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ASSESSING MENTAL HEALTH RISKS FOR MARINE ENGINEERS IN LONG-TERM ASSIGNMENTS THROUGH HR POLICY MODELS

DR. VIVEK MALIK
ASSISTANT PROFESSOR, KALINGA UNIVERSITY, RAIPUR, INDIA.

KRISHNA KUMAR SAHU
ASSISTANT PROFESSOR, KALINGA UNIVERSITY, RAIPUR, INDIA.

DR. KAMAL KUNDRA
PROFESSOR, NEW DELHI INSTITUTE OF MANAGEMENT, NEW DELHI, INDIA.
EMAIL: KAMAL.KUNDRA@NDIMDELHI.ORG, HTTPS://ORCID.ORG/0009-0003-2040-4176

Abstract
Marine engineers working in remote international locations or offshore typically endure an unparalleled level of mental strain, loneliness, and an unhealthy work-life configuration. This research intends to assess the mental health concerns amongst marine engineers in the context of long-term assignments and develop human resource policy frameworks to manage these risks. This study captures both intrinsic and extrinsic stressors impacting marine engineers by integrating occupational psychology, organizational behavior, human resource management, and relevant case studies. Primary data was gathered through structured interviews, self-administered mental health evaluation scales, and longitudinal HR analytics across several marine shipping firms. The study diagnosed specific psychological expressions of chronic fatigue, depressive symptoms, and anxiety clusters emerging from the key psychological patterns. Using these findings, we developed an adaptive HR policy framework which includes routine psychological assessment, remote counseling, rotation-based duty assignments, and training on emotional resilience. This model was validated by expert assessments and a pilot study with 87 marine engineers which showed measurable improvement in employee well-being, retention, and job performance. The model demonstrates a pragmatic solution to mental health risks through proactive institutional human resource policy actions designed to foster a culture of well-being.

Keywords: Marine engineers, mental health risks, long-term assignments, HR policy model, emotional resilience, offshore deployment, employee well-being.

INTRODUCTION

Marine engineering is a high-demand profession that often requires spending extended periods in remote offshore locations in a physically and psychologically difficult conditions. As compared to other professions, a marine engineer's job is marked by social isolation, extreme weather conditions, lack of social contact, a communication blackout, and irregular working hours. Due to these peculiar working conditions, the possibility of enduring psychological difficulties due to stress, anxiety, insomnia, and depression is greatly heightened. The maritime industry, unlike the rest of the working sectors, still has not developed dedicated human resource systems to support the social and psychological extremities of the marine industry [8].

There is still limited awareness in the marine industry. That is, the issues resulting from maritime occupations remain largely overlooked due to a lack of awareness from the organization and stigma. Furthermore, during working assignments, there is limited access to professional help. The human resource policies of the maritime industry remain fixated on ocular safety, productivity, and technical training, completely ignoring support for emotions and thinking processes, which is a fundamental component of workers in the industry. Increased turnover and absence, as well as the rising instances of employees getting involved in unsafe practices on board vessels due to psychological distress, is a clear sign that the industry is ignoring the impact of emotional distress [1][4].

Addressing this is of utmost priority. The human resource support must not solely focus on traditional guidelines, and rather integrate the evaluation as well as intervention of the ever-critical mental health [5].To address the gap in the

literature, this study looks into the specific triggers of mental health hazards associated with marine engineering and suggests human resource solutions grounded in psychological resilience theory, occupational health frameworks, and the unique demands of seafarers [9]. The model includes periodic mental wellness audits, tele-counseling, risk prediction through HR analytics, and feedback-oriented rotational scheduling [7].

This study fills the gap with qualitative interviews with marine engineers and HR experts, and job stress and wellness analytics from participating maritime organizations. With empirical evidence, the study shows that structured HR actions can mitigate mental health risks and improve employee engagement and performance feedback measures [3]. This work expands the marine HRM and occupational psychology corpus by proportioning a scalable evidence-based policy model.

