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Education and Training to Improve Human Resources Quality in Maritime Transportation Industry

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Abstract

This study aims to analyze the effect of education and training (Diklat) and the quality of training instructors on improving the quality of human resources (HR) in the sea transportation industry. This industry requires high quality human resources to ensure operational effectiveness and competitiveness in the era of globalization. The research method used is quantitative with a survey approach. The results showed that Training and Instructor Trainers have a significant and positive influence on the quality of human resources. The t-test results show that training has a coefficient of 0.722 and training instructors of 0.866, both of which are significant at the 0.000 level. The F test yielded a value of 78.436 with a significance of 0.000, indicating that the regression model as a whole is significant in predicting HR quality. The R Square value of 0.615 indicates that 61.5% of the variation in HR quality can be explained by the Training and Instructor Trainer variables. Based on these results, it is concluded that quality education and training programs, as well as competent training instructors, play an important role in improving the competence and performance of HR in the maritime transportation industry. The findings provide implications for company management in increasing investment in HR training to achieve better competitiveness in the sector.

Keywords: Training, Instructor Trainer, HR Quality, Marine Transportation Industry, Linear Regression

Introduction

The maritime transportation industry is vital to the global and national economy, especially in maritime countries such as Indonesia, which has a coastline of over 95,000 km. This strategic geographical position increases Indonesia's potential to develop the maritime transportation sector, which is vital to economic growth. This industry facilitates most of the country's exports and imports, especially for strategic goods, including raw materials and finished products, primarily transported by sea (Fardhal Virgiawan Ramadhan, 2023). In addition, the maritime transportation sector is vital to inter-island logistics distribution, ensuring the movement of goods between the various islands in Indonesia. This connectivity is critical to economic integration and stability, as it supports the distribution of essential goods and services across the archipelago (Naila Najma Alifa, 2024). The economic impact of maritime transportation goes beyond logistics; it significantly contributes to Indonesia's GDP and employment, making it a strategic area for investment and policy focus (Gary A. Gordon, 2024). Thus, the maritime transportation industry not only supports trade but also plays a vital role

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in driving national economic growth and stability. The global shipping industry is critical to international trade, accounting for approximately 90% of world trade due to its cost-effectiveness in transporting large quantities of goods over great distances (Elizabeth J. Abraham, 2024). However, as globalization increases, the industry faces significant challenges related to operational efficiency, safety, and environmental sustainability. The shipping sector must navigate complex regulatory and competitive pressures while addressing the urgent need for emissions reductions to combat climate change (Irmina Durlik, 2024). Environmental sustainability is a pressing concern, as ship pollution—including exhaust emissions, ballast water discharges, and oil spills—poses serious ecological risks and impacts human health (Xiaoxuan Zhou, 2024). The industry is often criticized for being a "sustainability laggard," indicating a delay in adopting cleaner technologies and practices needed to reduce its ecological footprint (Huan Liu, 2024). Additionally, safety challenges have been exacerbated by the rapid growth of maritime trade, necessitating enhanced navigation safety strategies to mitigate risks. Thus, the shipping industry must balance economic growth with environmental responsibility and operational safety to remain viable in an increasingly competitive global market.

The maritime transportation industry in Indonesia faces significant challenges due to the low quality of Human Resources (HR), which is critical to ensuring efficient operations, occupational safety, and environmental sustainability. As the industry evolves with technological advancements, there is an increasing demand for HR who not only possess technical skills but also managerial competencies and the ability to adapt to new technologies, such as digital port systems and automation (Hani Gita Ayuningtias, 2023). Competency gap analysis reveals that the skills required by the industry are often misaligned with those currently held by the workforce, hampering the sector's competitiveness on a global scale (Ioannis N. Theotokas, 2024). To address this issue, improving Human Resource Development (HRD) is essential, with a focus on equipping personnel with the skills needed to meet industry demand (Oladapo Adeboye Popoola, 2024). In addition, maritime education and training programs must be improved to prepare individuals for the evolving maritime sector landscape, ensuring they are well-versed in both technical and soft skills (Nofie Iman, 2022). By bridging the competency gap and cultivating a skilled workforce, Indonesia can improve the global competitiveness and operational efficiency of the maritime transportation industry.

