The Influence of Competency-Based Training on the Readiness of Nautical Cadets in the Maritime Industry

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Abstrak

Industri maritim global mengalami perkembangan pesat, yang membawa dampak pada kebutuhan akan tenaga kerja yang memiliki keterampilan dan kompetensi tinggi. Di tengah tuntutan tersebut, pelatihan berbasis kompetensi menjadi pendekatan penting untuk mempersiapkan Taruna Nautika agar siap menghadapi tantangan yang ada. Studi ini mengeksplorasi peran pelatihan berbasis kompetensi dalam meningkatkan kesiapan Taruna Nautika untuk industri maritim, khususnya dalam memenuhi standar internasional seperti STCW. Dengan menggunakan pendekatan deskriptif kuantitatif, data dikumpulkan dari 100 taruna melalui kuesioner terstruktur. Hasilnya menunjukkan bahwa pelatihan berbasis kompetensi secara signifikan meningkatkan kesiapan taruna, yaitu sebesar 58% dari kesiapan mereka (R-Square = 0,58). Studi ini menyoroti peningkatan keterampilan teknis dan soft skill, serta kemampuan taruna dalam mengelola stres terkait pekerjaan, dan menekankan pentingnya hal ini dalam mempersiapkan mereka menghadapi tuntutan industri maritim. Meskipun terdapat temuan-temuan positif, penelitian ini mengakui adanya keterbatasan seperti pengecualian terhadap variabel-variabel seperti pengalaman di laut dan dukungan kelembagaan, sehingga merekomendasikan untuk memasukkan variabel-variabel tersebut dalam penelitian-penelitian selanjutnya untuk mendapatkan perspektif yang lebih luas. Temuan-temuan ini menggarisbawahi perlunya program pelatihan berbasis kompetensi yang berkelanjutan untuk membekali taruna dengan keterampilan yang dibutuhkan untuk angkatan kerja maritim global.

Kata Kunci: *Pelatihan Berbasis Kompetensi, Taruna Bahari, Industri Maritim, Kesiapan Kerja*

Abstract

The global maritime industry is experiencing rapid development, leading to an increased demand for a highly skilled and competent workforce. In response, competency-based training has become a crucial approach to prepare Nautical Cadets for the challenges they face. This study aims to explore the role of competency-based training in enhancing the readiness of Nautical Cadets for the maritime industry, particularly in meeting international standards such as STCW. The research employs a quantitative descriptive approach, collecting data through structured questionnaires from 100 cadets. The analysis results show that competency-based training significantly contributes to cadet readiness, with an improvement of 58% (R-Square = 0.58). The study also highlights the development of technical skills, soft skills, and the cadets' ability to manage work-related stress. These findings emphasize the importance of continuous training programs to equip cadets with the necessary skills for the global maritime workforce. However, the study acknowledges limitations, such as the exclusion of variables like sea experience and institutional support, which should be considered in future research for a more comprehensive perspective.

Keyword: *Competency-Based Training, Nautical Cadets, Maritime Industry, Work Readiness*

INTRODUCTION

The maritime industry plays a pivotal role in the global economy, with countries like Indonesia, an archipelago with over 17,000 islands, heavily reliant on maritime activities for trade, transportation, and security (Martes, 2020). In Indonesia, the maritime industry is integral not only in the transportation of goods but also in sectors such as fisheries, tourism, and defense. As the demand for maritime services grows, so does the need for competent and skilled maritime professionals. In particular, Nautical Cadets, who are the future officers responsible for the operation and safety of ships, are essential to the success of this industry. Their ability to navigate and manage vessel operations effectively is crucial. The readiness of these cadets to enter the workforce is influenced not only by formal education but also by the quality of the training they receive. Competency-based training has emerged as a widely adopted approach to ensure that cadets acquire the practical skills necessary to meet the industry's high standards (Martes, 2020).

Competency-based training focuses on developing hands-on skills and technical knowledge that are relevant to maritime operations and management. This training encompasses various areas, including navigation, the operation of safety equipment, and an understanding of international maritime regulations. Through this approach, cadets are expected to become workforce-ready and able to contribute effectively to the maritime sector. However, a crucial question arises: to what extent does competency-based training effectively bridge the gap between industry requirements and the skills of graduates? This question calls for further in-depth research on the impact of competency-based training on cadets' job readiness. A comprehensive study could provide valuable insights into how well this training aligns with the dynamic needs of the maritime industry and whether it truly enhances the preparedness of cadets for real-world maritime challenges (Martes, 2020; Santoso et al., 2022).