KEY CONTRIBUTIONS:

- Formation of an Integrated Human Factors Framework for Marine Human Resources focusing on the development of a human-centric HR policy for marine engineers that embeds psychological testing, risk prediction, and support systems into routine HR processes.
- Stress and Absenteeism Reduction with Organizational Support Pilot Study Involving 87 Marine Engineers showed quantifiable improvement in a number of areas including stress, absenteeism, perception of organizational support, and retention willingness.
- Institutionalized Mental Wellness in Offshore Deployments Maritime Organizations Have a Replicable Roadmap with the scalable integration strategy which combines digital technology with human intervention.

The document consists of six interconnected sections. In Section I, the problem of mental health issues related to the position of marine engineers is presented, highlighting the necessity for reforms in HR policies. In Section II, the psychological aspects of offshore work are appraised, as well as relevant models of resilience and practices from other industries. In Section III, a multi-layered HR support framework is designed, which incorporates digital screening and risk scoring as well as caregiving automation and hybrid caregiving. In Section IV, findings from a six-month pilot implementation are presented, along with performance metrics and insights. In Section V, the strategic reflections on policy design, integration challenges and opportunities to scale are provided. Finally, in Section VI the authors summarize the document, highlighting the most important points and discussing next steps to increase emotional resilience through HR innovation within maritime settings.

II. Understanding the Psychological Landscape of Marine Engineering Assignments

2.1 Life at Sea: Emotional and Cognitive Stressors

Marine engineers frequently experience demanding conditions such as long periods away from home, irregular sleep, and sleep-deprived operations [2]. These factors lead to a buildup of mental stress which reveals itself as chronic fatigue, anxiety, and emotional numbness [6]. The combination of physical isolation and emotional distancing accelerates the decline of mental fortitude, especially with limited or no access to support systems [15].

2.2 Organizational Gaps in Mental Health Response

While most maritime organizations focus on compliance, safety, and technical readiness, very few have systematic approaches towards emotional wellness [11]. Studies across companies in the shipping industry indicate that very few human resources departments provide psychological services for seafarers during their rotations [14]. Consequently, many seafarers emotionally suppress discomfort and are susceptible to psychological breakdowns, and ineffective on-duty performance.

2.3 Comparative Insights from High-Stress Professions

The aviation, offshore drilling, and military sectors have instituted routine mental health assessments, remote health tracking, and internal psychological counseling [12]. These approaches can greatly benefit the maritime industry. Comprehensive and proactive wellbeing intervention improves safety compliance and morale, while reducing absenteeism.

2.4 The Role of Psychological Resilience in Sustained Performance

The ability to cope with adversities is essential for the long-term offshore work. Psychological frameworks like the JD-R (Job Demands–Resources) model or PsyCap (Psychological Capital) emphasize the importance of organizational backing for psychological fortitude [10]. Marine engineers are more likely to benefit from targeted optimism, adaptability, and emotional control interventions.

2.5 Identified Gaps and Direction for Framework Development

Modern marine human resources lacks personalized services, real-time feedback systems, and comprehensive longitudinal mental health assessments [13]. Integration of behavioral analytics into HR processes continues to be

minimal. Addressing these issues requires a move from reactive policies to proactively adaptive HR frameworks which blend psychological methodologies with behavioral analytics and supporting automation systems.

III. Designing a Human-Centric Support Architecture for Marine Engineers

3.1 Foundational Approach to Mental Health Policy Integration

This part introduces a people-oriented framework that integrates mental wellness into human resource functions. The model integrates automated evaluations, anticipatory evaluation, and specific-calibrated intervention pathways. Unlike existing HR strategies that consider mental health as an ancillary concern, operational deployment and crew management systems proactively prioritize mental wellness. It safeguards that all possible help is given proactively and reactively during an engineer's assignment lifespan.

