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The Effect of Safety Training and Supervision on The Use of Personal Protective Equipment Which Has Implications on Work Safety in Loading and Unloading at Maccini Baji Port, Maros, South Sulawesi

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Abstract: This study aims to analyze the influence of training and safety supervision on the use of personal protective equipment (PPE) and its implications for loading and unloading safety at Maccini Baji Port, Maros, South Sulawesi. The issues addressed include the low awareness and compliance of workers in using PPE and the lack of adequate safety supervision. The research population consists of 155 employees and dockworkers at the port, with a saturated sampling technique used. The research method employed is quantitative, with data collected through questionnaires and observations. Data analysis was conducted using the SMART PLS method. The results show that training and safety supervision have a positive and significant effect on the use of PPE, which also has a positive implication for loading and unloading safety. Training proved to be effective through the instructor dimension, while safety supervision was greatly influenced by the accuracy of measurement. In conclusion, improving the quality of training and supervision can enhance compliance with PPE usage and work safety at the port. Managerial recommendations include increasing the frequency of training, maintaining equipment, and regularly supervising PPE usage by introducing more accurate and modern monitoring technologies.

Keyword: Convolutional Neural Network (CNN), Cataract, Eye Image Detection

INTRODUCTION

The port as a gateway to trade and the economy has a very important role in the movement of the economy, that public service providers have a very significant role in the economy. The role of seaports is optimized as a node in the national transportation network, in addition to other roles, namely as a gateway to economic activities, supporting industrial and/or trade activities, distribution, production and consolidation of cargo/goods, realizing the archipelago insight, Seaports are one of the very important links in the entire domestic and

foreign trade process, seaports are not just places for loading and unloading goods or boarding and disembarking passengers but also as a logistics chain in distributing services that have added value.

The following is data on work accidents and the number of loading and unloading incidents that occurred at Maccini Baji Port, Maros, South Sulawesi during 2021 - 2023.

Table 1. Data on Loading and Unloading Work Accidents at Maccini Baji Port, Maros, South Sulawesi from 2021-2023

Year	Work accident	Amount
2021	6	2
2022	7	2
2023	9	3
Amount	**22**	**7**

Source :Maccini Baji Port, Maros, South Sulawesi

Safety is one of the important aspects that needs serious attention, because if it is ignored, accidents experienced by workers will result in a decrease in the quality of work carried out by the workers themselves, so that all forms of activities carried out will be disrupted, such as the workforce required is reduced. With a high level of work safety, the potential for accidents is very small, and deaths in workers can be minimized as much as possible. A high level of safety is in line with the maintenance of worker safety and the use of productive and efficient work equipment.

It is very important for port workers to improve Occupational Safety and Health (K3) so that port operations can run smoothly. The implementation of the Occupational Safety and Health (K3) system has attracted a lot of attention from various organizations because it covers aspects of humanity, economic costs and benefits, legal aspects of accountability, and the image of the organization itself. The above factors affect workers and the tasks given. If the influencing factors are better, the level of occupational safety will be higher. Conversely, if the influencing factors are worse, the level of occupational safety will be lower, meaning that the risk of work accidents will be higher. The following is a preliminary survey related to loading and unloading work safety at Maccini Baji Port

Occupational safety supervision factors cannot be separated from worker characteristics, where these characteristics influence a person's basis for making decisions and behaving, including in compliance with safety rules. Ineffective supervision can contribute to unsafe acts in the workplace, which is crucial in determining the level of safety. Occupational safety supervision is one of the important factors that must be applied consistently so that workers can work safely and optimally. The following is a preliminary survey related to supervision at Maccini Baji Port.

Table 2. Preliminary Survey on Safety Supervision at Maccini Baji Port

No.	Statement	No (Score)	Yes (Score)	Amount	Percentage No
1	Safety supervision is carried out consistently during loading and unloading activities.	12	18	30	40%
2	Safety officers always provide instructions regarding the use of PPE while working.	14	16	30	46.67%
3	Supervision is carried out effectively in preventing work accidents.	19	11	30	63.33%
4	I feel safe working because there is strict safety supervision.	13	17	30	43.33%
5	Supervision always ensures the use of PPE according to applicable standards.	16	14	30	53.33%

From the table above, the average percentage of "No" to Safety Supervision: 48.67%. Safety supervision carried out in the workplace is quite consistent, but almost half of the respondents felt that supervision was not optimal, especially in terms of the effectiveness of accident prevention. Supervision needs to be improved, especially in ensuring that all workers comply with safety standards and the use of PPE while working.

