



Managerial Transformation at Sea: Strategies to Enhance Performance, Motivation and Crew Safety

Azmal Aziz¹, Rita Yuni Mulyanti¹, Abdul Mukti Soma¹

¹Universitas Teknologi Muhammadiyah Jakarta, Indonesia

✉ pelayaransbr@gmail.com *

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Abstract

Work safety and crew performance are very important focus areas in the high-risk maritime industry, as exemplified by shipping companies. This study aims to analyze the impact of leadership and managerial competence on crew motivation and performance, as well as their influence on work safety. This study uses quantitative methods with a causal design used to examine cause-and-effect relationships among variables, including leadership, managerial competence, work motivation, crew performance, and work safety. Data were collected through a survey using a Likert-scale questionnaire with five response levels. The respondents were crew members working for a shipping company. Additional data collection techniques included field observations and literature review to complement the theoretical insights. Data analysis was conducted using Structural Equation Modeling with SmartPLS software. The findings indicate that transformational leadership and managerial competence significantly influence work motivation and crew performance. Moreover, work motivation serves as a mediating variable, strengthening the relationships between leadership and performance, as well as managerial competence and occupational safety. This study emphasizes the crucial role of effective leadership in workplace safety within the maritime industry. Its implications suggest that companies should enhance competency-based training and leadership strategies to optimize crew performance and ensure sustainable workplace safety.

INTRODUCTION

In the increasingly competitive era of globalization, the maritime industry plays a pivotal role in international trade (Alzate et al., 2024; Yu et al., 2024). This sector accounts for over 80% of global trade by volume, establishing itself as the backbone of the global economy (Chen et al., 2023; Reiter & Stehrer, 2023; Singh et al., 2023). However, despite its significant contributions, this sector faces substantial challenges related to occupational safety, performance,

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and crew motivation (Dewan & Godina, 2023; Felix Orikpete & Raphael Ejike Ewim, 2024; Funmilayo Aribidesi Ajayi & Chioma Ann Udeh, 2024). There has been a 15% increase in onboard workplace accidents over the past five years, with 70% of these incidents attributed to human error (Chowdhury et al., 2024; Maternová et al., 2023). This data underscores the importance of effective leadership and managerial competence in managing human resources within high-risk work environments such as the maritime industry.

One of the companies operating in this sector is Zamil Marine, based in Saudi Arabia. Zamil Marine is a maritime company that has implemented high safety standards in compliance with the IMO STCW 2010 regulations (Al-Mekhlafi et al., 2023; Boussahia & Sedira, 2024). However, the company's internal report in 2022 revealed significant issues concerning crew motivation and performance (Ubreziová et al., 2023). Approximately 40% of the crew reported feeling under-motivated in performing their duties, while workplace accidents increased by 12% compared to the previous year (Folke & Melin, 2024; Narayanan et al., 2023). This issue highlights a gap between the safety policies implemented and their practical application in the field, which can be linked to the managerial competence of leaders within the company.

Previous research has demonstrated that transformational leadership can significantly enhance performance and workplace safety. Leaders who can inspire and motivate employees are capable of fostering a productive and safe working environment (Prasetya et al., 2023; Wahyudi et al., 2023). However, this study has not focused on the specific context of the maritime industry. On the other hand, research by (Derdowski & Mathisen, 2023; Kadher et al., 2024) reveals that work motivation has a direct relationship with workplace safety, yet this study also falls short in exploring the role of leadership in high-risk industries such as the maritime sector.

Based on the existing literature review, there is a significant research gap in understanding the impact of leadership and managerial competence on work motivation, performance, and crew safety in the maritime sector (Chen et al., 2021; Hanif Dewan et al., 2024). Most previous research has focused more on non-maritime industries or only examined the relationship between two variables in isolation, without investigating the more complex interactions in maritime work environments (Morrison et al., 2023). This study aims to fill this gap by comprehensively examining the influence of leadership and managerial competence on motivation, performance, and workplace safety of crew members at Zamil Marine.

