The Influence of Crew Skills on the Use of Navigation Equipment and Its Impact on Shipping Safety: A case study at PT Al Jazeera Shipping Company

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Abstract

Technological progress in transportation, especially sea transportation, is necessary for a maritime nation. It is essential for ensuring the distribution of goods and mobilizing passengers between islands. Additionally, it is crucial for the maintenance of these systems. Every individual who works in this sector must be able to adapt to and maintain the stability of technological machinery. Technological advances have led to rapid development in various fields, including the maritime sector. However, these advances can lead to fatal work accidents if not balanced with qualified skills. Work accidents in the maritime transportation industry caused by human error result in significant losses for both ship passengers and companies. This study focuses on the initial skills of PT AJS ship crews in using navigation equipment. The research results show that the skills of ship crews in using navigation equipment significantly influence the safety of the shipping fleet.

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Introduction

Indonesia is a maritime country where the water area is more dominant than land. As a maritime country, the role of the transportation sector, especially sea transportation, really supports the smooth distribution of goods from one region to another. Likewise, human mobilization is assisted by sea transportation, making it easier for people between the islands to carry out their activities smoothly. In the current development era, this role is needed so that the challenges will increase. Conversely, technological advances bring developments in various fields, such as education, social relations, and community relationships, which will influence human behaviour. So many machines were created due to technological advances. However, technological advances can have dire consequences if not appropriately handled, such as new dangers and work accidents. In the shipping industry, for example, human lives will become victims if there is a lack of care in its maintenance and design. According to Daryanto (2010, 55), accidents are often caused by various factors. First, unsafe actions. Second, hazardous working conditions. Accidents can be prevented by anticipating things that can cause accidents. People who experience accidents are often caused by other people's negligence or because of their actions that do not support safety.

Sea transportation is the lifeline that ensures the smooth flow of goods between islands. This crucial role places a significant responsibility on ship crews, who are expected to be disciplined, skilled, and agile in carrying out their tasks. In the realm of shipping safety, it is evident that many jobs, both light and heavy, carry a considerable risk of work accidents. This underscores the importance of crew members' vigilance and adherence to safety protocols (Andry, Arief, & Yuliani 2014, 227-360).

The shipping industry continues to grow. The developments began in 1800 when steam-powered ships were introduced. People began to move from using sails as propulsion to using steam power. Further developments occurred in the early 1900s when diesel began to be used as a more efficient ship propulsion. Diesel is also mass-produced on land. In the 1970s, computerized ship controls began to be developed until uncrewed ships were finally discovered and along with technological developments, Porathe, Hoem, Rødseth, Fjørtoft, and Johnsen (2018) tried to analyze the level of safety of uncrewed ships and accidents caused by human error.

Several cases of disruption of shipping safety include ship accidents, namely MV technical factors. Tay Son 4 with FV Mulya Jaya Collision in the Java Sea On November 19, 2016, the boat NMS Advance crew that CNOOC SES LTD chartered caught fire and sank in the Thousand Islands on December 11, 2016. The human error factor was KM Bukit Raya, which ran aground in Pontianak, West Kalimantan, on June 4, 2016, and KM Lambelu in Tarakan on October 22, 2016. From 2010 to 2016, the frequency of ship accidents occurred relatively high (Voi.d 2021).

This ship accident resulted in relatively significant losses, including loss of life, goods, and cargo, as in the KM accident. Senopati Nusantara is in Mandalika Island, Java Sea, and KM waters. Levina waters of the Thousand Islands and KM. Tri-Star on the Musi River, Palembang. Based on KNKT data, as a result of ship accidents in 2010-2016, there were 337 deaths and missing people, cargo, and vehicles. Incidents or accidents occur to ship crews while working both on deck and in the engine room due to a lack of attention and prioritization of safety, often called human factors. In this regard, ship crews have a significant duty and responsibility to prevent accidents that can cause loss and suffering for all parties, e.g., ship crew to the company level, namely through reasonable work safety efforts (Voi.d 2021).

Based on data on ship accidents, the phenomenon or problem in this research is a shipping safety issue. In this research, the author observed that ship crew work accidents often occur due to many factors by revealing the factors that cause accidents to ship crew while working, and the consequences that arise due to these accidents, as well as efforts that must be made to reduce the risk of work accidents for ship crew. The research was conducted at PT Al Jazeera Shipping Company (PT AJS) the Company's business scope includes shipping activities, including the transportation of general goods.

In terms of shipping safety, company management also has an important role. Management, as the highest authority in the company, is obliged to implement, develop, and implement measures to prevent ship accidents. Management must also implement high commitment from the ship's crew so that management and the ship's crew have a unified view that ship accidents can be avoided and are not unexpected disasters. Management must guide the crew to prevent accidents or provide strict warnings so the same accident does not happen again. This study has found the influence of crew skills in the use of navigation equipment on the safety of shipping fleets on PT AJS.

