Marine Safety: Case Study on Safety Equipment Fulfillment towards Ship Safety

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Segurança Marítima: Estudo de Caso sobre o Cumprimento de Equipamentos de Segurança para Segurança de Navios

Marine Safety: Case Study on Safety Equipment Fulfillment towards Ship Safety

Seguridad marina: estudio de caso sobre el cumplimiento del equipo de seguridad para la seguridad del buque

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Resumo

Este estudo teve como objetivo identificar o cumprimento de equipamentos de segurança e seus efeitos para a segurança do navio. O estudo foi realizado em alguns portos da Indonésia, como Soekarno Hatta Harbour em Makassar, Tanjung Perak Harbour em Surabaya e Tanjung Priok porto em Jacarta. A técnica de amostragem foi amostragem intencional. Os dados foram coletados e tabulados utilizando-se a escala do modelo Likert. Os dados obtidos foram então analisados por estatística descritiva e estatística inferencial composta por análise de regressão e correlação. O resultado mostrou que houve efeitos positivos e significativos entre o cumprimento dos equipamentos de segurança e a segurança dos navios de marinheiro. A equação de regressão foi Y'= 2.421 + 0.753X. Além disso, o cumprimento dos equipamentos de segurança teve fortes efeitos em relação à segurança dos navios de marinheiro, com 0.753 correlação de coeficiente de 55.3% de contribuição. Além disso, os outros 44.7% foram influenciados por outras variáveis.

Palavras-chave: equipamento de segurança; segurança do navio; porto indonésio; navio indonésio

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Abstract

This study aimed to identify the fulfillment of safety equipment and its effect towards ship safety. This study was conducted at some harbors in Indonesia such as Soekarno Hatta Harbor at Makassar, Tanjung Perak Harbor at Surabaya and Tanjung Priok harbor at Jakarta. The sampling technique was Purposive sampling. Data were collected by questioners with Likert model scale. The obtained data then was being analysed using descriptive statistic and inferential statistic consisted of regression analysis and correlation. The result showed that there were positive and significant effects between safety equipment fulfilment and sailor ship safety. The regression equation was $Y' = 2{,}421 + 0{,}753X$. Moreover, safety equipment fulfilment had strong effects toward sailor ship safety with 0.753 coefficient correlation 55.3% contribution. Further, the other 44.7% was influenced by other variables.

Keywords: safety equipment; ship safety; Indonesian harbor; Indonesian ship

Resumen

Este estudio tuvo como objetivo identificar el cumplimiento de los equipos de seguridad y su efecto hacia la seguridad del barco. Este estudio se realizó en algunos puertos de Indonesia, como el puerto de Soekarno Hatta en Makassar, el puerto de Tanjung Perak en Surabaya y el puerto de Tanjung Priok en Yakarta. La técnica de muestreo fue el muestreo intencional. Los datos fueron recolectados por los interrogadores con la escala del modelo de Likert. Los datos obtenidos se analizaron mediante estadística descriptiva y la estadística inferencial consistió en análisis de regresión y correlación. El resultado mostró que hubo efectos positivos y significativos entre el cumplimiento del equipo de seguridad y la seguridad del buque marinero. La ecuación de regresión fue Y ^ '= 2,421 + 0,753X. Además, el cumplimiento del equipo de seguridad tuvo fuertes efectos en la seguridad de los buques marinos con una correlación de 0.753 coeficientes con una contribución del 55.3%. Además, el otro 44.7% fue influenciado por otras variables.

Palabras clave: equipo de seguridad; seguridad del barco; puerto indonesio; barco indonesio.

1. Introduction

The number of sea transportation accidents over the world has been decreased in last decade. However, in some developing countries including Indonesia, the number of sea transportation accidents has not decreased. It is emphasized by sea transportation accidents that happened in

Indonesian marine. Jinca said that based on the data from Indonesia's Sailor ship ministry, the number of ship accidents in Indonesia was wistfully happened (Jinca, 2011). Generally, the causes of ship accidents are: 78.45% human error, 9.67% technical problem, 1.07% weather, 10.75% weather and technical problem. Thus, the attempt to reduce sea transportation accidents need to be maintained because it emerges many risks such as death, injury, destruction property and material lost.

