# Analysis of Factors Affecting Shipping Safety in the Jurisdiction of the Port Authority and Harbormaster Office (KSOP) Class III Tanjung Wangi

Ni Puthu Cahayani Negara
Economy, Master of Economic, Mandala Institute of Technology and Science, Jember, Indonesia

Agustin Hari Prasetyowati
Economy, Master of Economic, Mandala Institute of Technology and Science, Jember, Indonesia

Tamriatin Hidayah
Economy, Master of Economic, Mandala Institute of Technology and Science, Jember, Indonesia

## Abstract

This study aims to analyze the influence of compliance with Standard Operating Procedures (SOP), work discipline, supervision, competence, and safety culture on shipping safety in the jurisdiction of the Port Authority and Harbormaster Office (KSOP) Class III Tanjung Wangi. The research uses a quantitative approach with an explanatory research method. Data collection was conducted through questionnaires distributed to 72 respondents consisting of employees and stakeholders involved in shipping operations within KSOP Class III Tanjung Wangi. Data analysis was performed using multiple linear regression with the assistance of SPSS software. The results show that simultaneously, SOP compliance, work discipline, supervision, competence, and safety culture have a significant effect on shipping safety, with a significance value of 0.000 and an F value of 71.181. The coefficient of determination ($R^2$) of 0.854 indicates that 85.4% of the variation in shipping safety can be explained by the research variables. Partially, all independent variables have a significant effect on shipping safety, with safety culture being the most dominant variable. These findings indicate that shipping safety is not only influenced by technical aspects but also by behavioral factors, supervision, competence, and organizational culture. Therefore, strengthening safety culture, improving SOP compliance, work discipline, supervision, and developing human resource competence need to be continuously carried out to create an optimal shipping safety system.

**Keywords**: SOP compliance, work discipline, supervision, competence, safety culture, shipping safety

## Introduction

Indonesia, as an archipelagic country, has a very high dependence on maritime transportation as a means of distributing goods and transporting people between islands. The high level of shipping activity makes maritime safety a strategic issue in supporting operational efficiency as well as protecting passengers, crew members, and the marine environment. Law Number 17 of 2008 concerning Shipping stipulates that maritime safety includes aspects of seaworthiness of ships, ship manning, navigation, and protection of passengers and workers. However, various ship accidents in Indonesia still indicate that human error is the dominant cause of maritime incidents. Human error may include non-compliance with SOPs, weak work discipline, low competence, suboptimal supervision, and a weak safety culture within organizations. This phenomenon shows that maritime safety is influenced not only by technical aspects but also by managerial and organizational behavior factors.

KSOP Class III Tanjung Wangi, as a government institution responsible for supervision and control of maritime safety, has an important role in ensuring safe shipping operations within its working area. The high intensity of vessel activity and passenger flow at Tanjung Wangi Port increases the risk of accidents if it is not supported by proper SOP compliance, work discipline, supervision, competence, and safety culture. Based on this condition, this study aims to analyze the influence of SOP compliance,

work discipline, supervision, competence, and safety culture on shipping safety in the KSOP Class III Tanjung Wangi area.

Compliance with Standard Operating Procedures (SOP) is an important aspect in supporting work effectiveness and safety within organizations. Compliance refers to the attitude and behavior of individuals in adhering to established rules, procedures, and organizational policies. In work implementation, SOP serves as a guideline that regulates work procedures so that operational activities are systematic, effective, and safe. The level of employee compliance with SOP reflects the extent to which employees are aware of and responsible for carrying out their duties according to established standards. In the context of maritime safety, compliance with SOP is a crucial factor because it is directly related to accident prevention, reduction of operational errors, and improvement of service quality. Employees who comply with SOP are better able to perform tasks in a structured manner and in accordance with established safety procedures. Conversely, low compliance with SOP may increase the risk of procedural violations that could potentially lead to accidents or operational losses.