Education and training (Diklat) are essential in developing human resources in the maritime transport sector, as they not only improve technical skills but also enhance managerial and leadership capabilities. This comprehensive approach is essential to increase productivity and efficiency throughout the maritime supply chain. The Maritime University of Constanta is

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actively addressing this need through projects focused on initial and continuous training of younger and more experienced lecturers, ensuring that the quality of education is aligned with current industry demands (Pedro B. Água, 2020). In addition, the International Maritime Organization (IMO) sets international standards that maritime universities must comply with, further emphasizing the importance of integrating practical training into the engineering curriculum (Vinko Pavic , 2023). Continuous training is essential in preparing the workforce for evolving challenges, such as adapting to new international regulations and the increasing emphasis on green shipping practices (Ergun Demirel, 2020). By implementing innovative training methodologies, the university aims to maintain and enhance the knowledge of experienced lecturers, thus equipping future maritime professionals with the skills necessary to navigate the complexities of the industry. This holistic approach ultimately contributes to a more competent and adaptable workforce in the maritime sector.

Diklat, or education and training programs, are also critical to improving leadership and management skills in Indonesia's maritime transportation sector. These programs ensure that human resources (HR) can operate efficiently and make strategic decisions that contribute to the industry's sustainable growth (Magmawati Tri Heriati, 2023). The focus of this study is to improve the quality of HR through targeted education and training, which is critical to preparing a competent workforce that is able to compete internationally (Ningrum Astriawati, 2022). To achieve this, the study will identify industry-specific needs that must be addressed through an effective diklat strategy (Prasadja Ricardianto, 2020). This strategy is tailored to meet the unique requirements of the maritime transportation industry, ensuring that the workforce is not only skilled but also adaptable to future challenges (Mukhlis, 2022). By formulating relevant training strategies, this study aims to develop a workforce that can effectively respond to local and international market demands, thereby improving the overall safety management system in traditional shipping (Pedro B. Água, 2020). This comprehensive approach is essential to address the current problems of high accident rates and low competitiveness in the sector.

Literature Review

Education and Training in Human Resource Development

Education and training (diklat) are important components in human resource development in various industries, including the maritime transportation industry. According to Becker (1964) in the Human Capital theory, education and training are considered as investments that increase individual productivity through increased skills, knowledge, and capabilities.

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Education and training enable the workforce to improve their abilities, adapt to technological changes, and improve performance in the workplace.

In the context of the maritime transportation industry, the role of education and training becomes more critical along with technological developments and increasing international standards related to safety, operations, and the environment. According to Marlow & Mitroussi (2013), quality education and training in the maritime industry plays an important role in ensuring that human resources are able to operate ships and ports safely and efficiently, and meet global regulations such as the STCW Convention (Standards of Training, Certification, and Watchkeeping for Seafarers) which regulates the competence of seafarers worldwide.

In addition, Noe (2017) stated that effective education and training must include learning methods based on technical and non-technical skills, such as managerial and leadership skills, which are needed to carry out complex maritime operations. Therefore, the development of training curricula in this industry must include aspects such as digital technology, safety management, and the implementation of green shipping.

Competency Theory

Competency theory emphasizes the importance of HR capabilities in meeting job demands through mastery of relevant skills, knowledge, and attitudes. According to Boyatzis (1982) in his competency model, there are three main components that form competency: (1) technical skills, (2) cognitive abilities, and (3) personal characteristics. In the maritime transportation industry, these three components are very important because workers need to have technical skills to operate ships and port equipment, cognitive abilities to make the right decisions in critical situations, and a high level of discipline and responsibility in maintaining work safety.

A study by Wang & Notteboom (2015) emphasized that improving HR competency in the maritime transportation industry can be done through education and training programs designed to strengthen technical and managerial skills, as well as encourage adaptation to new technological developments, such as the Internet of Things (IoT) and blockchain in maritime supply chain management. This is in line with the Competency-Based Education and Training (CBET) theory which emphasizes the importance of competency-based education to address specific industry needs.

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Maritime Transportation Industry and HR Challenges

The maritime transportation industry is known as a dynamic and highly regulated sector, where HR is faced with various operational, technological, and international regulatory challenges. According to Stopford (2009) in his book Maritime Economics, one of the main challenges in this industry is the lack of trained workers who are able to operate ships and port equipment efficiently, as well as adapt to rapid technological changes.

A study by Lorange (2005) shows that globalization and digitalization are increasing pressure on the maritime transportation industry to improve operations and competitiveness. Therefore, continuous education and training are essential to ensure that HR in this sector can overcome these global challenges. Effective training should include improving technical skills in port operations, logistics management, and knowledge of international regulations such as the MARPOL Convention governing marine pollution.

Another HR challenge is the high turnover rate in the maritime industry. Drewry (2016) revealed that many shipping companies face the problem of limited skilled labor caused by the lack of continuous training programs. This can be addressed through the development of education and training programs that focus not only on improving technical skills, but also on developing soft skills such as conflict management, leadership, and team collaboration.

