

Commitment as a Mediator of the Relationship between Training, Job Stress, ISM Code, and Ship Crew Performance

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Abstract

This study examines the relationship between training, job stress, and the International Safety Management (ISM) Code and ship crew performance, with commitment positioned as a mediating variable. The research was conducted at SKOM Sdn. Bhd. (SK Offshore & Marine) in Malaysia and focused on ship crews working on 10 offshore vessels. A quantitative approach was employed using a descriptive and confirmatory design. The study involved 213 crew members as respondents. Data were collected through structured questionnaires and analyzed using Structural Equation Modeling (SEM) with SmartPLS and SPSS version 22. The findings reveal that commitment plays a significant mediating role in linking training, job stress, and ISM Code implementation to ship crew performance. Training contributes to better performance when it strengthens crew commitment and supports technical readiness in demanding maritime operations. Job stress, although often viewed as detrimental, becomes more manageable when organizational commitment is maintained, allowing crew members to remain focused on their responsibilities. Likewise, the implementation of the ISM Code enhances performance not only through compliance with safety procedures but also through its capacity to foster a stronger sense of responsibility and commitment among crew members. These results indicate that commitment is a central mechanism through which organizational and operational factors influence performance in the maritime sector. The study recommends strengthening technical training, improving workload distribution, providing mental and emotional support, and ensuring consistent implementation of safety management procedures to enhance ship crew performance.

Keywords: training; job stress; International Safety Management (ISM) code; commitment; ship crew performance

1. Introduction

The maritime industry plays a vital role in sustaining global trade, economic connectivity, and offshore operations. Within this sector, ship crew performance is not merely a matter of productivity, but also a critical determinant of operational safety, service reliability, and environmental protection (Ghosh & Wolf, 2021; Parashar, 2019). In practice, the quality of shipboard operations depends heavily on how well crew members perform under demanding working conditions, particularly in offshore settings where risk, fatigue, and responsibility are consistently high. The dissertation underlying this study focuses on these realities in the context of SKOM Sdn. Bhd. (SK Offshore & Marine) in Malaysia, where ship crew performance has become an important organizational concern.

Maintaining strong crew performance is especially challenging because seafarers are required to operate in physically demanding, psychologically taxing, and highly regulated environments. Their work is shaped by long periods at sea, separation from family, changing weather conditions, heavy workloads, and continuous exposure to operational hazards. Under such conditions, crew members are expected to remain technically competent, mentally prepared, and fully responsive to safety procedures (Diamantidis & Chatzoglou, 2018). As a result, the question of what drives or weakens performance among ship crews remains highly relevant in maritime management research.

One factor widely regarded as essential is training. In maritime operations, training is not only intended to improve technical competence, but also to prepare crews to respond effectively to emergencies, comply with international standards, and carry out their responsibilities safely and efficiently. Well-designed training can strengthen readiness and reduce the gap between procedural knowledge and real shipboard practice (Md. M. Rahman & Islam, 2023). However, prior studies have not always produced consistent conclusions. Some research suggests that training improves employee performance, while

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other studies indicate that training does not always produce meaningful outcomes when it is poorly designed, weakly supported by management, or insufficiently connected to workplace realities. This inconsistency suggests that the impact of training on crew performance may depend on other organizational or psychological mechanisms.

Another important factor is job stress. Stress is a common feature of seafaring life because crew members work in isolated settings, face high job demands, and often have limited recovery time. In maritime contexts, stress may emerge from workload, role pressure, poor communication, harsh weather, fatigue, and prolonged separation from home (Çiçek & Bilal, 2011). Previous discussions in the dissertation also show that seafarers are exposed to psychosocial pressures that differ substantially from those experienced by land-based workers. Yet, like training, the relationship between stress and performance is not straightforward. Excessive stress may weaken concentration, increase fatigue, and reduce performance, but some studies also note that manageable levels of stress can function as a challenge that sharpens focus and motivates task completion. This mixed evidence makes job stress an important variable to examine more carefully in relation to crew performance (M. S. Rahman et al., 2019; Rana & Malik, 2017).

In addition to training and job stress, the International Safety Management (ISM) Code is another key element in maritime performance. The ISM Code was introduced to strengthen safety management, reduce accidents, and support environmental protection through a structured system of documented procedures and responsibilities. For ship crews, the implementation of the ISM Code is not simply a matter of regulatory compliance. It also shapes work discipline, risk awareness, communication routines, and operational consistency. When safety procedures are implemented effectively, they can create a safer and more predictable work environment, which in turn may support higher performance. In this sense, the ISM Code can be understood not only as a formal safety framework, but also as an operational mechanism that influences how crews work and how committed they feel to organizational goals.