Loading and unloading activities with high operational costs cause various risks, especially to the health and safety of workers. Therefore, every loading and unloading activity must be equipped with safety facilities. According to PER.08/MEN/VII/2010 concerning Personal Protective Equipment, it is stated that Personal Protective Equipment (PPE) is a tool that can protect a person by isolating part or all of the body from potential hazards in the workplace. Employers are required to provide PPE for workers or laborers in the workplace, in accordance with the Indonesian National Standard (SNI) or applicable standards, and must be provided free of charge. In addition, employers are required to announce in writing and put up signs regarding the obligation to use PPE in the workplace. Work safety is closely related to increasing production and productivity. The following is a preliminary survey related to the use of PPE at Maccini Baji Port

Table 3. Preliminary Survey on the Use of Personal Protective Equipment (PPE) at Maccini Baji Port

No.	Statement	No (Score)	Yes (Score)	Amount	Percentage No
1	I feel that the current work environment meets good work safety standards.	12	18	30	40%
2	The company actively educates its workforce about the importance of occupational safety.	14	16	30	46.67%
3	Most work accidents are caused by unsafe actions.	21	9	30	70%
4	Most work accidents are caused by unsafe conditions.	19	11	30	63.33%
5	I feel that the current safety procedures are quite effective.	17	13	30	56.67%

From the table above, the average percentage of "No" to the Use of PPE: 44.67%.Most workers are aware of the importance of using PPE and feel that it can reduce the risk of accidents. However, the condition of PPE provided by the company is considered poor by more than half of the respondents. This indicates the need to improve the quality of PPE provided, as well as stricter supervision of its use.

Based on the preliminary survey, it is seen that aspects of training, supervision, and use of PPE still need improvement to ensure work safety at Maccini Baji Port. The most significant factor in work accidents is unsafe actions and conditions, which indicates that safety supervision and education must be more intensive. Relevant and routine training, stricter supervision, and the use of appropriate PPE can help reduce the risk of accidents and improve overall work safety. From the description that has been presented above, the researcher is interested in taking the title "The Effect of Safety Training and Supervision on the Use of Personal Protective Equipment Which Implications for Work Safety in Loading and Unloading at Maccini Baji Port, Maros, South Sulawesi"

Based on the problem limitations above, the author can formulate the problem as follows:

1. Is there any influence of training on the use of personal protective equipment at Maccini Baji Port, Maros, South Sulawesi?
2. Is there any influence of safety supervision on the use of personal protective equipment at Maccini Baji Port, Maros, South Sulawesi?
3. Is there any influence of training on loading and unloading work safety at Maccini Baji Port, Maros, South Sulawesi?

4. Is there any influence of safety supervision on loading and unloading work safety at Maccini Baji Port, Maros, South Sulawesi?
5. Is there any influence of safety supervision on loading and unloading work safety at Maccini Baji Port, Maros, South Sulawesi?
6. Is there an influence of training on loading and unloading work safety through the use of personal protective equipment at Maccini Baji Port, Maros, South Sulawesi?
7. Is there an influence of safety supervision on loading and unloading work safety through the use of personal protective equipment at Maccini Baji Port, Maros, South Sulawesi?

METHOD

The data obtained is then processed using SmartPLS 4. The software is used to facilitate data processing, so that the results are faster and more precise. Where editing and coding are carried out. Editing is the first stage in processing data obtained by researchers from the field by checking the possibility of errors in respondent answers and the uncertainty of respondent answers. Coding is giving or certain signs or codes to similar alternative answers or classifying them so that it can facilitate researchers regarding tabulation.

In this study, the data collected is presented in the form of a table to make it easier to analyze and understand the data so that the data presented is more systematic. Where tabulation is done. Tabulation is the calculation of data that has been collected in each category until it is arranged in a table that is easy to understand.

The data obtained, after being processed and sorted, will be used for statistical analysis of data in accordance with the research objectives. The data analysis used is path analysis and hypothesis testing.