Work discipline is the willingness and ability of individuals to comply with all organizational regulations and carry out their duties and responsibilities according to applicable rules. Work discipline reflects the level of employee compliance with working hours, rules, operational procedures, and organizational behavior standards. Good discipline creates an orderly, structured, and conducive work environment in supporting organizational goals. In shipping operations, work discipline is very important because maritime activities require high levels of accuracy, precision, and responsibility. Employees with good work discipline will be more consistent in carrying out tasks according to procedures and will reduce the possibility of violations and operational errors. Thus, work discipline can support maritime safety through improved operational performance and compliance with safety standards.

Supervision is a control process carried out by organizations to ensure that all activities run in accordance with planned objectives, standards, and procedures. Supervision is conducted to minimize deviations, improve work effectiveness, and ensure task implementation follows applicable procedures. Through supervision, organizations can evaluate work performance and take corrective actions when inconsistencies are found. In maritime safety, supervision plays a strategic role in maintaining safety, ensuring ship seaworthiness, and monitoring port operations. Effective supervision helps organizations detect potential safety risks early so that preventive actions can be taken quickly and appropriately. Therefore, optimal supervision is essential to support maritime safety and security.

Competence refers to the abilities possessed by individuals in performing work, including knowledge, skills, and work attitudes. Competence indicates the level of employee capability in completing tasks effectively according to organizational standards. Competent employees not only understand their duties and responsibilities but are also able to make appropriate decisions in various work situations. In the maritime sector, competence is a crucial factor because operational activities often involve high safety risks. Employees with good competence are better able to understand safety procedures, operate equipment correctly, and handle emergency situations appropriately. Thus, competence supports improved work quality and maritime operational safety.

Safety culture refers to the values, attitudes, perceptions, and behaviors developed within an organization that prioritize safety as the main focus in every work activity. Safety culture reflects the commitment of both the organization and individuals to consistently implement workplace safety. Organizations with a strong safety culture encourage employees to maintain collective awareness of workplace safety and comply with safety procedures. In maritime safety, safety culture is very important because it influences employee behavior in performing operational tasks. A strong safety culture builds safe work habits, increases awareness of risks, and strengthens compliance with regulations and safety SOPs. With a strong safety culture, the potential for accidents and operational errors can be minimized, thereby ensuring maritime safety.

Maritime safety refers to the condition in which safety and security requirements in shipping activities are fulfilled. Maritime safety includes various aspects such as ship seaworthiness, safety of crew and passengers, protection of the marine environment, and compliance with shipping regulations and standards. The main objective of maritime safety is to prevent maritime accidents and ensure the smooth and secure operation of shipping activities.

Maritime safety is influenced by several factors, including SOP compliance, work discipline, supervision, employee competence, and organizational safety culture. If these factors are implemented optimally, the risk of accidents and operational disruptions can be reduced. Therefore, maritime safety

is a shared responsibility that requires the commitment of all parties to consistently implement safety procedures and standards.

## Methods

This study uses a quantitative approach with an explanatory research design, which aims to explain causal relationships between variables through hypothesis testing. The quantitative approach was chosen because this study seeks to measure the influence of SOP compliance, work discipline, supervision, competence, and safety culture on shipping safety in an objective and measurable manner.

The research was conducted at the Port Authority and Harbormaster Office (KSOP) Class III Tanjung Wangi. This location was selected based on the strategic role of KSOP as a government institution responsible for supervising and controlling maritime safety within the operational area of Tanjung Wangi Port. The high level of shipping activity in this area makes it relevant for examining factors influencing maritime safety.

The population of this study consists of all employees and stakeholders involved in shipping operations at KSOP Class III Tanjung Wangi. The sampling technique used is saturated sampling, meaning that the entire population was used as research respondents. The total sample in this study was 72 respondents.

Data collection was conducted through questionnaires distributed to respondents. The research instrument was designed using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). This scale was used to measure respondents' perceptions of each indicator of the research variables.

The independent variables in this study are SOP compliance (X1), work discipline (X2), supervision (X3), competence (X4), and safety culture (X5). The dependent variable is shipping safety (Y). The operational definitions of each variable were developed based on relevant indicators derived from theories and previous studies.