On the other side, sailor ship management claimed that all regulations and procedures have been executed well. Every 3 months, internal ship auditing will be held by company management, and every year external ship auditing will be executed by Port State Control in all harbours in Indonesia. These procedure are assuring that the ship has fulfilled ISM Code (*International Safety Management*). The procedures include ship document checking, ship construction, safety infrastructure and equipment on the ship. Skill and competence of each personnel or crew must be reviewed based on their responsibility and task. Moreover, SOLAS (Safety of Life at Sea) must be enforced. SOLAS consists of regulations regarding on variety, amount and safety equipment's operation that must be available in various types of ship. Furthermore, LSA (Life Saving Appliances and Arrangements) is enforced as a guarantee of ship's seaworthiness (SOLAS, 2014). Neglecting in safety equipment fulfillment is one of the factors that cause fatal risks when ships voyage. As stated by Munzil as a public safety observer, every transportation accident happened in Indonesia usually caused many casualties more than hundred victims. It includes accidents in land, air and sea (Thahir, 2015). For instance, a ship accident that causes many victims. It is caused by the lack of attention to passengers' safety. For instance, sea accident of KM marina happened at Kolaka sea, South east Sulawesi to Siwa, South Sulawesi. Many victims were missing and have not founded. Moreover, Munzil also adds that it is a classic problem of Indonesian's sailor ship. The problem of monitoring responsibility that does not run maximally causes the amount of victims often more than manifested data registered in Syahbandar. Thus, it may be one of imbalance factors between the amount of safety equipment and passengers (Thahir, 2015). Seaworthiness is based on Regulation number 17 2008 regarding on sailor ship article 17 paragraph 2 that includes ship safety, pollution prevention of ship, ship crew's recruitment, cargo line and loading, crew's and passengers' safety, ship's legal status, and safety management. The seaworthiness fulfillment is proven with ship's certificate and license.

2. Methodology

This study was a quantitative study with survey approach. The survey study has three major goals they are describing particular situation, identifing measured situation to compare, and determining the correlation of particular situation. This study was conducted at some harbors in Indonesia such as Seokarno Hatta Harbor at Makassar, Tanjung Perak Harbor at Surabaya and Tanjung Priok harbor at Jakarta. The sampling technique was Purposive sampling. Data were collected using questioners with Likert model scale. The obtained data then was being analysed using descriptive statistic and inferential statistic consisted of regression analysis and correlation. The obtained data were primary data that granted directly with answered-questioner from respondents (Sugiyono, 2013). Data collection was conducted using some instruments as follows:

a. Questionnaire of Safety equipment fulfilments
b. Questionnaire of Indonesian flagged Ship's safety
c. Interview

2.1. Data Analysis

Inferential analysis technique used correlation analysis of Pearson Product Moment (PPM) and double regression analysis (Multiple Linear Analysis). The usage of parametric statistic must fulfill every requirements of every variable that will be distributed normally and for multiple linear analyses must be independent from data's multi co-linearity. Therefore, the examination is required before conducting parametric statistical analysis as follows:

a. Data normality test is conducted to identify the normality of data distribution that becomes the requirement to determine what statistic suits with the next analysis.
b. Data linearity test is used to identify linearity correlation between X variable (safety equipment fulfillment) and Y variable (Indonesian flagged Ship's safety).
c. Linear Regression test is used to examine the correlation between independent and dependent variables and explain how their relation.

$$Y' = a + bX \quad \text{.....(1)}$$

Y' : predicted value

a : Constanta or if charge X = 0

b : Regression coefficient

X : value of independent variable

d. Correlation test is used to identify correlation level between dependent and independent variables using simple corelation formula:

$$r_{xy} = \frac{\Sigma xy}{\sqrt{(\Sigma x^2)(\Sigma y^2)}} \quad \text{.....(2)}$$

r_{xy}: product moment correlation between x_1 and Y .

Moreover, the contribution can be seen from the value of Determinant Coefficient or value of R square of the partial coefficient and multiplied with 100%.

$$KD = R = r^2 x100\% \quad \text{.....(3)}$$

R : value of determinant coefficient (variables contribution) (Riduwan, 2009).

SPSS (*Statistical Product and Service Solution*) version 20 is used to help data processing quickly and appropriately.

3. Result

3.1 Descriptive Result of Readiness Analysis on Safety Equipment Fulfillment of Indonesian Ship

The data described in this study was the score of safety equipment fulfillment of Indonesian flagged ships that was obtained through questionnaire by closed mode to respondents. The results can be seen in table 1 below;

Table 1. Readiness analysis on safety equipment fulfillment of Indonesian flagged ship.