This research is expected to contribute both theoretically and practically. Theoretically, this study enriches the leadership literature within the context of the maritime industry, particularly in the relationship between transformational leadership, motivation, and occupational safety. Practically, this research provides recommendations for maritime companies to develop effective leadership strategies that enhance performance and ensure the safety of crew members.

In addition, this research will also examine how external factors such as operational pressures, international regulations, and corporate work culture can influence leadership effectiveness in improving work motivation and safety. By understanding these dynamics, it is hoped that maritime companies can design more effective leadership training policies and programs that focus not only on regulatory compliance, but also on building a work culture that supports crew well-being.

This research also considers the role of managerial strategies in supporting improved crew performance and safety. The implementation of adaptive

leadership strategies based on effective communication can be a powerful tool in improving crew motivation and performance. However, the implementation of these strategies requires the support of leaders who have competence in change management as well as the ability to build effective communication between management and crew.

Taking a holistic approach, this research will use mixed methods combining quantitative and qualitative analysis to gain more comprehensive insights. Data will be collected through surveys, in-depth interviews, as well as analysis of company documents to explore how transformational leadership can be effectively applied in the context of day-to-day operations at Zamil Marine.

The results of this research are expected to provide applicable recommendations for the maritime industry, particularly in the development of leadership programs that not only improve operational efficiency, but also create a safer and more conducive work environment for the welfare of crew members. Thus, this research can contribute to improving the competitiveness of the maritime industry at the global level and ensuring business sustainability in the face of future challenges.

METHODS

This quantitative research uses a causal research design to test hypotheses regarding the cause-and-effect relationship between variables, which consists of two independent variables, one dependent variable, and one intervening variable that acts as a mediator. Data were collected using structured instruments that have been validated and reliable and analyzed with Structural Equation Modeling through SmartPLS software. This research was conducted at the Zamil Marine office in Saudi Arabia, this research focused on the operational activities of 113 crew members who were selected based on certain criteria to ensure the accuracy of the data. The study lasted for two months, covering the main work locations.

The research procedure followed structured stages, starting with the identification of research variables, development of a theoretical framework, and questionnaire design. Data collection was conducted by distributing questionnaires in person or electronically, supplemented by observation and literature review. The data processing stage included editing, coding, and tabulating responses, followed by validity and reliability testing using Structural Equation Modeling. The final stage was to compile the findings, draw conclusions, and provide recommendations to improve operational efficiency and workplace safety.

The instrument used in this study was a systematically designed questionnaire to collect data on the variables under study, which was developed based on relevant indicators to ensure accurate measurement of the influence and relationship. Data collection utilized three main techniques: questionnaires, observation, and literature review (Burhanuddin et al., 2022; Engkizar et al., 2023; Febriani et al., 2020; Fitria et al., 2022; Muslan et al., 2023). Questionnaires provided primary data on work motivation, leadership, competence, and crew performance, while observations provided first-hand insights into the work environment, and the literature review collected secondary data to support the theoretical framework. Data analysis was conducted using Structural Equation Modeling to evaluate the relationships between variables, starting with validity and reliability tests of the research instruments, followed by path regression analysis using SmartPLS software (Gombár et al., 2024). Each question in the questionnaire uses a Likert scale, which allows respondents to provide a quantitative assessment of their

agreement with the statements presented (Khikmatul Heny Masitoh, Sonhaji, 2017; Lionello et al., 2021; Pratama et al., 2022; Siregar & Pasaribu, 2022). The Likert scale used consists of five levels, as shown in the following table.

Table 1. The Likert Scale

Scale	Description
1	Strongly disagree
2	Disagree
3	Somewhat disagree
4	Agree
5	Strongly agree

To build an effective Likert scale, relevant questions-both positive and negative-must be clearly defined and presented to respondents for truthful responses. Each answer is assigned a numerical value (e.g., 5 for highly positive, 1 for highly negative), and total scores are calculated. Invalid or incomplete responses are filtered out to form a valid scale for further data collection. Once the Likert scale is established, its validity and reliability must be tested to ensure consistency in measuring the intended constructs. In this study, validity testing was conducted using SmartPLS with the Pearson Product Moment formula to assess the correlation between items and total scores, where a correlation value between -1 and 1 indicates the strength and direction of the relationship. Hypothesis testing employed Structural Equation Modeling to analyze the influence of leadership and managerial competence on motivation, performance, and safety improvement, with the hypothesis that both variables positively impact these factors. Reliability was tested using the Cronbach's Alpha (α) method, where a construct reliability value above 0.60 signifies a reliable instrument.