Data analysis was performed using multiple linear regression analysis with the assistance of IBM SPSS software. Prior to regression analysis, the data were tested using validity and reliability tests to ensure the research instrument was appropriate. Furthermore, classical assumption tests were conducted, including normality, multicollinearity, and heteroscedasticity tests, to ensure the regression model met analytical requirements. The coefficient of determination ($R^2$) was used to measure the contribution of independent variables to the dependent variable, while hypothesis testing was conducted using partial tests (t-test) and simultaneous tests (F-test). The results of these analyses were used to explain the influence of each variable on shipping safety at KSOP Class III Tanjung Wangi.

## Results and Discussion

Based on the research findings, the characteristics of the respondents show that most respondents are employees and operational personnel directly involved in maritime safety activities within the KSOP Class III Tanjung Wangi environment. The respondents consist of personnel who play roles in shipping operation supervision, port service management, ship safety control, and administrative activities related to maritime safety and security. Their direct involvement in operational activities provides relevant information that accurately reflects real conditions in the field.

The respondent characteristics also indicate diversity in terms of age, education level, years of service, and operational experience. Most respondents have relatively long work experience, which enables them to understand safety procedures, operational supervision, and the implementation of shipping regulations within KSOP Class III Tanjung Wangi. In addition, the varied educational backgrounds of the respondents support their understanding of the importance of maritime safety and the implementation of operational standards.

This diversity of respondent characteristics provides a representative overview of maritime safety conditions in KSOP Class III Tanjung Wangi. Therefore, the data obtained in this study are considered capable of reflecting the actual conditions regarding the implementation of SOP compliance, work discipline, supervision, competence, safety culture, and maritime safety in the research area.

The descriptive results of respondents' answers indicate that the variables of SOP compliance, work discipline, supervision, competence, safety culture, and maritime safety are all in the "good" category. This suggests that respondents perceive that the implementation of maritime safety practices at KSOP Class III Tanjung Wangi has been running at a relatively optimal level.

## Research Instrument

Validity testing was conducted to determine the ability of the research instrument to measure the variables under study. The validity test was carried out by comparing the calculated r value (r-count) with the r table value at a significance level of 5%. Meanwhile, the reliability test was conducted using Cronbach's Alpha to determine the level of consistency of the research instrument. An instrument is considered reliable if it has a Cronbach's Alpha value greater than 0.60.

Table 1. Results of Validity and Reliability Tests

| Variables / Indicators | | cronbach's alpha | Correlation Coefficient (r-count) | Cut-off Value |
|---|---|---|---|---|
| SOP Compliance (X1) | | 0,962 | | |
| X1.1 | Efficient | | 0,952 | 0.2287 |
| X1.2 | Consistent | | 0949 | 0.2287 |
| Work Discipline (X2) | | 0,904 | | |
| X2.1 | Attendance | | 0,884 | 0.2287 |
| X2.2 | Compliance with Work Regulations | | 0,868 | 0.2287 |
| X2.3 | Compliance with Work Standards | | 0,871 | 0.2287 |
| X2.4 | High Level of Alertness | | 0,845 | 0.2287 |
| X2.5 | Ethical Work Behavior | | 0,798 | 0.2287 |
| Supervision (X3) | | 0,867 | | |
| X3.1 | Setting Standards | | 0,589 | 0.2287 |
| X3.2 | Measurement | | 0,871 | 0.2287 |
| X3.3 | Comparing | | 0,796 | 0.2287 |
| X3.4 | Compare | | 0,865 | 0.2287 |
| Competence (X4) | | 0,867 | | |
| X4.1 | Knowledge | | 0,716 | 0.2287 |
| X4.2 | Skill | | 0,722 | 0.2287 |
| X4.3 | Attitude | | 0,668 | 0.2287 |
| Safety Culture (X5) | | 0,864 | | |
| X5.1 | Leadership | | 0,897 | 0.2287 |
| X5.2 | Work Participation | | 0,960 | 0.2287 |
| X5.3 | Training | | 0,926 | 0.2287 |
| X5.4 | Continuous Improvement | | 0,889 | 0.2287 |
| Shipping Safety (Y) | | 0,830 | | |
| Y1 | Crew Health | | 0,477 | 0.2287 |
| Y2 | Passenger Health | | 0,888 | 0.2287 |
| Y3 | Reliable Ship Human Resources / Competence | | 0,888 | 0.2287 |