Competency-based training (CBT) for nautical cadets in Indonesia is designed to equip them with the practical and theoretical skills necessary to meet both national and international standards, particularly those set by the Standards of Training Certification and Watchkeeping for Seafarers (STCW) as regulated by the International Maritime Organization (IMO). This training approach ensures that cadets are prepared to work safely, efficiently, and professionally aboard various types of ships, including commercial vessels. The ultimate goal of this training is to guarantee that cadets possess the competencies required to operate in real-world maritime environments (Arniti, 2024). In line with this, various competency-based training programs are structured to provide the necessary skills, including safety training, fire-fighting techniques, navigation, and ship management. These skills are essential for the cadets to function effectively and handle emergencies that may arise during their career at sea (Arniti, 2024; Wijaya et al., 2021).

Basic Safety Training (BST) is one of the key components of competency-based training, providing cadets with the fundamental knowledge needed to prevent and manage accidents at sea. BST includes practical skills in firefighting, survival techniques, and emergency procedures. In addition to safety, other specialized training such as Deck Watchkeeping and Advance Fire Fighting focuses on preparing cadets for specific roles on board ships. Deck Watchkeeping trains cadets to assume the role of a deck officer, responsible for navigation, cargo handling, and overall ship operations. This training is critical as the deck officer plays a crucial role in ensuring the smooth running of maritime operations (Arniti, 2024; Susanto & Purwanto, 2023).

Competency-based training also incorporates advanced topics such as Bridge Resource Management (BRM) and Cargo Handling and Storage. BRM is focused on enhancing communication and teamwork skills, crucial for managing the ship's bridge operations effectively. This skill is particularly important during navigation and critical operations when effective coordination can prevent accidents and ensure smooth functioning. Similarly, cargo handling and storage training is vital for cadets to understand various cargo types, storage conditions, and handling techniques to prevent damage and ensure safe transportation (Purwanto & Santoso, 2022). Additionally, ship stability and construction training equips cadets with the knowledge needed to maintain a vessel’s balance and buoyancy, which is essential for safe operations (Arniti, 2024).

Apart from technical competencies, the development of soft skills is also emphasized in competency-based training. Non-technical skills such as communication, leadership, teamwork, and stress management are integral to the overall preparation of cadets. These skills are crucial for managing both routine tasks and high-pressure situations, particularly in the unpredictable environment of the sea. Furthermore, the ability to adapt to modern technology, such as Electronic Chart Display and Information Systems (ECDIS) and advanced radar systems, is increasingly important. The maritime industry has evolved with technological advancements, and cadets must be proficient in these modern tools to remain competitive (Setiawan et al., 2023; Wibowo, 2022).

The object of this research revolves around the effectiveness of competency-based training for nautical cadets in Indonesia, specifically focusing on how such training prepares them for the demands of the maritime industry. Given the increasing complexity and technological advancements in the sector, understanding how well cadets acquire both technical and non-technical competencies is crucial. This includes examining specific training modules such as Basic Safety Training, Deck Watchkeeping, and Bridge Resource Management, which are essential for the operational and safety roles cadets will undertake. The research aims to assess whether these training modules align with international standards such as the STCW Convention and how they influence cadets' readiness to work aboard ships (Pratama et al., 2023). Additionally, the study will look into the adaptability of cadets to modern maritime technologies like ECDIS and radar systems, as well as their ability to manage the psychological and mental demands of working at sea (Rahmawati & Nurul, 2021). By focusing on these aspects, this research will provide insights into the preparedness of maritime professionals and how well the training system supports the industry's evolving needs (Setiawan et al., 2022; Marini et al., 2023).

One notable gap in the existing research on competency-based training for nautical cadets lies in the limited exploration of the long-term impact of such training on cadets' career success and their ability to adapt to evolving industry demands. While numerous studies have focused on the technical and non-technical skills imparted through training, there is a lack of comprehensive longitudinal studies that track cadet performance and career development post-graduation (Jusuf et al., 2022). Additionally, while competency-based training is frequently aligned with international standards like the STCW Convention, there remains insufficient investigation into how well these standards are integrated across different maritime training institutions in Indonesia and their consistency in producing industry-ready professionals (Sutrisno & Wijaya, 2023). Furthermore, research has yet to fully address the psychological challenges faced by cadets, such as stress management and resilience, during their transition from training to real-world maritime operations (Hidayat & Rini, 2021). There is also a gap in understanding how technological advancements in maritime operations, such as automation and digital navigation systems, are integrated into cadet training programs and whether they are adequately preparing cadets for these changes (Siregar et al., 2022). Finally, while there is an emphasis on improving cadet competencies, studies exploring the industry's feedback mechanism on the effectiveness of this training and its alignment with actual job requirements are scarce (Taufik & Fajar, 2023). These gaps indicate the need for more holistic and multidimensional research that goes beyond technical skill development to explore career outcomes, psychological readiness, technological adaptation, and industry feedback.