Statistics

		Equipment fulfillment
N	Valid	150
	Missing	0
Mean		39,86
Median		40,00
Mode		40,00

Std. Deviation	2,99
Minimum	31,00
Maximum	47,00

Source: Own Study

Based on the data obtained on table showed that mean was 39,86, median was 40,00, modus was 40,00, deviation standard was 2,99 with range of ship's safety equipment readiness score between 31,00 to 47,00. Moreover, the distribution test was conducted to identify the readiness of ship safety equipment. It is illustrated on Table 2 as follow:

Table 2. Distribution test of ship safety equipment readiness of Indonesian flagged ships.

Score	Category	Frequency	Percentage	Cumulative Percentage
10-22	Low	0	0	0
23-35	Medium	13	8,7	8,7
36-49	High	137	91,3	100,0
	Total	150	100,0	100,0

Source: Own Study

Based on the data obtained in Table 2 showed that none of the respondents gave low safety equipment fulfillment for Indonesian flagged ships. Moreover, 8.7% respondents responded that the Indonesian flagged ships has medium safety equipment fulfillment. Further 91.3% respondents responded that Indonesian flagged ships had high safety equipment fulfillment. It concluded that, Indonesian flagged ships were in high category of safety equipment fulfillment.

3.2 Descriptive Analysis Result of Sailor Ship Safety of Indonesian Ship

Data described in this study were the safety score of Indonesian flagged ships that obtained from closed questionnaire. The results of descriptive analysis are seen in table 3 below:

Table 3. Descriptive analysis on sailor ship safety of Indonesian flagged ships

Statistics.

		Equipment fulfillment
N	Valid	150
	Missing	0
Mean		32,42
Median		32,50
Mode		33,00
Std. Deviation		3,03
Minimum		25,00
Maximum		39,00

Source: Own Study.

Based on the table 3 above, it showed that the mean score was 32.42 and the median was 32.50 and modus for 33.00. The deviation standard was 3.03 with range score of sailor ship safety for25.00 to 39.00.

Moreover, the safety category of Indonesian flagged ships was identified using distribution test. The results were illustrated in table 4 as follow:

Table 4. Distribution test on sailor ship safety of Indonesian flagged ships.

Score	Category	Frequency	Percent	Cumulative Percent
10-22	Low	0	0	0
23-35	Medium	25	16,7	16,7
36-49	High	125	83,3	100,0
	Total	150	100,0	100,0

Source: Own Study

Based on the table above, it showed that none of the respondents responded low safety sailor ship of Indonesian flagged Ships. Moreover, 16.7 % of respondents responded that sailor ship safety was medium. Meanwhile, 83.3% respondents responded that Indonesian flagged ships had high safety category. Thus, from the results above, it illustrated that Indonesian flagged ships had high category of sailor ship safety.

3.3 Normality Test

Normality test aimed to identify the variable distribution's normality, which showed in Table 5 below:

Table 5. Normality test on safety equipment readiness of Indonesian flagged ships

Normality Test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Safety Equipment's readiness	,055	150	,072	,785	150	,014

a. Lilliefors Significance Correction

Source: Own Study

Results of normality test used *Kolmogorov-Smirnov* analysis obtained 0.72 significant value. The significant value was higher than alpha 0.05 so that the variable of safety equipment readiness was distributed normally. Furthermore, results of normality test on variable of safety sailor ship of Indonesian flagged ships were illustrated on Table 6 below:

Table 6. Normality test on Safety equipment readiness of Indonesian flagged ships

Normality Test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Safety equipment readiness	,043	150	,064	,585	150	,024

a. Lilliefors Significance Correction

Source: Own Study

Results of normality test using *Kolmogorov-Smirnov* analysis obtained significance value as 0.64. The significance value was higher than alpha value as 0.05 so that the variable data of sailor ship safety on Indonesian flagged ships was distributed normally.

3.4 Linearity Test

Linearity test aimed to identify variable of ship's safety equipment readiness that linearly affected variable of sailor ship safety of Indonesian flagged ships. The result of linearity test was illustrated on Table 7 as follow:

Table 7. Linearity test of safety equipment readiness toward sailor ship safety

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Ship safety * equipment fulfillment	Between Groups	(Combined)	874,488	14	62,463	16,9	,000
		Linearity	757,559	1	757,559	206,1	,000
		Deviation from Linearity	116,929	13	8,995	2,447	,075
	Within Groups		496,205	135	3,676		
	Total		1370,693	149			

Source: Own Study

Based on table 7 the obtained-significance value was smaller than 0.05. Thus, it can be concluded that there is a significant effect between safety equipment readiness and ships' safety.