Source: Processed data

The results of the validity test in Table 1 show that the variables of work quality, productivity, efficiency, job satisfaction, work ability, performance development, and performance productivity were measured using three indicators. The results indicate that the r-count values are greater than 0.2287. Therefore, it can be concluded that the indicators used to measure all variables are valid, and they have a high level of accuracy in measuring the intended constructs. Furthermore, based on Table 2, it can also be concluded that all research instruments produce Cronbach's Alpha values greater than 0.60. This indicates that all instruments are reliable, meaning they are consistent and dependable in measuring each variable in the study.

## Classical Assumption Test

The classical assumption test is a series of statistical tests used in multiple linear regression analysis to ensure that the model used is valid and produces unbiased estimations.

**Normality Test**

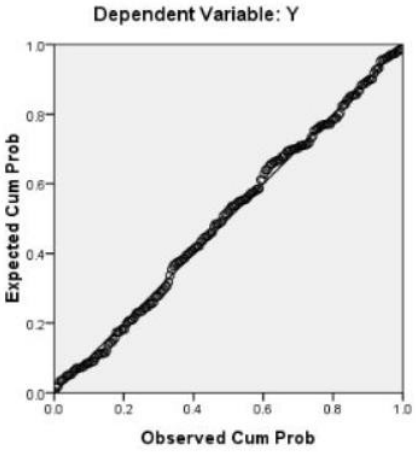


Figure 1. Grafik P-P Plot Normal P-P plot of Regression Standardized residual
Source: Processed data

In regression analysis, the normality test is used to ensure that the assumptions of the regression model are fulfilled (Ghozali, 2001 in Widagdo, 2020). A good regression model has residuals that are normally distributed. As shown in Figure 1, based on the Normal P-P Plot of Regression Standardized Residual, the points follow the diagonal line. Therefore, it can be concluded that the data are normally distributed.

**Multicollinearity Test**

Table 3. Results of Multicollinearity Test

Coefficients[a]

| Model | | Collinearity Statistics | |
|---|---|---|---|
| | | Tolerance | VIF |
| 1 | X1 | ,263 | 3,799 |
| | X2 | ,120 | 8,367 |
| | X3 | ,145 | 6,880 |
| | X4 | ,532 | 1,881 |
| | X5 | ,176 | 5,679 |
| | X6 | ,199 | 5,026 |

a. Dependent Variable: Y

Source: Processed data

The decision criteria for the multicollinearity test are based on the tolerance value. If the tolerance value is greater than 0.10, it indicates that there is no multicollinearity. In addition, if the Variance Inflation Factor (VIF) value is less than 10.00, it also indicates that multicollinearity does not occur.Based on Table 3, it can be concluded that all tolerance values are greater than 0.10, meaning that no multicollinearity symptoms are present. Similarly, all VIF values are below 10.00, confirming that there is no indication of multicollinearity among the independent variables in this study.

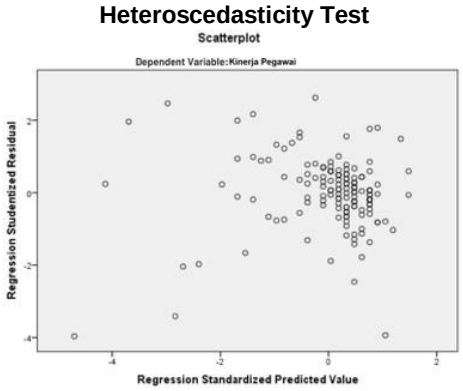

Figure 2. Scatterplots
Source: Processed data

Heteroscedasticity refers to a condition in which the variance of the residuals in a regression model is not constant. The decision rule is based on the significance value (Sig.). If Sig. > 0.05, it indicates that heteroscedasticity does not occur. Conversely, if Sig. < 0.05, it indicates the presence of heteroscedasticity.As shown in Figure 3, there is no clear pattern, and the points are spread above and below the value 0 on the Y-axis. Therefore, it can be concluded that heteroscedasticity does not occur in the regression model used in this study.