Opportunities for Human Resource Development in the Maritime Transportation Industry

Digital transformation in the maritime transportation industry opens up great opportunities for improving the quality of human resources through technology-based education and training. According to Notteboom & Winkelmans (2020), the adoption of technologies such as port automation, digital management systems, and big data can help improve operational efficiency in ports and shipping, but only if the human resources involved are able to master this technology. Technology-based training programs, such as simulation training, e-learning, and the use of IoT, enable human resources to better understand modern operational systems.

Furthermore, the IMO (International Maritime Organization) through its programs continues to encourage improved education and training in the field of maritime safety and sustainability. Programs such as the IMO Model Courses provide international guidance for designing maritime education curricula that meet global standards, which are very important for improving human resource competencies in the maritime transportation sector.

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Methods

This study uses a quantitative descriptive method that aims to analyze the role of education and training in improving the quality of Human Resources (HR) in the maritime transportation industry. This method was chosen because it is able to provide a clear picture of the relationship between training programs and improving human resource competencies. In addition, this study also attempts to identify factors that influence the effectiveness of education and training. The population of this study were workers in the marine transportation industry, including operational workers, managerial staff, and personnel involved in managing ports and shipping companies in Indonesia. The samples taken were employees and managers in the marine transportation sector who had participated in education and training programs related to competency improvement. A total of 100 respondents were selected from several shipping and port companies in strategic areas such as Jakarta, Surabaya, and Makassar. This study involved two main variables: Independent variables: Education and training programs (diklat), which include aspects of curriculum, training frequency, training methods (technical, managerial, digitalization), and training instructors. Dependent variables: Human resource quality, which is measured through several indicators such as improving technical skills, managerial abilities, adaptation to new technologies, and productivity and performance in operational tasks.

Results and Discussion

Validity & Reliability Test

Table 2. Validity Test

Correlations

		Sig. (2-tailed)	Validitas
Training	Sig. (2-tailed)	0,000	0,000
Coach Instructor	Sig. (2-tailed)	0,000	
Quality of Human Resources	Sig. (2-tailed)	0,000	0,000

. Correlation is significant at the 0.01 level (2-tailed).

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Interpretation

The results of the study stated that all variables in this study were declared valid with a sign value of 0.000 > 0.005, thus the variables in this study can be continued to the next stage.

Tabel 3. Reliabilitas

Reliability Statistics	
Cronbach's Alpha	N of Items
0,828	3

Interpretation

The results of the SPSS statistical calculations show that the Cronbach`s Alpha value is 0.828 <0.7, thus all variables in this study are declared reliable and can be continued.

Determinant Analysis

Table 4. Determinant Analysis

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,785[a]	0,615	0,608	6,33240
a. Predictors: (Constant), Coach Instructor, Training				

Interpretation

- The R value of 0.785 indicates a strong correlation between the independent variables (Coach Instructor and Training) and the dependent variable (for example, Quality of Human Resources or Performance). In this context, an R value approaching 1 indicates a strong positive relationship between education and training and increasing the Quality of Human Resources in the marine transportation industry.
- The R Square value of 0.615 indicates that 61.5% of the variation in the dependent variable (Quality of Human Resources) can be explained by this model, namely by the factors Coach Instructor and Training. This means that most of the changes in Quality of Human Resources or performance can be influenced by education and training, so that the remaining 38.5% is influenced by other variables outside this study.

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T Test & F Test

Table 5. T Test

Coefficients[a]						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	16,238	4,283		3,792	0,000
	Training	0,722	0,161	0,387	4,486	0,000
	Coach Instructor	0,866	0,160	0,466	5,400	0,000
a. Dependent Variable: Quality of Human Resources						

Interpretation

The interpretation of the t-test table (Coefficients) for the regression model with the dependent variable Quality of Human Resources is as follows:

1. Constant:
   - The t-value for the constant of 3.792 indicates that the constant is statistically significant, which means that even without the influence of Training and Coach Instructor, there are still basic factors that affect the Quality of Human Resources.
   - The Sig. value of 0.000 indicates that this constant is significant at the 95% confidence level (because <0.05). Thus, the constant plays an important role in the model.

2. Training:
   - The t-value of 4.486 indicates that Training has a significant influence on the Quality of Human Resources.
   - The Sig. value of 0.000 indicates that the influence of Training is statistically significant at the 95% significance level (because <0.05). This means that Training significantly affects the improvement of the Quality of Human Resources.
   - Beta (Standardized Coefficients): A value of 0.387 indicates the relative contribution of Training to the dependent variable, which is around 38.7% of the change in Quality of Human Resources explained by Training.