Table 2. Reliability Test

Description	Cronbach's alpha	Composite reliability
Leadership	0.961	0.966
Competence	0.958	0.964
Performance	0.961	0.966
Work motivation	0.960	0.965
Safety improvement	0.961	0.966

RESULT AND DISCUSSION

Overview of research objects

Zamil Marine Services is part of Zamil Offshore Services Company, a Saudi Arabia-based company that was established in 1977 and has become one of the largest maritime service providers in the Middle East. The company operates more than 80 Offshore Support Vessels to meet the needs of oil and gas exploration and production in the Arabian Gulf region. The fleet includes vessels such as Anchor Handling Tug Supply, Platform Supply Vessels, and Fast Crew Supply Vessels. In addition, Zamil Marine offers ship maintenance and repair services through its modern shipyard at Dammam Port, which is capable of handling vessels up to 1,500 tons. The company also builds various types of vessels, provides maritime logistics services for large-scale energy projects, and manages offshore oil and gas platform installation and maintenance projects, especially for large clients such as Saudi Aramco. Beyond ship operations and construction, Zamil Marine manages navigation and pilot services at King Abdulaziz Port, servicing more than 2,400 vessels annually. With its headquarters in Dammam and additional facilities along the

Arabian Gulf coast, the company is also expanding its international reach to the United Arab Emirates, Southeast Asia, and Africa. Through innovation, efficiency and commitment to safety, Zamil Marine continues to strengthen its position as an industry leader, supporting global energy needs.

Respondents based on gender

Data was collected through a questionnaire to identify demographic characteristics based on gender. This approach aims to analyze the proportion of crew members at Zamil Marine Company in Saudi Arabia, thereby determining the most dominant gender among the respondents. The analysis yielded data from 113 respondents. The gender distribution of the respondents is shown in the following figure.

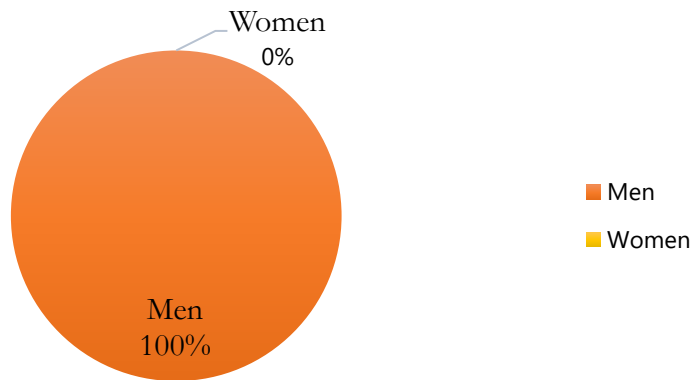


Fig 1. Respondents by gender

Based on figure 1, it shows that the respondents are predominantly male, with 113 individuals representing 100%, while there were no female respondents, as all maritime employees are male.

Respondents by age

Age is often related to position and status within an organization, including at Zamil Marine Company in Saudi Arabia. The age distribution of respondents in this study is designed to provide an overview of the age groups of the crew members who participated, allowing for an analysis of the correlation with work experience, responsibilities, and roles within the company. The tabulated data includes age categories grouped by specific age ranges, such as young, productive, and nearing retirement age. The breakdown of respondents by age is shown in the following figure.