## Multiple Linear Regression Analysis Results

Using SPSS Statistics 22 software, the results of the multiple linear regression analysis were obtained. Based on the output, the multiple linear regression model can be formulated as follows:

Table 4. Results of Multiple Linear Regression Analysis

Coefficients[a]

| Model | | Unstandardized Coefficients | | Standardized Coefficients | T | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 2,370 | 1,519 | | 1,560 | ,127 |
| | X1 | ,015 | ,056 | ,014 | 2,271 | ,007 |
| | X2 | ,435 | ,131 | ,323 | 3,322 | ,002 |
| | X3 | ,307 | ,127 | ,242 | 2,419 | ,019 |
| | X4 | ,056 | ,048 | ,074 | 2,164 | ,049 |
| | X5 | ,457 | ,085 | ,474 | 5,400 | ,000 |

a. Dependent Variable: Y

Source: Processed data

Based on the regression results shown in Table 4.12, the following regression equation is obtained:

**Y = 2,370 + 0,015 X1 + 0,435 X2 + 0,307 X3 + 0,056 X4 + 0,457 X5 + e**

Description:

Y = Shipping Safety
X1 = SOP Compliance
X2 = Work Discipline
X3 = Supervision
X4 = Competence
X5 = Safety Culture
a = Constant
b = Regression Coefficient
e = Error

T01he results of the analysis show that all independent variables have a positive influence on shipping safety. This means that an increase in SOP compliance, work discipline, supervision, competence, and safety culture will improve shipping safety in the KSOP Class III Tanjung Wangi area.

## Coefficient of Determination Test ($R^2$)

The coefficient of determination in this study is used to determine how much influence the independent variables have on the dependent variable. The results of the coefficient of determination test are presented in Table 5 as follows:

Table 5. Coefficient of Determination Test Results ($R^2$)

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | ,924[a] | ,854 | ,842 | 1,320 |

Source: Processed data

The Adjusted R Square value of 0.842 indicates that 0.842 (or 84.2%) of the variation in Shipping Safety can be explained by the variables of SOP Compliance, Work Discipline, Supervision, and Safety Culture. This value of 0.842 or 84.2% shows that the regression model has a very strong explanatory power, while the remaining 15.8% is explained by other factors outside the model.

## Hypothesis Testing Results

### t-Test (Partial Test)

The t-test is conducted to determine the partial effect of each independent variable on shipping safety.

Table 6. t-Test Results (Partial Test)

Coefficients[a]

| Model | | Unstandardized Coefficients | | Standardized Coefficients | T | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 2,370 | 1,519 | | 1,560 | ,127 |
| | X1 | ,015 | ,056 | ,014 | 2,271 | ,007 |
| | X2 | ,435 | ,131 | ,323 | 3,322 | ,002 |
| | X3 | ,307 | ,127 | ,242 | 2,419 | ,019 |
| | X4 | ,056 | ,048 | ,074 | 2,164 | ,049 |
| | X5 | ,457 | ,085 | ,474 | 5,400 | ,000 |

b. Dependent Variable: Y

Source: Processed data.

1. Effect of SOP Compliance on Shipping Safety
   The t-test results show that SOP compliance has a significant effect on shipping safety. This indicates that the higher the employees' compliance with SOP, the higher the level of shipping safety.
2. Effect of Work Discipline on Shipping Safety

The t-test results show that work discipline has a significant effect on shipping safety. Disciplined employees tend to be more compliant with safety regulations and are able to carry out tasks in an orderly manner.

3. Effect of Supervision on Shipping Safety
   The t-test results show that supervision has a significant effect on shipping safety. Effective supervision is able to minimize procedural violations and improve operational control.
4. Effect of Competence on Shipping Safety
   The t-test results show that competence has a significant effect on shipping safety. Good competence enables employees to perform their duties professionally and appropriately handle operational risks.
5. Effect of Safety Culture on Shipping Safety
   The t-test results show that safety culture has a significant effect on shipping safety and is the most dominant variable. This indicates that an organizational culture that prioritizes safety as the main focus is able to shape safe work behavior.