Method

The method used in this research is a quantitative approach. Because the COVID-19 pandemic has not yet ended, activities and interactions are still limited, so data collection uses surveys. Data was collected by distributing questionnaires via chain messages with Google Forms and additional data from related literature. The author conducted research on ship crew at PT AJS, total 21 people on seven ships, including Sea Monarch, Sea Thunder, Al Aali 1, Al Faisal 1, Valian Eagle, Sea Dragon, and Sea Majestic. The questionnaires then calculated using SPSS software. This software offers data analysis for descriptive and bivariate statistics, numeric outcome predictions, and group identification predictions. The author also made observations in the field to see and collect additional information directly from the research object. This research was designed to find out what skills ship crew members should have so that they influence shipping safety. Shipping safety includes efforts to overcome disasters or accidents, covering several aspects, such as sailing safety, ship management, and the safety of the ship, its cargo, and passengers (Siswoyo 2017, 59).

The Skill of Navigation Equipment in Contribution to Shipping Safety

Transportation management is the management of transportation modes by a group or group. Transportation services are one of the income factors (input) from production, trade, agriculture, and other economic activities. Sea transportation management is simple, namely, how the delivery of goods can be carried out well and how the transportation of these goods is also well regulated. They are arranged to start with goods delivery, transportation, and warehousing. When sending goods by ship, one must pay attention to the size of the load and fulfilment so that shipping costs do not increase and maritime transportation accidents are avoided (Sinitsyn et al. 2022)

PT AJS is a shipping company that has been active in the maritime, offshore, and oil industries for more than the last 40 years and has a fleet of various sizes and types. This company is based in Bahrain. Bahrain is located on the west coast of the Persian Gulf in the Middle East Region. Bahrain is one of the countries with a high Human Development Index, which the World Bank released as a country with a high income. Apart from that, according to news released by CNN, Bahrain is among the ten best countries in the world for elite workers from foreign countries. There are several criteria to be included in the list of countries considered friendly for foreign workers, including health insurance, work career, safety, tolerance, and other things that support quality of life.

To join a ship's crew, a person must meet several criteria, including the crew's skills in using navigation equipment in ship operations. The totality of a sailor's professional expertise and skills defines the ship's crew's skills in using navigation equipment. Who is trusted to work on ships to produce performance and provide satisfaction to ship owners and passengers, as obtained through education, training, and experience during work? Indicators of ship crew proficiency are expertise, skills, education, training, experience, and welfare. The skills of the ship's crew indirectly affect shipping safety. Therefore, a survey was carried out on several crew members from several ships from the AJS company.

The survey was conducted to determine the influence of crew members' skills in using navigation equipment on the navigation safety of PT AJS., based on data obtained from a questionnaire, was distributed to 21 respondents. From the data obtained, the characteristics of the crew members of the fleet at PT AJS can be seen in terms of age, education, maritime expertise, length of service, and training can be seen in Table 1.

Table 1. Classification of Respondents Based on Age

Age	Number of Respondent	Percentage (%)
25 -35	6	28,57
35-45	12	57,14
45-55	3	14,29
Total	21	100

Source: Questionnaire Data, 2022.

Table 2. Classification of Respondents Based on Educational Expertise

Level of Marine Expertise	Number of Respondent	Percentage (%)
Ahli Teknika/ Nautika Tkt. I	3	14,29
Ahli Teknika / Nautika Tkt. II	2	9,52
Ahli Teknika/ Nautika Tkt. III	3	14,29
Ahli Teknika/ Nautika Tkt. V	4	19,05
Ahli Teknika / Nautika Tkt. D	9	42,86
Total	21	100

Source: Questionnaire Data, 2022 .

Table 3. Classification of Respondents Based on Length of Work

Length of Work	Number of Respondent	Percentage (%)
< 1 years	4	19,05
1 -2 years	6	28,57
3-4 years	8	38,10
> 4 years	3	14,29
Total	21	100

Source: Questionnaire Data, 2022.

Table 1 shows that the most considerable age level is 35 - 45 years old, with 12 respondents (57.17%), 25 - 35 with six respondents (26.67%), and 45 - 55 with five respondents. Respondents (16.6%). Based on Table 2, the most extensive educational expertise in the marine sector is the Tk Engineering/Nautics Expert. D as many as nine respondents (42.86%), with the lowest being Engineering / Nautical Expert Tk.II as many as two respondents (9.52%). Based on Table 3, it is known that the most excellent length of time that ship crew has worked is 3 - 4 years for as many as eight respondents (38.10%), followed by 1 -2 years for as many as six respondents (28.70.7%), for < 1 year as many as four respondents (19.05%), for > 4 years there were three respondents (14.29%).