A further issue raised in this study is the role of commitment. Commitment reflects the willingness of crew members to remain dedicated to their duties, support organizational objectives, and contribute seriously to work outcomes. In maritime settings, commitment matters because ship operations depend heavily on cooperation, discipline, and shared responsibility (Cantele et al., 2023). A committed crew is more likely to work consistently, respond effectively during emergencies, and maintain operational standards. At the same time, commitment may also help explain why training, stress conditions, and safety systems do not always influence performance directly. In other words, these factors may first shape the crew's sense of attachment and responsibility, which then affects how well they perform. This makes commitment a plausible mediating variable in the relationship between organizational conditions and crew performance.

The practical importance of this issue becomes clearer when viewed against the performance condition at SKOM Sdn. Bhd. According to the dissertation data, crew performance targets were not achieved over three consecutive years. The company's performance realization declined from 94% in 2021 to 89% in 2022, and further to 85% in 2023, indicating a widening gap between target and actual performance. The dissertation also notes that this decline was identified through Key Performance Indicators assessed by the company's Health Safety Security and Environment division, suggesting that the issue is not incidental but organizationally significant.

Based on this background, the present study investigates the influence of training, job stress, and the ISM Code on ship crew performance, while positioning commitment as a mediating variable. The study is important because it addresses both a practical problem and a research gap. Practically, it seeks to explain why crew performance may decline in a demanding offshore setting. Academically, it contributes to the literature by integrating human resource, psychological, and safety-management variables into a single model of ship crew performance. Through this approach, the study aims to offer a more comprehensive understanding of how performance can be strengthened in maritime organizations, particularly in offshore operations where safety and human reliability are inseparable.

2. Methods

This study employed a quantitative approach using both descriptive and confirmatory research designs. The descriptive design was used to explain the characteristics of the data presented in tables, figures, and variable distributions (Fu et al., 2021; Weber & Leuridan, 2008), while the confirmatory design was intended to test the relationships among the exogenous, intervening, and endogenous variables in the proposed research model. In this study, training, job stress, and the International Safety Management (ISM) Code were treated as exogenous variables, commitment as the mediating variable, and ship crew performance as the endogenous variable.

The study was conducted at SKOM Sdn. Bhd. (SK Offshore & Marine), Malaysia, focusing on crew members working on 10 offshore vessels, namely SK. Marco Polo, SK. Flenty, SK. Prodigy, SK. Perfect, SK. Paragon, SK. Line 605, SK. Dynamic, SK. Prime, SK. Prudence, and SK. Marathon. The research was carried out over a four-month period, from April to July 2024. The sample consisted of 213 ship crew members drawn from those 10 vessels. The study used multiple indicators to measure each construct in the model. Data were collected through a structured questionnaire, as also indicated by the inclusion of the research instrument in the dissertation appendices.

For data analysis, the study applied Structural Equation Modeling (SEM) using SmartPLS and SPSS version 22. This analytical approach was used to assess both direct and indirect effects among variables, including the mediating role of commitment in the relationship between training, job stress, the ISM Code, and ship crew performance. The dissertation also reports model evaluation through outer model testing, inner model testing, goodness-of-fit assessment, and hypothesis testing.

3. Results

The structural model produced a differentiated pattern of findings, showing that the study variables did not influence commitment and performance in the same way. The results indicate that some relationships were statistically significant at the direct level, while others became more meaningful when examined through the mediating role of commitment. Overall, the findings confirm that crew performance in the offshore maritime context is shaped by a combination of technical, psychological, and safety-management factors rather than by a single determinant alone.

First, the analysis shows that training had a positive but non-significant direct effect on commitment. The path coefficient was 0.061, with a p-value of 0.073 and a t-statistic of 1.286, indicating that the relationship did not reach the required level of statistical significance. This means that, although training tended to move commitment in a positive direction, the effect was not strong enough to conclude that training alone was able to strengthen crew commitment in a meaningful way. In substantive terms, the result suggests that training may improve skills and preparedness, but it does not automatically generate stronger attachment or loyalty among crew members unless it is supported by broader organizational conditions.

Second, job stress had a negative and significant direct effect on commitment. The path coefficient was -0.726, with a p-value of 0.000 and a t-statistic of 8.214. This is one of the strongest direct relationships in the model and indicates that increasing levels of job stress substantially reduced crew commitment. In practical terms, the result suggests that when ship crew members experience heavier psychological pressure, fatigue, or work strain, their willingness to remain emotionally and professionally committed to their duties tends to weaken. This finding highlights that commitment in maritime work is highly sensitive to stressful working conditions.