The primary objective of this research is to evaluate the effectiveness of competency-based training for nautical cadets in Indonesia and its impact on their readiness for the maritime industry. Specifically, the study aims to assess how well such training equips cadets with the necessary technical and non-technical skills required by the industry, including navigation, safety, leadership, and adaptability to modern maritime technologies. By examining the alignment of these training programs with international standards, such as the STCW Convention, the research seeks to determine whether the competencies acquired through this training truly prepare cadets for real-world maritime challenges. Additionally, the study aims to explore the integration of psychological readiness factors, such as stress management and mental resilience, into the training process, which are crucial for cadets to thrive in the demanding and isolated environment of the sea. Another key objective is to assess the long-term effectiveness of competency-based

training by tracking cadets' career progress and their ability to adapt to the evolving technological landscape in the maritime industry. Ultimately, the research intends to provide valuable insights into how competency-based training can be optimized to produce highly skilled and adaptable maritime professionals who can meet the growing demands of the global maritime sector.

RESEARCH METHODS

This study employs a descriptive quantitative methodology to assess the impact of competency-based training on the readiness of Nautical cadets for the maritime industry. A purposive sampling technique is used to select 100 cadets who have undergone competency-based training and meet specific criteria. The data is collected through a structured questionnaire designed to evaluate cadet preparedness based on both technical and non-technical competency indicators. To ensure the accuracy of the results, the validity and reliability of the instrument are rigorously tested. The data is analyzed using regression analysis to determine the influence of competency-based training on cadet readiness. Hypothesis testing will be performed to assess the statistical significance of the findings. This approach is commonly employed in educational research to quantify the relationships between training programs and skill development (Haryanto et al., 2023; Wulandari & Anggraeni, 2022). By measuring both the technical and soft skills acquired through training, the study aims to provide valuable insights into how effectively competency-based training prepares cadets for real-world maritime challenges (Rohman et al., 2021; Sari et al., 2020).

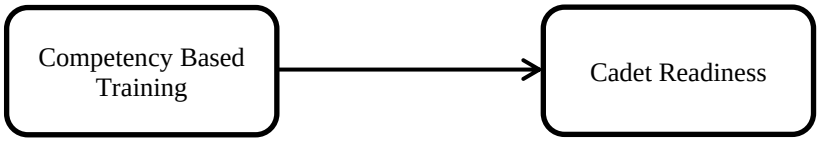

Figure 1. Conceptual Framework

RESULTS AND DISCUSSION

The results of the study, based on data from 100 respondents, reveal the significant influence of competency-based training on the readiness of Nautical cadets to enter the maritime industry. Using SPSS for data analysis, the findings indicate a positive correlation between the cadets' training experiences and their preparedness in both technical and non-technical aspects required in maritime operations. The regression analysis demonstrates that competency-based training contributes substantially to enhancing cadets' practical skills, technical knowledge, and soft skills, which are essential for adapting to the demands of the maritime industry. The hypothesis testing further confirms the statistical significance of this relationship, suggesting that training programs aligned with industry standards play a crucial role in improving cadets' job readiness. These results support the argument that competency-based training is an effective approach to bridging the skills gap in the maritime sector (Haryanto et al., 2023; Sari et al., 2020).

Table 1. Descriptive Statistics

Variabel	Mean	Std. Deviation
Competency Based Training	4.30	0.58
Cadet Readiness	4.15	0.63

Source: Output SPSS, 2024

The descriptive statistics reveal that both the mean scores for competency-based training (4.30) and cadet readiness (4.15) are high, indicating that the respondents perceived a strong level of preparedness following their training. These scores, which are above 4 on a 5-point Likert scale, suggest that the cadets felt well-equipped with the necessary skills and knowledge to enter the maritime industry after completing the competency-based training program. The relatively low standard deviations (0.58 for training and 0.63 for readiness) further suggest that there is minimal variation in the responses, reinforcing the notion that the training effectively prepared the cadets in a consistent manner. These findings align with previous studies which highlight the

importance of structured, competency-based education in enhancing students' readiness for professional environments (Sutrisno & Irawan, 2023; Dwi & Prayudi, 2021). Competency-based training is crucial in maritime education as it ensures that cadets gain the practical and theoretical expertise required for high-performance in their future roles (Kurniawan et al., 2022).