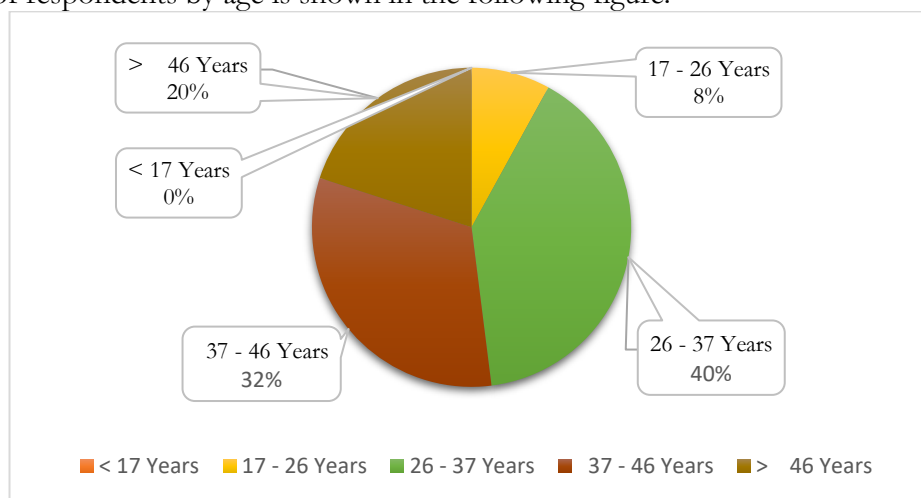


Fig 2. Respondents by age

Based on figure 2, it can be seen that the largest group of respondents falls within the age range of 26 to 37 years (38.1%) and 37 to 46 years (32.7%). This proportion indicates a significant age distribution, highlighting that the majority of the crew members are in the productive age groups.

Validity test

The validity testing in this study indicates that all indicators meet convergent validity, with outer loading values above 0.50, indicating that measurement items are well correlated with the measured constructs. Additionally, the results of discriminant validity show that the correlation between constructs and their respective measurement items is higher compared to other constructs, allowing latent constructs to predict items within their block more effectively. Therefore, this measurement model is valid based on both tests. The validity test results can be seen in the following figure.

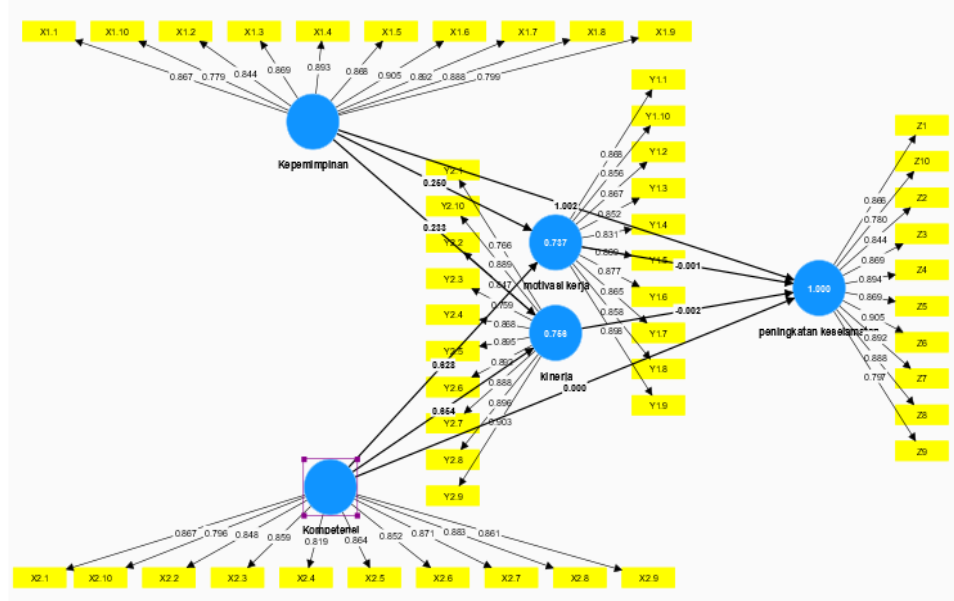


Fig 3. Validity test using SEM analysis

After dropping the indicators with loading values below 0.5, it can be seen in the path diagram above that no indicators have a loading value below 0.5. Therefore, these variables can be considered valid. Based on the output from the diagram above, the factor loadings for the second-order constructs already meet convergent validity, as the indicator values are all above 0.5.