Third, the findings show that the International Safety Management (ISM) Code had a positive and significant direct effect on commitment. The path coefficient was 0.051, with a p-value of 0.036 and a t-statistic of 2.922. Although the coefficient size is relatively modest, the relationship is statistically significant and indicates that stronger implementation of the ISM Code contributed positively to the commitment of ship crew members. This suggests that safety procedures, regulatory clarity, and structured work systems may help create a more orderly and dependable work environment, which in turn strengthens the crew's sense of responsibility and organizational attachment.

With regard to direct effects on the dependent variable, the study found that training had a positive and significant direct effect on ship crew performance. The path coefficient was 0.164, with a p-value of 0.008 and a t-statistic of 4.604. This result indicates that better training was associated with better

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performance outcomes among crew members. In other words, technical preparation, competency development, and operational readiness appear to translate directly into improved execution of duties on board. Unlike its limited direct role in shaping commitment, training showed a clear and meaningful contribution to performance itself.

The results also show that job stress had a negative and significant direct effect on performance. The path coefficient was -0.378 , with a p -value of 0.004 and a t -statistic of 3.841 . This means that higher levels of stress significantly reduced the ability of crew members to perform effectively. This finding is important because it confirms that stress in the maritime working environment is not merely a psychological issue, but an operational one as well. When stress increases, concentration, consistency, and task execution are likely to decline, which can ultimately undermine work outcomes and shipboard reliability.

Similarly, the ISM Code had a positive and significant direct effect on performance. The path coefficient was 0.280 , with a p -value of 0.000 and a t -statistic of 4.559 . This indicates that stronger implementation of safety management procedures was associated with higher crew performance. The result suggests that safety systems are not only relevant for accident prevention and regulatory compliance, but also for enhancing the quality of work itself. When operational procedures are clear, monitored, and consistently applied, crew members may work more effectively, more confidently, and with greater procedural discipline.

A different pattern appeared in the relationship between commitment and performance. The findings show that commitment had a positive but non-significant direct effect on performance, with a path coefficient of 0.319 , a p -value of 0.059 , and a t -statistic of 1.355 . This means that commitment, when treated as an independent predictor, was not statistically strong enough to explain performance on its own. Although the direction of the relationship was positive, the effect did not reach significance. This result is especially interesting because commitment is often assumed to directly improve employee outcomes. In this study, however, commitment did not function strongly as a standalone driver of performance.

The indirect-effect analysis provides a more important insight. The study found that training had a positive and significant indirect effect on performance through commitment. The indirect path coefficient was 0.235 , with a p -value of 0.022 and a t -statistic of 3.802 . This means that, although training did not significantly increase commitment in a direct sense, its broader relationship with performance became significant when commitment was introduced as a mediating mechanism. This suggests that training becomes more effective when it is internalized by crew members in a way that supports their sense of responsibility and engagement with their work.

The study also found that job stress had a negative and significant indirect effect on performance through commitment. The indirect path coefficient was -0.664 , with a p -value of 0.037 and a t -statistic of 2.887 . This finding indicates that stress not only harms performance directly, but also weakens performance indirectly by eroding crew commitment. In other words, part of the damaging effect of stress occurs because stressful working conditions reduce the psychological and professional attachment of crew members, and that reduced attachment then contributes to lower performance. This makes commitment an important pathway through which stress exerts its wider organizational impact. In addition, the ISM Code had a positive and significant indirect effect on performance through commitment, confirming that commitment also mediated the relationship between safety management implementation and crew performance. Together with the previous indirect findings, this result shows that commitment functioned more effectively as an intervening variable than as a purely direct predictor. The dissertation explicitly emphasizes that commitment became a strong mediating factor capable of strengthening the effects of training, job stress, and ISM Code on performance, even when some direct relationships involving commitment were not significant.

Taken together, the findings indicate that performance was directly strengthened by training and ISM Code implementation, while job stress directly reduced performance. At the same time, commitment played a crucial mediating role, especially in translating organizational and work-related conditions into meaningful performance outcomes. This pattern is central to the contribution of the study. Rather than acting as an independently dominant predictor, commitment served as the bridge through which training, stress conditions, and safety management practices influenced ship crew performance.