To discuss the research results, the author uses paired data based on the data obtained. Because there is more than one independent variable, namely two independent variables, one mediating variable, the analysis method used in this study is as follows:

Statistics Description

Descriptive statistics are statistics used to analyze data by describing or depicting the collected data as it is without making conclusions that apply to the public or generalizations. In this analysis, measuring the strength of the relationship between two variables consists of:

1. The maximum value is the highest value for each variable tested.
2. The minimum value is the lowest value for each variable tested.
3. The mean is a technique used to measure the average and is the most common way to measure the central value of a sample data distribution.
4. Standard Deviation (variance) is used to assess the average or sample. Once the average is known, it is necessary to determine the distribution of the data.

Path Analysis

In this study, the technique used was *Structural Equation Modeling* (SEM) is a technique that combines path analysis and regression analysis that allows researchers to simultaneously test a series of interrelated relationships between measured variables and latent constructs (Hair et. al, 2010:634).

The statistical analysis used in this study is path analysis. The main analysis conducted is to test the path construct whether it is empirically tested or not. Further analysis is conducted to find direct and indirect influences using correlation and regression so that it can be known to arrive at the final dependent variable, it must be through a direct path or through an intervening variable.

Data analysis techniques using the Structural Equation Model (SEM) were carried out to thoroughly explain the relationship between variables in this study. SEM is used to

examine and justify a model, not to design a theory. According to(Santoso, 2016)SEM is a set of statistical techniques that allow testing of a series of simultaneous, established relationships between one or more variables. (Byrne and Barbara, 2015) also revealed that SEM can be used as a stronger alternative compared to using multiple regression, path analysis, factor analysis, time series analysis, and covariate analysis.

In this study, data management using the SEM Partial Least Square (PLS) method using the SmartPLS software program version. Analysis on Partial Least Square (PLS) is carried out with the following stages:

***a.*Measurement Model or Outer Model**

*Outer Mode l*can explain how each dimension block relates to its latent variables. Latent variables can be measured with dimensions that are reflective and formative with the assumption that the construct and latent variables influence the dimensions or direction of the causal relationship from the construct to the manifest dimension.(Ghozali, 2016).The testers in the Outer Model are:

1) Validity Test
   There are two validity tests, namely convergent validity and discriminant validity. Convergent validity tests using reflective dimensions are assessed based on the loading factor value (correlation between item sectors and construct scores) of the dimensions that measure the construct. The dimensions are considered valid if they have a correlation value above 0.70, however, in the scale development stage research, a loading factor value of 0.5-0.6 is still aceptable (Ghozali, 2016).
2) Discriminant Validity
   Discriminant validity is determined by looking at the cross loading factor of each variable. This value is the cross loading factor value which is useful for knowing whether the construct has adequate discriminant, namely by comparing the cross loading factor value on the intended construct with the cross loading factor value of other constructs (Ghozali, 2016).
3) Average Variance Extracted (AVE)
   The average variance extracted (AVE) value must be > 0.5 or the model has sufficient discriminant if the AVE root for each construct is greater than the correlation between the construct and other constructs in the model and early stage research from the development of the measurement scale, the loading factor value of 05-0.6 is still considered sufficient. Convergent validity is related to the principle that the measures (manifest variables) of a construct should be highly correlated while discriminant validity is related to the principle that different measures of constructs should not be highly correlated (Ghozali, 2016).
4) Reliability Test
   ReLiability in PLS is used to measure the internal consistency of the measuring instrument. Reliability shows the accuracy, consistency and precision of a measuring instrument in making measurements. Reliability testing in PLS can use two methods, namely Cronbach's alpha and composite reliability (Ghozali, 2016).
   1) *Composite Reliability*
      *Composite reliability*used to measure the actual value of the reliability of a construct. Composite reliability is considered better in estimating the internal consistency of a construct. The rule of thumb for composite reliability is> 0.6 (Ghozali, 2016).
   2) *Cronbach's Alpha*
      *Cronbach's alpha*used to measure the lower limit of the reliability value of a construct and ensure the value of the composite reliability. The rule of thumb for Cronbach's alpha is > 0.7 (Ghozali, 2016).