Based on recapitulation data from the results of questionnaires that have been filled in regarding shipping safety carried out on ship crews, it was found that 46.67% of respondents stated that they Strongly Agree and 34.29% of respondents stated that they Agree, so it can be said that the shipping safety of the fleet of ships is agreed. Regarding this statement, shipping safety for the fleet of ships. Agree is necessary. However, a small number of respondents still disagree, which means that the statement regarding the safety of shipping for the shipping fleet needs to be considered and improved further.

In this analysis, we will explain the influence of ship crew skills in using navigation equipment on the navigation safety of PT AJS ships or it can be said that if the ship crew's skills in using navigation equipment have been implemented, the safety of the shipping fleet at PT AJS will increase. This analysis process is built based on the crew's skills in using navigation equipment (X) and the shipping safety of the ships' ships at PT AJS (Y) (Sugiyono 2013).

From the respondents' answers, it will be known whether there is an influence on the ship crew's skills in using navigation equipment on the shipping safety of PT AJS fleet of ships for this reason, analysis data was obtained on the relationship between ship crew skills in the use of navigation equipment (X) and the shipping safety of the ship fleet at PT AJS (Y). The analysis in this research determines the proportional influence between the ship crew skill variable in using navigation equipment (X) and the shipping safety variable (Y). Sugiyono (2017, 237) simple linear regression formula as follows Y = a + bx. a is Konstanta (fixed number) and b is Regression coefficient.

Based on the results of the calculations carried out, a is 2.350 and b is 0.929 in the form of a simple linear regression equation as follows: Y = 2,350 + 0,929X. From the regression equation, it can be seen that the relationship between ship crew skills in using navigation equipment and shipping safety in the fleet is in the same direction (positive); this is shown in the regression coefficient or b value in the regression equation which shows a positive number of 0.929, which means that for every increase The crew's skill in using navigation equipment of 1 unit will be followed by an increase in the shipping safety of the fleet of 0.929 units at a constant of 2.350. Likewise, vice versa, if the crew's skill in using navigation equipment decreases by 1 unit, the shipping safety of the fleet will tend to decrease by 0.929 units at a constant of 2.350. The coefficient a (intercept) is 2,350, which means that if there is no crew skill in using navigation equipment (X=0), it is estimated that the shipping safety of the fleet will be 2,350 units. The author also carried out a correlation test to determine the level of influence of the independent variable and the dependent variable as seen in Table 4. The greater the correlation, the stronger the relationship as shown in Table 5.

From a simple correlation calculation, r is obtained at 0.841. From these results, it appears that the relationship between ship crew skills in using navigation equipment and the shipping safety of the fleet is very strong and in the same direction (positive). To be able to provide an interpretation of the strengths and weaknesses of this relationship, the author uses the guidelines in Table 6. To determine

the magnitude of the contribution of the ship crew skill variable in the use of navigation equipment (X) to the shipping safety variable of the ship fleet at PT AJS (Y), can be known by calculating the determinant coefficient where Rsquare x 100% based on the SPSS output results shown in Table 7.

Table 4. Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2,350	5,817		,404	,691
	Crew skills in the use of navigation equipment	,929	,137	,841	6,768	,000

a. Dependent Variable: Shipping safety

Source: SPSS data processing results 2022.

Table 5. Correlations

		Crew skills in the use of navigation equipment	Shipping safety
Crew skills in the use of navigation equipment	Pearson Correlation	1	,841**
	Sig. (2-tailed)		,000
	N	21	21
Shipping safety	Pearson Correlation	,841	1
	Sig. (2-tailed)	,000	
	N	21	21

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

Source: SPSS data processing results 2022.

Table 6. Interpretation of the relationship levels of X and Y

Interval Coefficient	Relationship levels
0,00 – 0,200	Very low
0,20 – 0,399	Low
0,40 – 0,599	Average
0,60 – 0,799	Strong
0,80 – 1,000	Very Strong

Source: (Sugiyono, 2017, 214)

Table 7. Coefficient of determination analysis results (Model Summary)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,841[a]	,707	,691	4,70719

Source: SPSS data processing results 2022.