Structural Model Evaluation (Inner Model)

The evaluation of the research model's goodness of fit is conducted by measuring the R-Square (R^2) value. The inner model represents the relationships between latent variables based on substantive theory. The model fit evaluation results can be seen in the following table.

Table 3. R-Square Value

Description	R-square	R-square adjusted
Performance	0.756	0.751
Work motivation	0.737	0.732
Safety Improvement	1.000	1.000

Based on Table 3, the R-Square value for performance (Y) is 0.676, with an adjusted R-Square value of 0.667. This indicates that performance can be explained by training and development by 68%, while the remaining 32% is influenced by other variables outside the study. Meanwhile, the R-Square value for competence improvement (Z) is 0.695, with an adjusted R-Square value of 0.681. This means that competence improvement is explained by performance

by 70%, while the remaining 30% is influenced by other variables outside the study.

Hypothesis test

Hypothesis testing in this study was conducted using multiple regression analysis through the Smart PLS program, with seven hypotheses formulated earlier. The relationships between variables were determined based on the original sample coefficient values, where a positive value indicates a positive relationship, and vice versa. The effect between variables was analyzed by comparing the t-statistic value with the t-table, where the t-table value used is 1.6609. The results of the hypothesis test can be seen in Table.

Table 4. Hypothesis Test Results

Influence between Variables	Coefficient	T statistics	P values	Description
Leadership performance ->	0.141	1.652	0.099	Not Significant
Leadership motivation -> work	0.119	2.096	0.036	Significant
Leadership improvement -> safety	0.003	363.811	0.000	Significant
Competence performance ->	0.136	4.823	0.000	Significant
Competence motivation -> work	0.124	5.058	0.000	Significant
Competence improvement -> safety	0.004	0.100	0.921	Not Significant
Performance improvement -> safety	0.003	0.568	0.570	Not Significant
Work motivation -> safety improvement	0.003	0.404	0.686	Not Significant

Based on the analysis results, the influence of leadership on performance has a coefficient of 0.141, with a t-statistic value of 1.652, which is lower than the critical value of 1.66 at a significance level of $\alpha=0.099>0.05$ $\alpha = 0.099 > 0.05$. This indicates no significant positive influence between leadership and performance. However, leadership has a significant positive influence on work motivation, with a coefficient of 0.119 and a t-statistic value of 2.096 ($>1.66 > 1.66$) at a significance level of $\alpha=0.036<0.05$ $\alpha = 0.036 < 0.05$, meaning an increase of 1 unit in leadership will increase work motivation by 2.096 units. Additionally, leadership significantly influences safety improvement, with a coefficient of 0.003 and a t-statistic value of 363.8 ($>1.66 > 1.66$) at a significance level of $\alpha=0.000<0.05$ $\alpha = 0.000 < 0.05$.

Competence has a significant positive influence on performance, with a coefficient of 0.136 and a t-statistic value of 4.823 ($>1.66 > 1.66$) at a significance level of $\alpha=0.000<0.05$ $\alpha = 0.000 < 0.05$, meaning an increase of 1 unit in competence will enhance performance by 4.823 units. Competence also has a significant positive effect on work motivation, with a coefficient of 0.124 and a t-statistic value of 5.058 ($>1.66 > 1.66$) at a significance level of $\alpha=0.000<0.05$ $\alpha = 0.000 < 0.05$. However, competence does not significantly influence safety improvement, with a coefficient of 0.004 and a t-statistic value of 0.100 ($<1.66 < 1.66$) at a significance level of $\alpha=0.921>0.05$ $\alpha = 0.921 > 0.05$.

Furthermore, performance does not significantly influence safety

improvement, with a coefficient of 0.003 and a t-statistic value of 0.568 ($<1.66 < 1.66$) at a significance level of $\alpha=0.570 > 0.05$ ($\alpha = 0.570 > 0.05$). Similarly, work motivation does not have a significant positive influence on safety improvement, with a coefficient of 0.003 and a t-statistic value of 0.404 ($<1.66 < 1.66$) at a significance level of $\alpha=0.686 > 0.05$ ($\alpha = 0.686 > 0.05$). Therefore, while leadership and competence play crucial roles in enhancing work motivation and performance, their impact on safety improvement is not fully significant.