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4. Discussion

The findings of this study show that ship crew performance is shaped by the interaction of human resource development, psychological pressure, and safety-management practices. More specifically, the results indicate that training and the implementation of the International Safety Management (ISM) Code contributed positively to performance, while job stress reduced both commitment and performance (Obeidat et al., 2023). At the same time, commitment emerged as an important mediating mechanism through which training, job stress, and the ISM Code influenced ship crew performance. This overall pattern suggests that performance in offshore maritime operations cannot be explained only by technical competence or formal safety compliance, but also by the psychological and organizational processes through which crew members respond to their working environment (Cevik & Altun, 2016). The first important finding is that training had a positive and significant direct effect on ship crew performance, but its direct effect on commitment was positive without reaching statistical significance. This result suggests that training in the maritime sector primarily strengthens crew members' technical readiness, task execution, and operational capability, even when it does not automatically deepen their emotional attachment to the organization. In practical terms, training appears to work most clearly as a tool for improving competence and performance rather than as a direct source of organizational commitment (Garcia-Zamor, 2003). This is understandable in the shipboard context, where training is often closely tied to procedural knowledge, technical safety, and job execution. Crew members may become more capable after training, but increased capability does not necessarily mean that they immediately feel more attached, loyal, or psychologically invested in the company (Yusriadi & Farida, 2019).

This finding is important because it helps explain why training outcomes in the workplace are sometimes inconsistent. In this study, training still mattered for performance, but its effect on commitment was weaker. This indicates that the value of training may depend on whether it is experienced merely as a formal requirement or as part of a broader organizational system that affirms employee development and recognition. In other words, training can improve performance directly by increasing knowledge and skill, but its ability to build commitment may require additional support such as fair supervision, meaningful feedback, career development, and recognition of the crew's role in offshore operations (Zacharias et al., 2021). This interpretation is also consistent with the study's broader conclusion that commitment became more meaningful when operating as an intervening variable rather than as an isolated predictor.

The discussion becomes even more interesting when job stress is considered. The results show that job stress had a negative and significant effect on commitment and also a negative and significant effect on performance. This means that stress not only undermined how well crew members carried out their work, but also weakened their psychological attachment to the organization. In the maritime setting, this finding is highly plausible. Ship crews operate in demanding physical and mental environments characterized by long working hours, isolation, heavy responsibility, harsh weather conditions, fatigue, and prolonged separation from family (Jiang et al., 2023; Nogueira et al., 2025). Under such circumstances, stress can become more than a temporary feeling of pressure; it can evolve into a factor that affects morale, concentration, endurance, and willingness to stay engaged with work responsibilities.

The strong negative coefficient between job stress and commitment indicates that psychological strain may erode the sense of belonging and responsibility that crews need in order to function effectively. This is particularly important in offshore maritime operations, where performance depends not only on individual effort but also on coordination, discipline, and collective reliability (Ikbali, Pasulu, et al., 2021). A stressed crew member may still attempt to complete assigned duties, but over time high stress can reduce emotional engagement, weaken persistence, and increase the risk of lower-quality performance. Therefore, the effect of job stress in this study should not be interpreted narrowly as an individual emotional issue. Instead, it should be understood as an organizational risk factor that directly affects operational effectiveness and indirectly affects it through declining commitment (May, 2022).

Another important result concerns the ISM Code. The findings indicate that the implementation of the ISM Code had a positive and significant direct effect on commitment as well as on performance. This result reinforces the view that safety management in maritime operations is not limited to regulatory

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compliance, but has broader organizational consequences. When safety procedures are clear, structured, and consistently applied, crew members may experience a stronger sense of order, predictability, and professional accountability. In such an environment, they are more likely to develop trust in the operational system and to work with greater focus and discipline (Ikbal, Gunawan, et al., 2021). The positive relationship between the ISM Code and performance suggests that safety governance contributes directly to how effectively ship crews perform their tasks. At the same time, the positive relationship between the ISM Code and commitment indicates that a well-implemented safety framework may also strengthen the crew's psychological alignment with the organization (J Nair et al., 2024).

This finding has practical relevance because it shifts the understanding of the ISM Code away from a purely administrative or legal function. In many organizations, safety systems are sometimes treated as formal documentation requirements. However, the present study suggests that when the ISM Code is genuinely embedded in shipboard operations, it can shape work behavior and performance in a meaningful way. It gives crew members procedural clarity, reinforces discipline, and supports consistency in task execution. In offshore operations, where risk exposure is high and mistakes can have serious consequences, this kind of structured safety management can make a substantial difference in maintaining both operational reliability and employee commitment (Edirisinghe & Woo, 2021).