3.5 Regression Test

Regression analysis aimed to identify the effects between safety equipment readiness and sailor ship safety of Indonesian flagged ships. The regression analysis was illustrated on the Table 8 below:

Table 8. Regression Analysis

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2,421	2,225		1,088	,028
	Equipment Fulfillment	,753	,056	,743	13,523	,000

a. Dependent Variable: sailor ship safety

Source: Own Study

Based on Table 8 above, Regression obtained result of $Y' = 2{,}421 + 0{,}753X$ with significance value smaller than 0.05 and t_{count} value was higher than t_{table} (13,523 > 1,655). The value of regression coefficient was positive. Thus, the value showed that there was significant and positive effects between safety equipment readiness and sailor ship safety of Indonesian flagged ships.

3.6 Correlation Test

Correlation test aimed to identify the correlation of effect between safety equipment readiness and sailor ship safety of Indonesian flagged ship. The correlation test was illustrated on Table 9 as follow:

Table 9. Correlation Test

Correlations			
		Equipment fulfillment	Sailor ship safety
Equipment fulfillment	Pearson Correlation	1	,743**
	Sig. (2-tailed)		,000
	N	150	150
Sailor ship safety	Pearson Correlation	,743**	1
	Sig. (2-tailed)	,000	

	N	150	150

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

Source: Own Study

Table 9 above showed the obtained-coefficient value as 0,743. Based on the correlational coefficient interpretation, the value identified that variable of safety equipment readiness positively and strongly affected variable of sailor safety of Indonesian flagged ships.

3.7 Determination Test

Determination test aimed to identify the contribution between safety equipment readiness and sailor ship safety of Indonesian flagged ships. The result of determination test can be seen in Table 10 below:

Table 10. Determination test

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,743[a]	,553	,550	2,035

a. Predictors: (Constant), equipment fulfillment

Source: Own Study

Based on the table above, the value of coefficient determination was 0.553 x 100% = 55.3%. Thus, the contribution of safety equipment on the ships had contribution as 55.3%.

4. Discussion

The results showed that both variables of safety equipment readiness and sailor ship safety were in high category. It was obtained and explained by the responses of respondents from the questionnaire shared. Moreover, the results of this study showed that the presence of safety and emergency equipment such as: lifeboats and life rafts, lifebuoys, lifejackets and attachments, buoyancy apparatus, emergency alarm system and public address system, two-way VHF radiotelephone sets and fire-fighting equipment were completely and maximally worked. Respondents' response regarding on safety equipment readiness was in line with

respondents' response about sailor ship safety on Indonesian flagged ships. The respondent responded high category of safety equipment readiness and sailor ship safety. Moreover, based on regression analysis, regression equation was $Y' = 2.421 + 0.753X$. The regression equation showed that every Constanta incensement on variable of safety equipment readiness of ships was 0.753. It illustrated that there was significant and positive effect between safety equipment preparations toward sailor ship safety. The higher safety equipment readiness, the higher sailor ship safety of Indonesian flagged ships. Furthermore, data obtained from correlation coefficient was 0.753. The value of correlation coefficient illustrated that safety equipment preparations affected strongly towards sailor ship safety of Indonesian flagged ships. Meanwhile, based on analysis of determination coefficient showed that the contribution of ships' safety equipment readiness was 55.3% and 44.7% was affected by other variables outside.

5. Conclusion

There was a significant and positive effect of the readiness of safety equipment fulfillment towards sailor ship safety of Indonesian flagged ships. It showed that the preparation on ship safety equipment should be really noticed due to avoid the unexpected things. Furthermore, the more ready safety equipment prepared, the higher and safer sailor ship of Indonesian flagged ships.

6. Suggestion

Based on the result and discussion, then the researchers suggest;

1. For every party who responsible on ship safety should notice the importance of ship safety equipment preparation due to shipping safety. They have to put attention on things that could increase the shipping safety.
2. For every party who interested in doing research related to shipping safety could make observation on other factors that help the shipping safety since 44.7% of shipping safety is influenced bty the other variables outside this research.

References

Jinca, M.Y. (2011). Transportasi Laut Indonesia Analisis Sistem dan Studi Kasus. Brilyan Internasional, Surabaya.

SOLAS Consolidated Edition. (2014). IMO Publishing, London.

Thahir, T. (2015). Alat Keselamatan Minim jadi Faktor banyaknya Korban Kecelakaan di Laut [Internet]. Tribun Makassar, cited 19 June 2018. Available from: http://makassar.tribunnews.com/2015/12/23/alat-keselamatan-minim-jadi-faktor-banyaknya-korban-kecelakaan-di-laut

Sugiyono. (2013). Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R&D. Alfabeta, Bandung..

Riduwan. (2009). Metode dan Teknik Menyusun Proposal Penelitian. Alfabeta, Bandung

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