This study reveals that managerial leadership does not significantly influence the work motivation of crew members. This finding contradicts prevailing theories emphasizing the critical role of leadership in driving work motivation (Koeswayo et al., 2024). In specific contexts, such as the maritime industry, external factors such as demanding working conditions and extended working hours tend to have a more substantial impact on motivation than leadership styles (Setiawan & Krisnandi, 2023). At companies like Zamil Marine, a hierarchical work culture leads crew members to focus primarily on direct orders, rendering managerial leadership less relevant in enhancing work motivation.

Conversely, the research indicates that leader competence significantly impacts work motivation. Competencies encompassing technical, managerial, and interpersonal skills enable leaders to foster a conducive work environment for motivation enhancement (Ha, 2023). These competencies also promote effective communication and positive interpersonal relationships, ultimately boosting crew members' motivation.

The study further demonstrates that leadership significantly influences performance. Leaders with high managerial competence can provide clear direction, support subordinate development, and ensure the optimal management of resources. This aligns with research by Awashreh et al., (2024) which highlights that effective leadership enhances both individual and team performance through improved job satisfaction and task execution. Additionally, leader competence significantly impacts performance. Strong managerial skills allow leaders to better manage decision-making, organization, and problem-solving, which directly affect performance outcomes (Zada et al., 2024). In a supportive work environment, subordinates feel empowered and are able to perform more effectively (Khair et al., 2024).

However, the study finds that leadership, competence, and motivation do not significantly influence performance or motivation through the enhancement of workplace safety. In the maritime industry, safety perceptions are often more directly shaped by implemented policies and practices rather than leaders' managerial competence. Although leaders may possess the competence to design safety policies, inadequate resources or infrastructure can hinder the implementation of such policies, resulting in negligible effects on motivation and performance.

This study underscores the importance of considering factors beyond leadership and competence, such as working conditions, organizational culture, and employee welfare. In specific contexts, these variables play a more pivotal role in influencing employee motivation and performance than leadership efforts or workplace safety measures alone.

This study further supports the perspective of Lee et al., (2024) who assert that organizational factors such as corporate culture, working conditions, and employee well-being play a more decisive role in determining motivation and performance than leadership. In industries with demanding working conditions, such as the maritime sector, an employee well-being-

oriented approach and supportive organizational policies are often more effective in enhancing productivity than direct leadership interventions. Moreover, previous research by Kambey et al., (2024) has demonstrated that transformational leadership has a more significant impact in job contexts with high cognitive demands compared to roles that are more compliance-based, such as those in the maritime sector. This finding underscores that leadership effectiveness is highly dependent on industry context and the nature of the work performed by employees.

These findings also align with the Self-Determination (Wilhelm et al., 2024), which posits that intrinsic motivation has a greater influence on job performance than external factors such as leadership. In work environments with low levels of autonomy, such as the maritime industry, motivation is more strongly influenced by reward systems and employee welfare policies rather than individual leadership skills. Overall, this study affirms that the effectiveness of leadership and competence in enhancing motivation and performance is highly contingent on the specific work context. In the maritime industry, where safety and working conditions are paramount, a more systemic approach to organizational policy may be more effective in improving employee well-being and productivity than direct leadership interventions. Therefore, policy recommendations that prioritize improvements in working conditions and employee welfare may serve as a more effective strategy than leadership-based approaches alone.

CONCLUSION

This study concludes that leadership does not directly influence performance but significantly impacts work motivation and workplace safety. Leader competence strongly affects performance and work motivation but has a less pronounced effect on workplace safety, which is more influenced by company policies and available facilities. Work motivation also does not show a significant impact on workplace safety, as safety perceptions are more influenced by rules and on-site working conditions. Performance in the maritime industry appears to depend more on leaders' technical and managerial capabilities than on work motivation or workplace safety directly. Overall, the study emphasizes the importance of combining effective policies, employee welfare improvement, and enhanced workplace facilities to support motivation, performance and workplace safety in the maritime industry.

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