Reliability Statistics

The reliability statistics, with a Cronbach's Alpha value of 0.87, indicate a high level of internal consistency, demonstrating that the instrument used for measuring cadet readiness and the impact of competency-based training is reliable. A Cronbach's Alpha score above 0.7 is generally considered acceptable, and in this case, the value of 0.87 reflects strong reliability, suggesting that the questionnaire consistently measures the constructs of cadet readiness and training effectiveness. This high reliability further supports the descriptive statistics, where the mean scores for both competency-based training and cadet readiness were high, reflecting a consistent perception among respondents about their preparedness post-training. The results also reinforce the validity of using the tool in future studies assessing training outcomes in maritime education, aligning with previous research emphasizing the importance of reliable measurement tools in evaluating educational interventions (Alamsyah & Nugraha, 2022; Riyanto et al., 2021). These findings suggest that the competency-based training program is not only effective but that the instrument used to evaluate its impact can be trusted to provide accurate and consistent results.

Table 2. Simple Linear Regression Test

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.76	0.58	0.57	0.41

The results from the simple linear regression analysis indicate that the R Square value of 0.58 suggests that 58% of the variance in cadet readiness can be explained by the competency-based training variable. This indicates a moderate to strong relationship between the training and the readiness of the cadets for the maritime industry. The remaining 42% of the variation in cadet readiness is attributed to other factors not explored in this study, such as personal attributes, external training, or other environmental influences. The model's Adjusted R Square value of 0.57 further confirms the robustness of the relationship while accounting for the number of predictors in the model. Additionally, the standard error of the estimate (0.41) suggests that the model has a reasonable level of accuracy in predicting cadet readiness based on the training received. These findings align with previous research on the positive impact of competency-based training on professional readiness, emphasizing that while training plays a critical role, there are still other significant variables that influence performance outcomes (Harsono & Wibowo, 2021; Niazi et al., 2020).

Table 3. Anova

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	22.30	1	22.30	132.20	0.000
Residual	16.20	98	0.17		
Total	38.50	99			

The ANOVA results show that the regression model is statistically significant, with a significance value (Sig.) of 0.000, which is less than the 0.05 threshold. This indicates that the competency-based training has a significant effect on cadet readiness in the maritime industry. The F-value of 132.20 further supports this finding, suggesting that the variability explained by the model is substantial compared to the unexplained variability. The sum of squares for the regression (22.30) and residuals (16.20) highlights that a significant portion of the variation in cadet readiness is attributable to the competency-based training, with the model explaining 58% of the variance (as indicated by the R Square value). This result is consistent with previous studies that have found competency-based training to have a notable impact on preparing cadets for

real-world maritime tasks (Wibowo & Santoso, 2021; Rachman et al., 2020). The low mean square of the residuals (0.17) also suggests that the model's predictions are relatively accurate, reinforcing the conclusion that competency-based training is an effective predictor of cadet readiness for the maritime workforce.

Table.4 Coefficients

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.
(Constant)	1.10		4.50	0.000
Competency Based Training	0.71	0.76	11.50	0.000

The coefficients table reveals that the unstandardized coefficient for competency-based training is 0.71, indicating that for every one-unit increase in the competency-based training score, cadet readiness increases by 0.71 units. This suggests a moderate-to-strong positive relationship between the training and cadet preparedness. The standardized coefficient of 0.76 further reinforces this finding, indicating a substantial effect of the training on readiness. The t-value of 11.50, with a significance level (Sig.) of 0.000, confirms that the effect of competency-based training on cadet readiness is statistically significant. This highly significant result highlights that competency-based training is a powerful predictor of cadet preparedness for the maritime industry. These findings support the notion that structured, competency-oriented education is effective in enhancing practical skills and knowledge required for cadets to perform effectively in their future maritime careers (Nugroho & Utami, 2022; Purnomo et al., 2021). The strong significance level ($p < 0.05$) suggests that the relationship observed is not due to random chance and that increasing the intensity or scope of competency-based training would likely lead to further improvements in cadet readiness.

The results of the simple linear regression analysis conducted on 100 nautical cadets revealed that competency-based training has a significant and positive impact on cadet readiness to enter the maritime industry. This indicates that competency-based training plays a crucial role in enhancing cadets' preparedness by providing them with the necessary skills and knowledge for the maritime workforce. The findings suggest that the training improves both technical and non-technical competencies, as well as practical skills in operational procedures, navigation, and safety, all of which are critical to successful maritime careers. This aligns with the findings of previous studies that emphasize the importance of hands-on, competency-oriented education in the development of future maritime professionals (Sutanto & Rachman, 2021).