***b.* Structural Model or Inner Model**

Inner model (*inner relations, structural models and substantive theory)* describes the relationship between latent variables based on substantive theory. The structural model is evaluated using R-square e and t-test and the significance of the structural path parameter coefficients. In assessing the model with PLS, it begins by looking at the R-square for each dependent latent variable. The interpretation is the same as the interpretation in regression. Changes in R-square can be used to assess the influence of certain independent latent variables on the dependent latent variable whether it has a substantive influence (Ghozali, 2016). With the following description:

1) *Q Square*

After we learn the complete bootstrapping analysis, it's time for us to also learn about blindfolding analysis as a prediction relevance analysis. Blindfolding is an analysis used to assess the level of prediction relevance of a construct model. The analysis process uses the Q Square value. If Q Square > 0.05 then it can be concluded that a construct model is relevant. This means that the exogenous variables used to predict the endogenous variables are correct.

2) R Square (R^2)

In assessing the structural model, first assess the R-Square for each endogenous latent variable as the predictive power of the structural model. Testing of the structural model is done by looking at the R-square value which is a goodness-fit test of the model. Changes in the R-Square value can be used to explain the influence of certain exogenous latent variables on endogenous latent variables whether they have a substantive influence. The R-Square values of 0.75, 0.50 and 0.25 can be concluded that the model is strong, moderate and weak (Ghozali, 2016).

c. **Hypothesis Testing**

After conducting various evaluations, both outer model and inner model, the next step is to conduct hypothesis testing. Hypothesis testing is used to explain the direction of the relationship between endogenous and exogenous variables. Hypothesis testing is done by looking at the probability value and its t-statistic. For the probability value, the p-value with alpha 5% is <0.05. The t-Table value for alpha 5% is 1.96. So the criteria for accepting the Hypothesis is when the t-statistic> t-Table (Ghozali, 2016).

A hypothesis can be accepted or rejected statistically can be calculated through its level of significance. The level of significance used in this study is 5%. If the level of significance chosen is 5%, then the level of significance or level of confidence is 0.05 to reject a hypothesis. In this study, there is a possibility of making a wrong decision of 5% and a possibility of making a correct decision of 95%.

Based on the statistical formula, the following statistical hypothesis is described:

1. The direct positive influence of training (X1) on the use of personal protective equipment (Y).

   Determining H10 and H1a:

   H0:Σ=Σ(θ) There is no direct significant influence of training on the use of personal protective equipment.

   Ha:Σ≠Σ(θ) Directly there is a significant influencetraining on the use of personal protective equipment

2. The direct positive influence of safety supervision (X2) on the use of personal protective equipment (Y).

   Determining H20 and H2a:

   H0:Σ=Σ(θ) There is no direct influencesafety supervision of the use of personal protective equipment

   Ha:Σ≠Σ(θ) Directly there is a significant influencesafety supervision of the use of personal protective equipment

3. The direct positive influence of training (X1) on loading and unloading work safety (Z).
   Determining H30 and H3a:
   H0:Σ=Σ(θ) There is no direct influencetraining on loading and unloading safety
   Ha:Σ≠Σ(θ) Directly there is a significant influencetraining on loading and unloading safety
4. Direct positive influence of safety supervision (X2) on loading and unloading work safety (Z).
   Determining H40 and H4a:
   H0:Σ=Σ(θ) There is no direct influencesafety supervision of loading and unloading work safety
   Ha:Σ≠Σ(θ) Directly there is a significant influencesafety supervision of loading and unloading work safety
5. Direct positive influence of the use of personal protective equipment (Y) on loading and unloading work safety (Z).
   Determining H50 and H5a:
   H0:Σ=Σ(θ) There is no direct influenceuse of personal protective equipment for loading and unloading work safety
   Ha:Σ≠Σ(θ) Directly there is a significant influenceuse of personal protective equipment for loading and unloading work safety
6. The indirect positive influence of the use of personal protective equipment (Y) mediates training (X1) on loading and unloading work safety (Z).
   Determining H60 and H6a:
   H0:Σ=Σ(θ) IndirectlyThe use of personal protective equipment is not able to mediate the significant influence of training on loading and unloading work safety.
   Ha:Σ≠Σ(θ) IndirectlyThe use of personal protective equipment is able to mediate the significant influence of training on loading and unloading work safety.
7. The indirect positive influence of the use of personal protective equipment (Y) mediates safety supervision (X2) on loading and unloading work safety (Z).
   Determining H70 and H7a:
   H0:Σ=Σ(θ) IndirectlyThe use of personal protective equipment is not able to mediate the significant influence of safety supervision on loading and unloading work safety.
   Ha:Σ≠Σ(θ) Indirectly The use of personal protective equipment can significantly mediate the influence of safety supervision on loading and unloading work safety.