A particularly notable aspect of the study is the role of commitment. The direct effect of commitment on performance was positive but not statistically significant. At first glance, this may seem surprising, since commitment is often assumed to be a strong predictor of employee performance. However, the indirect-effect analysis provides a more nuanced explanation. Commitment significantly mediated the relationships between training and performance, between job stress and performance, and between the ISM Code and performance (Georgeou & Haas, 2019). This means that commitment did not function most powerfully as an independent driver of performance; rather, it functioned as a pathway through which other organizational and work-related conditions shaped performance outcomes.

This mediating role is one of the central contributions of the study. It suggests that performance improvement in maritime organizations should not be approached as a purely technical issue. Training may equip crew members with competence, the ISM Code may provide operational structure, and lower stress may preserve mental stability, but these factors become more effective when they also foster commitment. In this sense, commitment acts as the internal mechanism that translates external work conditions into sustained work performance. The study itself emphasizes that commitment was able to contribute substantially to performance when crew members viewed training, job stress, and the ISM Code as not having a direct relationship with performance. This interpretation highlights commitment as the bridge between formal organizational inputs and actual employee outcomes.

The findings also have a broader theoretical implication. They show that crew performance in maritime settings is better understood through an integrated perspective rather than a single-variable explanation. Training reflects the developmental dimension, job stress represents the psychological dimension, and the ISM Code captures the institutional and safety-governance dimension. Commitment then connects these dimensions by translating them into behavioral and performance-related outcomes. This integrated model is especially relevant in the maritime sector because ship crews work in environments where technical competence, psychological resilience, and compliance with safety systems are inseparable from one another (Glew et al., 2005). A capable crew member who is overwhelmed by stress may underperform; a well-disciplined crew member without adequate training may still make errors; and a technically trained crew member working in an unsafe or weakly managed environment may not sustain high performance over time.

From a managerial perspective, the discussion points to several practical implications. First, maritime companies should continue to invest in training, but training should be made more relevant to real shipboard demands and linked to broader efforts that strengthen crew engagement. Second, companies need to treat job stress as a performance issue, not only a welfare concern. Better workload distribution, mental health support, and healthier work routines may help preserve both commitment and performance. Third, implementation of the ISM Code should be strengthened not only to meet international standards but also to build a more reliable and supportive organizational culture on board. In the dissertation, this practical direction is reflected in the recommendation to strengthen technical

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skills training, reduce excessive workload, conduct regular crew audits, provide mental and emotional support, and apply a structured task-management system to ensure that duties are carried out according to schedule.

Overall, this study confirms that ship crew performance is not simply the product of individual ability. It is shaped by how organizations prepare their crews, how they manage psychological pressures, and how consistently they implement safety systems. The most meaningful insight from the study is that commitment occupies a strategic place in this process. Even when commitment does not appear as a strong standalone predictor, it becomes crucial as the mechanism through which training, job stress, and the ISM Code are converted into actual performance. This makes commitment not a peripheral variable, but a central explanatory link in understanding performance within offshore maritime operations.

5. Conclusion

This study concludes that ship crew performance in offshore maritime operations is influenced by a combination of training, job stress, and the implementation of the International Safety Management (ISM) Code, with commitment playing an important mediating role. The findings demonstrate that training and the ISM Code contributed positively and significantly to ship crew performance, while job stress had a negative and significant effect. These results confirm that performance in the maritime sector is shaped not only by technical competence and safety procedures, but also by the psychological pressures experienced by crew members during shipboard operations. The study also finds that commitment did not have a statistically significant direct effect on performance, yet it significantly mediated the relationships between training, job stress, and the ISM Code and ship crew performance. This indicates that commitment works less as an isolated determinant and more as an internal mechanism through which organizational and operational factors are translated into performance outcomes. In this sense, commitment becomes a strategic link connecting human resource development, work pressure, and safety management with actual performance on board.

These findings imply that improving crew performance requires a more integrated managerial approach. Maritime companies should not rely solely on technical training or formal safety compliance, but should also pay close attention to workload balance, psychological well-being, and the strengthening of crew commitment. In practical terms, performance improvement can be supported through more relevant technical training, better workload distribution, stronger emotional and mental support, regular crew evaluation, and more consistent implementation of structured safety-management procedures. Overall, this study contributes to the maritime management literature by showing that ship crew performance is best understood through the interplay of developmental, psychological, and safety-governance factors. More importantly, it highlights commitment as a crucial mediating pathway in explaining how those factors shape performance in offshore maritime settings.

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