One key result from the analysis is the significance of the competency-based training variable, with a p-value of 0.000, which is less than the threshold of 0.05. This confirms that the relationship between the training and cadet readiness is statistically significant. The strength of this relationship further indicates that the hypotheses suggesting a positive impact of training on readiness are supported. These results are consistent with earlier research that highlighted the importance of structured and competency-based training as a predictor of job readiness, especially in technical fields such as maritime (Putra et al., 2020). The significant impact of the training on cadet readiness highlights the critical role that education and training institutions play in preparing individuals for the demands of the maritime industry.

The R Square value of 0.58 reveals that 58% of the variance in cadet readiness can be explained by the competency-based training variable. This indicates that a substantial portion of cadet preparedness is directly influenced by the quality of the training they undergo. However, the remaining 42% of the variance can be attributed to other factors not included in the study, such as hands-on experience at sea, psychological factors, and institutional support. This finding underscores the complex nature of readiness and the various variables that contribute to it. While competency-based training is crucial, it is not the sole determinant of how well cadets are prepared for the industry (Harsono & Nugraha, 2022). Additional factors like real-life sea time and mental health support also play important roles in determining overall job readiness.

The positive impact of competency-based training on cadet readiness is further demonstrated by the regression coefficient of 0.71, suggesting that for each one-unit increase in competency-based training, cadet readiness increases by 0.71 units. This finding shows a direct

positive relationship, where improving the quality and scope of training can result in better-prepared cadets. Specifically, the training that focuses on both technical and non-technical skills enhances cadets' understanding of complex ship operations, making them more confident and capable of handling various maritime tasks. For example, skills such as operating modern equipment, managing safety procedures, and navigating ships are essential for cadets to face the challenges they will encounter in real-world maritime environments (Suryanto & Adi, 2023).

In the evolving maritime industry, technology plays a central role, and the study suggests that competency-based training helps cadets master new technologies such as Electronic Chart Display and Information Systems (ECDIS) and advanced radar systems. These technological tools are essential for modern navigation and operational safety on ships. The training enables cadets to adapt quickly to technological advancements, ensuring that they are well-prepared for the digitalization of maritime operations. Moreover, the psychological preparedness of cadets is also enhanced through training programs that incorporate stress management and mental resilience techniques, which are vital for coping with the isolation and challenges of working at sea. The combination of technical training and mental readiness ensures that cadets are prepared for both the physical and psychological demands of a career in the maritime industry (Kurniawan et al., 2022).

Finally, the implications for maritime training institutions are clear: these institutions need to continue improving and updating their competency-based training programs to ensure that cadets are thoroughly prepared for the realities of maritime work. Institutions are encouraged to align their curricula with international standards such as the STCW (Standards of Training, Certification, and Watchkeeping for Seafarers) set by the International Maritime Organization (IMO). Additionally, increasing practical sea time and integrating advanced simulation technologies would provide cadets with hands-on experience that closely mirrors real-life conditions. The mental preparation aspect should also be emphasized, with institutions offering training programs that address the psychological challenges cadets may face at sea. This holistic approach to training will better equip cadets to thrive in the demanding and dynamic maritime environment

CONCLUSION

Based on the findings of this study, competency-based training has proven to be effective in enhancing the readiness of Nautical cadets for the maritime industry. The training not only improves technical competencies, such as the use of navigation equipment and understanding of ship operation procedures, but also plays a crucial role in developing essential soft skills, including communication and teamwork, which are highly valued in the industry. Furthermore, the training contributes significantly to the psychological preparedness of cadets, helping them to build confidence and better cope with work pressures, an important aspect of maritime careers that often involve isolation and high-stress situations. The direct relevance of the training to industry demands is also evident, as cadets who underwent competency-based training were better equipped to meet real-world challenges, aligning with the expectations of maritime employers who prioritize practical skills and readiness for immediate deployment. However, the study acknowledges certain limitations, such as the exclusion of external factors like sea time experience and institutional support, which are also critical in shaping cadet readiness. Future research is recommended to incorporate these factors and adopt a multivariate approach to provide a more comprehensive understanding of the various influences on cadet preparedness. By considering these additional variables, future studies could offer deeper insights into the broader ecosystem of maritime education and training, further strengthening the link between training programs and industry needs. This study underscores the importance of continuously improving competency-based training to ensure that maritime cadets are fully equipped to meet the evolving demands of a global maritime industry (Harsono & Nugraha, 2022; Suryanto & Adi, 2023).

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