**F-Test (Simultaneous Test)**

The F-test is conducted to determine the simultaneous effect of all independent variables on shipping safety. This test is used to examine whether SOP compliance, work discipline, supervision, competence, and safety culture together have a significant influence on shipping safety.

Tabel 7. Hasil Uji F (Simultan)

**ANOVA[a]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 620,436 | 5 | 124,087 | 71,181 | ,000[b] |
| | Residual | 106,340 | 61 | 1,743 | | |
| | Total | 726,776 | 66 | | | |

Source: Processed data

H6. The hypothesis testing results show a significance value of 0.000 with an F-count value of 71.181. Since the significance value is smaller than 0.05, it can be concluded that SOP compliance, work discipline, supervision, competence, and safety culture simultaneously have a significant effect on shipping safety.

The results of the study show that SOP implementation has a significant effect on shipping safety in the KSOP Class III Tanjung Wangi environment. Compliance with Standard Operating Procedures (SOP) is an important factor in maintaining the consistency of work execution in accordance with established safety standards. Employees who carry out their duties based on correct operational procedures are able to minimize work errors, reduce accident risks, and improve operational performance. The higher the level of employee compliance with SOP, the better the shipping safety that can be achieved. These findings are in line with Dianti's study, which states that the existence of SOP plays an important role in preventing shipping accidents and improving operational safety.

In addition to SOP implementation, work discipline is also proven to have a significant effect on shipping safety. Work discipline reflects employees' attitudes in obeying organizational rules, carrying out duties according to responsibilities, and maintaining work activities. Employees with high discipline tend to comply more with safety regulations, execute

procedures more accurately, and reduce the potential for operational violations. With good work discipline, shipping activities can be carried out more safely, orderly, and under control. This finding supports Abiyesha's research, which states that work discipline has a positive effect on ship crew safety.

Supervision also shows a significant influence on shipping safety. Effective supervision enables organizations to ensure that all operational activities are carried out in accordance with safety.

## Conclusion

Based on the results of the study, it can be concluded that SOP compliance, work discipline, supervision, competence, and safety culture have a significant influence on shipping safety in the KSOP Class III Tanjung Wangi area, both partially and simultaneously. The findings indicate that the better the implementation of SOP compliance, work discipline, supervision, employee competence, and safety culture, the higher the level of shipping safety that can be achieved. Among all the variables examined, safety culture is the most dominant factor influencing shipping safety. This shows that an organizational culture that prioritizes safety as the main priority is able to shape safer, more disciplined, and more responsible work behavior in carrying out operational activities.

This study also proves that shipping safety is influenced not only by technical operational aspects but also by work behavior factors, the effectiveness of supervision, human resource competence, and organizational culture. Therefore, efforts to improve shipping safety need to be carried out comprehensively and sustainably through strengthening safety culture, improving SOP compliance, strengthening work discipline, optimizing supervision, and continuously developing employee competence. The synergy among these factors is expected to create a more effective shipping safety system and reduce the risk of maritime accidents within KSOP Class III Tanjung Wangi

Based on the research findings, several recommendations can be made to improve shipping safety in the KSOP Class III Tanjung Wangi environment. First, KSOP Class III Tanjung Wangi should enhance regular training and safety certification programs to improve employee competence in dealing with various operational conditions and maritime safety risks. Continuous training will help employees better understand safety procedures and improve their ability to handle emergency situations.Second, supervision of SOP implementation should be strengthened to ensure that operational procedures are carried out consistently and in accordance with established safety standards. Optimal supervision will help minimize procedural violations and increase employee compliance with work safety regulations.Third, the organization needs to build a stronger safety culture through effective safety communication, regular safety briefings, and periodic safety evaluations. These efforts are important to increase employees' awareness that safety is a shared responsibility and must be the top priority in every shipping operational activity.In addition, future researchers are expected to expand this study by adding other variables that may influence shipping safety, such as leadership, workload, organizational communication, and working environment factors. The inclusion of these variables is expected to broaden the scope of maritime safety studies and provide more comprehensive research results.

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