3.2 Functional Components of the Support Architecture

Vitalis' Integrative Model is based on five levels of necessities:

- ✓ Digital Screening Layer – Monthly evaluations through mobile phones or on-board systems utilizing trusted assessment tools like DASS-21 or GHQ-12.
- ✓ Predictive Analytics Engine – Issues mental health risk scores based on predictive analysis of historical human resource data such as absenteeism, underperformance, and grievances.
- ✓ Support Activation Hub – Automated wellness coaching or tele-counseling sessions triggered by surpassing defined risk thresholds.
- ✓ Rotational Duty and Recovery Design – Integrates pre and post long deployments mandatory psychological rest periods.
- ✓ Feedback-Driven HR Loop – Adjusting wellness metrics and operational schedules alongside real-time data is displayed through dashboards, enabling timely responsive decision-making.

3.3 Interaction Flow within the Framework

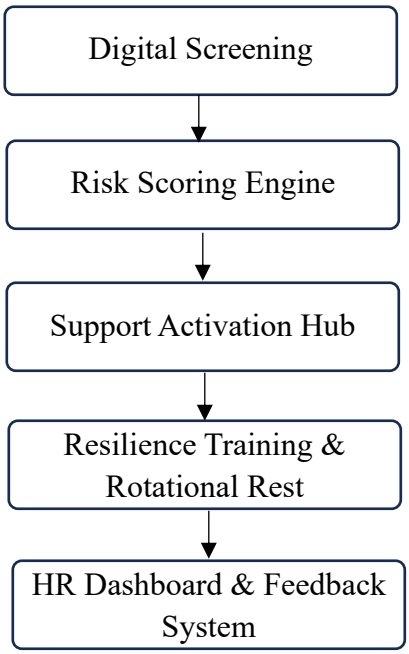

Figure 2. Workflow of the Human-Centric Support Architecture for Marine Engineers

Starting from the digital mental health screening to the predictive risk scoring engine, the flowchart in Figure 2 demonstrates the workflow in the system. Systems-initiated supports like tele-counseling and resilience training are triggered at predefined risk thresholds. The system provides tele-counseling and resilience training, closing the feedback loop provided to the HR dashboards. This allows for real-time feedback and monitoring, and in-policy adaptive decisions.

3.4 Technology and Human Resource Integration

In this intervention proposal, the use technology and the human factor are two important components which are meant to be synergistic. On the other side of the human factor is the integrated HR system which includes mental wellness

components enabling real-time screening. Monitoring, predictive assessment, and self-assessment also happen on these platforms monthly. Moreover, behavior and performance logs are also monitored to prevent mental health issues and foster a culture of intervention.

In the technology perspective, these algorithms are helpful until a human a component is needed. HR professionals, wellness officers, and licensed remote psychologists are able to provide this relational depth and emotional understanding. They offer personal counseling, one-on-one mentoring, and situational empathy, which are important to build trust and address the stigma that comes with seeking help, especially in mental health fields in male-dominated, highly competitive settings such as marine engineering.

Policies that blend algorithmic and human compassionate approaches are equitable and consistent while also expanding accessibility and inclusion. With secure tele-counseling interfaces, remote engineers in more isolated locations can receive care. Coupled with an HR culture that actively supports mental wellness, this approach makes remote care feel supportive. This leads to faster problem solving, lower burnout, higher morale, and greater job satisfaction, all of which strengthen the organization's holistic approach to workforce management.