3. Coach Instructor
   - A t value of 5.400 indicates that Coach Instructor has a stronger influence than Training on Quality of Human Resources.
   - Sig. (Significance): A Sig. value of 0.000 indicates that the influence of Coach Instructor is statistically significant at a 95% confidence level (because <0.05). This means that Coach Instructor has a significant impact on Quality of Human Resources.
   - Beta (Standardized Coefficients): A value of 0.466 indicates that Coach Instructor has a greater relative influence on Quality of Human Resources than Training, with a contribution of around 46.6% to the change in Quality of Human Resources.

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Conclusion

- Both independent variables, namely Training and Coach Instructor, have a significant influence on the Quality of Human Resources with a significance value of 0.000, which means that the influence of both is statistically significant.
- Coach Instructor has a greater influence on the Quality of Human Resources than Training, as seen from the higher B and Beta values.
- The results of the t-test show that improving the quality of training (Coach Instructor) and education (Training) can significantly improve the Quality of Human Resources in the marine transportation industry.

F Test Table

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6290,465	2	3145,233	78,436	,000[b]
	Residual	3929,733	98	40,099		
	Total	10220,198	100			

a. Dependent Variable: Quality of Human Resources
b. Predictors: (Constant), Coach Instructor, Training

Interpretation

The interpretation of the F-test table (ANOVA) for the regression model that predicts Quality of Human Resources is as follows:

1. F-statistic:

• The F value of 78.436 is the result of dividing the Mean Square Regression by the Mean Square Residual (3145.233 ÷ 40.099 = 78.436).

• This F value is used to test the significance of the model as a whole, namely whether the independent variables (Coach Instructor and Training) collectively influence the dependent variable (Quality of Human Resources).

2. Significance (Sig.)

The Sig. value of 0.000 indicates that this regression model is statistically significant at the 95% confidence level (because <0.05). In other words, there is strong evidence that the independent variables (Coach Instructor and Training) together have a significant influence on Quality of Human Resources.

The results of the F test show that the overall regression model is significant and can explain variations in the Quality of Human Resources. The F value = 78.436 which is significant at 0.000 indicates that Coach Instructor and Training together have a significant influence on improving the Quality of Human Resources in the marine transportation industry. This means that the model used is good enough to predict the relationship between the independent variables and the dependent variable.

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Conclusion

This study aims to analyze the influence of Training and Coach Instructor on improving the Quality of Human Resources (HR) in the marine transportation industry. Based on the results of regression analysis, t-test, and F-test, several important conclusions can be drawn as follows:

1. The Influence of Training on the Quality of Human Resources:

The results of the t-test show that the Training variable has a regression coefficient of 0.722, which means that every 1 unit increase in training will increase the Quality of Human Resources by 0.722 units. With a t value = 4.486 and significance = 0.000, it can be concluded that Training has a statistically significant influence on the Quality of Human Resources. This means that education and training play an important role in improving the competence and skills of HR in the marine transportation industry.

2. The Influence of Coach Instructor on the Quality of Human Resources:

The Coach Instructor variable has a regression coefficient of 0.866, indicating that a 1 unit increase in the quality of Coach Instructors can increase the Quality of Human Resources by 0.866 units. The t value = 5.400 and significance = 0.000 indicate that the Coach Instructor has a very significant influence on the Quality of Human Resources. This confirms that the role of competent and experienced instructors is very important in ensuring the effectiveness of training for HR development.

3. Strength of the Regression Model:

• The R value of 0.785 indicates that the model has a strong correlation between the independent variables (Training and Coach Instructor) and the dependent variable (Quality of Human Resources). In addition, the R Square of 0.615 indicates that 61.5% of the variation in Quality of Human Resources can be explained by the two independent variables, while the rest is influenced by other factors not included in the model.

• The Adjusted R Square of 0.608 also indicates that this model is quite strong and relevant in explaining variations in Quality of Human Resources.

4. Overall Model Significance (F Test):

The F test produces an F value = 78.436 with significance = 0.000, which means that the overall regression model is significant. Thus, the variables Training and Coach Instructor

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together have a significant influence on the Quality of Human Resources. This shows that investment in education and training, as well as the quality of instructors, are very important in efforts to improve the performance and competence of human resources in the marine transportation industry.

This study as a whole concludes that Training and Coach Instructor have a significant and positive influence on improving the Quality of Human Resources in the marine transportation industry. The development of quality education and training programs, as well as improving the competence of instructors, can be an effective strategy in strengthening the competitiveness and performance of human resources in this sector. The regression model used shows strong and significant results, so it can be a good basis for decision making related to human resource development in the marine transportation industry.

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