By observing at the calculation results of KD = r2 x 100% = (0,841)2 x 100%, Rsquare is 0.586 or 70.7%. This shows the significant contribution of the ship crew's skills in using navigation equipment to the safety of PT AJS fleet of ships amounted to 70.7%, while the remaining 29.3% was the relationship of other factors. Based on the data and analysis that has been carried out, the results show that: 1. The results of the regression analysis carried out obtained that a was 2.350 and b was 0.929 or Y = 2.350 + 0.929 The use of navigation equipment of 1 unit will be followed by the impact on the shipping safety of the fleet of 0.929 units; 2. The results of the Correlation Coefficient analysis obtained r of 0.841, meaning that the relationship between ship crew skills in using navigation

equipment and the shipping safety of the fleet is strong and in the same direction (positive); 3. The Coefficient of Determination analysis results show that the contribution of the relationship between ship crew skills in the use of navigation equipment to the shipping safety of the fleet is 70.7%. In comparison, the remaining 29.3% is the relationship between other factors, such as price, promotions, etc., which the author did not examine. The skills of human resource crew members can be used as material to improve organizational performance because the skills of human resource crew members that occur within an organization can affect shipping safety, so it is necessary to take steps or methods to manage the skills of human resource crew members, namely to improve shipping safety (Thamrin 2015).

Humans need transportation to meet the very diverse needs of life, which are generally related to producing goods and services. Transportation is the business of moving or moving people or goods from a location of origin to a location of destination. Sea transportation as the primary means of goods delivery services deserves excellent attention. Management principles are applied so that goods arrive on time and in good condition. Sea transportation plays a vital role in international and domestic trade. Sea transportation also opens up access and connects island areas, both developed and isolated areas. Each individual has different skill levels depending on their abilities and Experience. Job skills have significant benefits for individuals, companies, and society.

Notoadmodjo (Notoadmodjo 2012, 44) says skills are the application of knowledge, so a person's skill level is related to the level of knowledge, and several factors influence knowledge. First, level of education. The higher a person's education, the better knowledge they have. So it will be easier to accept and absorb new things. It can also help them complete these new things—second, Age. As a person's Age increases, changes will occur in the person's physical and psychological health. The older a person is, the more mature they will be in thinking and working—third, Experience. Experience can be used to improve and as a source of knowledge to obtain the truth. A person's Experience will influence a person's maturity in thinking when doing something. Ranupandojo & Hasan (2000, 97) say that the longer a person works in a particular job, the more experienced they will be and the better their work skills will be.

A ship's crew is someone who has employed in any capacity on board a seagoing ship or a ship used for commercial shipping at sea which an individual or a public company, other than warships, owns. Meanwhile, Triyanto (2005, 38) states: "Ship crew are all people who are and work on the ship, whether as officers, subordinates (sailors) or supercargo who are listed on the certificate and have signed a maritime work agreement with the shipping company." Based on the previous definition, a ship's crew member is someone who works or is employed on a ship by a ship owner or operator who has a seaman's certificate of competency (COC) and a seaman's skill certificate (certificate of proficiency/COP), and has signed a maritime work agreement. Navigation is sailing a ship from one place to another smoothly, safely, and efficiently (Berg, Storgård, & Lappalainen 2013, 1-48). Navigation tools are tools used to assist in navigation. Navigation tools are divided into two types, namely conventional and electronic navigation tools. Electronic navigation tools consist of radar, Global Positioning and System (GPS), Radio Direction and Finder (RDF), Echosounder (with sonar device), and Automatic Identification and System (AIS).

The ship's seaworthiness conditions can influence or increase work efficiency, including proper workspace layout, appropriate indoor light, appropriate air temperature and humidity, and sound that does not disturb work concentration. The age of the fleet, many of which are old, also affects unexpected damage, thus affecting the ship's safety. Shipping safety plays a significant role in determining the smooth running of sea transportation. A ship must meet/comply with shipping safety regulations to be used to transport goods or passengers. Shipping Safety is defined as a condition of fulfilling safety and security requirements relating to transportation in waters and ports. Thus, it can be concluded that the skills of human resource crew members have a solid relationship and influence on shipping safety, meaning that the higher the level of conflict, each leader must understand the skills of human resource crew members to direct the ship crew's skills in the desired direction so that they can use it to improve shipping safety. The seaworthy condition of the ship must be a top priority at the management and crew level.

Conclusion

Companies should be able to give more awards to each division in the company so that employees can be more motivated to give their best for the company. Apart from that, the aspirations of each employee should be accommodated first and appreciated by superiors and the company, especially those directly related to work, because employees are more aware of developments and obstacles in the field. Increasing skills and special training will increase the ship crew's ability to work so that ship safety will be more guaranteed. The crew's skills must be adjusted to the type of ship, size, and operational needs. For this reason, crew recruitment must pay attention to the skills possessed by the crew concerned so that they experience minimal technical obstacles and disruptions in their daily work. The crew's skills must be supported by other resources such as work facilities, health, awards, old age security, and so on, encouraging them to carry out their work. If these resources are met, it will undoubtedly affect the behavior of the ship's crew.

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