness:** Life at sea can be isolating, leading to stress and mental health issues. Seafarers with high emotional intelligence are better equipped to recognize their own emotions and those of others, which helps in managing stress and staying mentally resilient during long voyages.

- 2. Improving Communication:** Seafarers often work in multinational crews where cultural differences can lead to misunderstandings. EI enhances empathy and the ability to read emotional cues, improving cross-cultural communication and reducing conflicts on board.

- 3. Fostering Leadership and Teamwork:** Emotional intelligence plays a key role in leadership within maritime environments. Leaders with high EI can motivate their teams, manage conflicts, and maintain morale. They also foster a positive working environment by understanding the emotional needs of their crew members.

- 4. Crisis Management:** Seafaring often involves handling emergency situations, such as navigating storms or responding to accidents.

Seafarers with high EI are more likely to remain calm, think clearly, and manage their own emotions while providing support to others during crises.

**5. Enhancing Safety:** Emotional intelligence contributes to safety by promoting better teamwork and reducing the likelihood of stress-induced errors. It allows individuals to work collaboratively, recognize signs of fatigue or distress in others, and take proactive measures to ensure a safe working environment.

Training programs focused on emotional intelligence can significantly benefit the maritime workforce, helping professionals develop the soft skills needed for leadership, communication, and stress management, all of which are critical for safety and operational success at sea

#### 4.4. Leadership and Teamwork Training

In addition to technical knowledge, maritime education is now placing greater emphasis on soft skills such as leadership, communication, and teamwork. Maritime operations require collaboration between diverse crews, often working under pressure. Innovative training programs include team-building exercises, leadership simulations, and conflict resolution workshops to ensure future maritime professionals can manage teams effectively and navigate complex interpersonal dynamics at sea.

#### 4.5. Mental Health and Well-Being Programs

Recognizing the challenges seafarers face during long periods at sea, some maritime institutions have introduced mental health and well-being training into their curriculums. These programs address stress management, coping mechanisms, and the importance of mental resilience. By incorporating these elements into education, the industry aims to promote a healthier, more supportive environment for maritime professionals

#### Conclusion

The research highlights the critical need for modernization in maritime education, emphasizing the integration of digital skills, environmental compliance, and safety protocols into training programs. The gaps in the current educational infrastructure, particularly in faculty expertise and research, limit the ability of maritime institutions to prepare a future-ready workforce. Key solutions include the use of advanced technologies such as simulators and VR, promoting careers in underexplored sectors, and fostering soft skills like emotional intelligence and leadership.

**Further Work:** Future research could explore the long-term impact of these innovative training methods

on career progression and operational safety in the maritime industry. Additionally, studies should investigate the integration of mental health and well-being programs into maritime curriculums, particularly their effects on reducing stress and improving teamwork at sea. Cross-national comparisons of successful maritime training models could offer insights into scalable solutions for the Indian maritime sector. Lastly, the role of artificial intelligence and data analytics in further enhancing safety and operational efficiency should be explored.

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