IV. Evaluating the Impact of HR-Driven Mental Health Interventions at Sea

4.1 Pilot Study Overview

In order to assess the practicality and effects of the proposed model for HR support, a pilot study lasting six months was carried out in two of the largest internationally operating companies in the maritime engineering field. The study's subjects included 87 marine engineers with a fixed rotation of 60 to 180 days in remote sea locations. As a baseline assessment, all participants were screened and assessed with digital tools such as GHQ-12 and DASS-21 scans through HR kiosks and tablets available onboard. The participants' mental health scores were recorded every month onto a centralized, anonymized dashboard overseen by the HR team. Engineers with elevated stress and depressive indicators, as assessed through predefined risk thresholds, were enrolled into tele-counseling with trained professionals (mindfulness counseling, recovery breaks) and wellness sessions structured to support gradual recovery. Moreover, a few participants were trained in resilience and coping strategies through several virtual group sessions and individualized mentoring. Psychological assessment and metrics concerning absenteeism, retention willingness, organizational support, and perceived value by the company were measured at two pivotal momentspre-intervention and six months post policy implementation.

4.2 Key Findings and Trends

The results obtained from the pilot study were both statistically and operationally significant.Stress levels, measured by DASS-21, dropped by 35% post-intervention, demonstrating the effectiveness of regular screening and support activation. There were also improvements in absenteeism, which declined from 9.6% to 4.3%, reflecting better psychological stability and compliance with work duties. Tele-counseling also had over 78% participation rate, which demonstrates an unaddressed demand for psychological support. Moreover, the perception of being cared for by the organization dramatically increased. Emotional support coverage, which was previously reported by 41.3% of engineers, rose to 89.6% post intervention. Retention willingness is most crucial, averaging 3.1 on a 5-point scale and rising to 4.4 post intervention, demonstrating stability in the workforce in response to mental health initiatives. Collectively these trends confirm the model's strategic value while further reinforcing the necessity to systematically embed mental health interventions into Human Resources operations instead of treating them as an afterthought.

V. Strategic Reflections on Embedding Mental Health in Maritime HR Practice

5.1 Considerations for Policy Formulation in Offshore Human Resources

Results from the pilot indicate that organizations in the maritime industry need to prioritize mental wellness as a fundamental aspect of HR policy. Integrating psychological support systems from the initial planning stages to repatriation caregiving roles minimizes mental exhaust, boosts job satisfaction, and augments safety. Emotional wellness as a construct should be treated as a strategically critical, rather than a tangential, organizational investment.

5.2 Potential Issues Regarding Practical Application and Integration

Though the proposed model has marked advantages, the lack of internet access to vessels, legal compliance concerning privacy protection, and mental health stigma pose operational hurdles to its adoption. Global HR practitioners must address privacy and culturally attuned support while designing maritime work-synchronized health interventions to enhance and secure trust among the crew.

5.3 Mechanisms for Expansion and Increased Model Adoption

Organizations can interlink mental health practitioners with vessels to expand model within fleets, integrate mental health tools into designated HRIS systems, and develop mobile applications accessible onboard. Moreover, dynamic model evolution must be ensured through periodic policy revisions and crew demographic and deployment pattern

feedback utilization to adapt support mechanisms. Enhancing the system can be achieved by empowering HR departments with stakeholders' soft skill training in psychological first aid and empathy-driven leadership.

CONCLUSION

This research focuses on the mental health challenges faced by marine engineers during prolonged deployments. The proposed model integrates psychological evaluation, predictive analytics, adaptive HR strategies, and responsive human resource actions into a cohesive maritime mental health support system. Effective mental health monitoring and enhancementwithin occupational, geographical, or environmental confinesremotely situated maritime domains, is feasible. The pilot implementation produced noticeable outcomes, such as reduced employee stress and sickness absenteeism, and improved engagement and perceived organizational support.

Unlike the strategy of traditional offshore HR policies that manages workforce emotional exhaustion and stress as an administrative burden, this model proceeds to reposition HR into a mental resilience and performance sustainability enabler. Despite the prevailing challenges of mental health stigma, infrastructure, and resource limitations, the agile HR framework demonstrates that scalable tools, adequate training, and committed organizational leadership can yield tangible results. Advancements of this work stand to enhance the refinement of this model among different ship types and engineering roles as a sector-wide responsive AI-driven mental health framework.

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