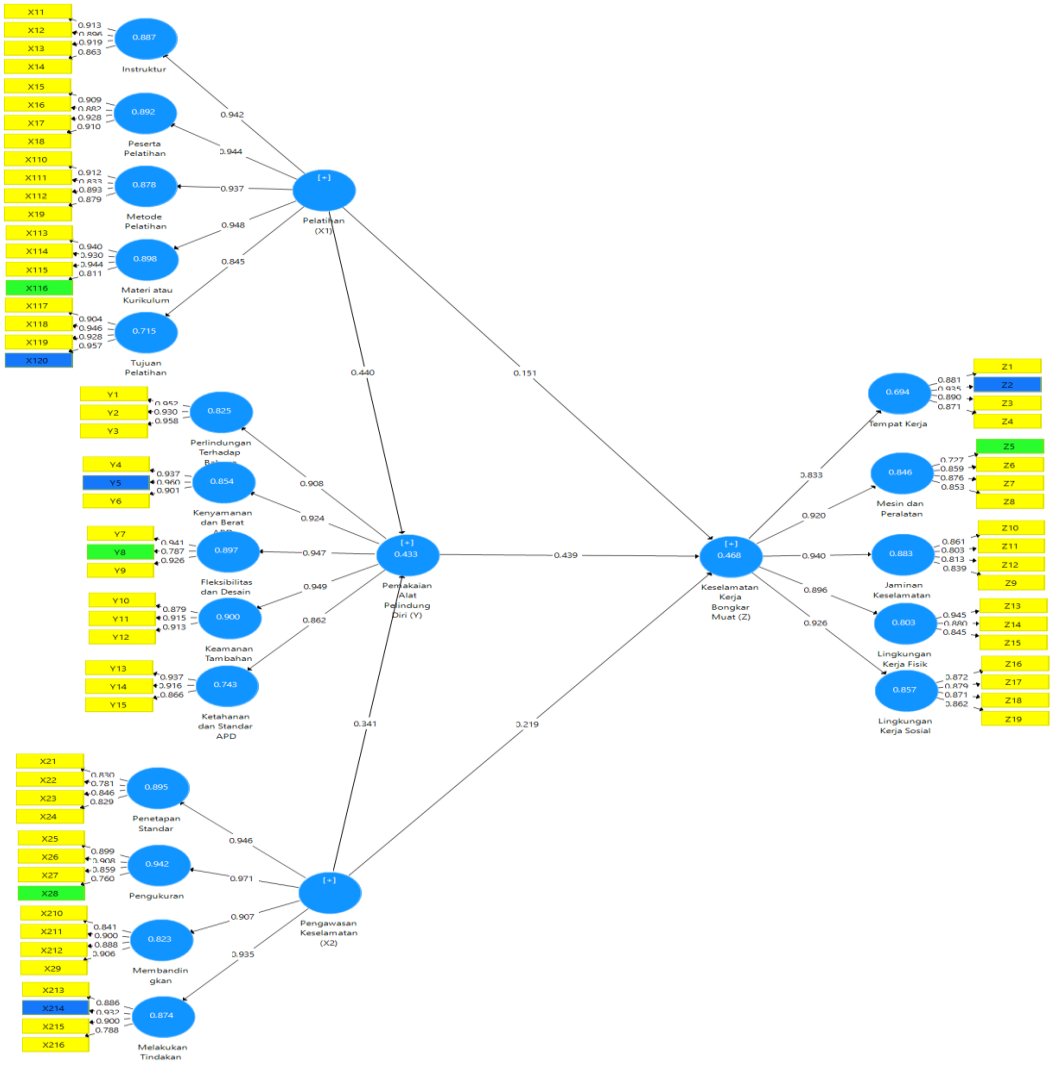
   Of all existing hypotheses using the following criteria:
   a. H0 is rejected or Ha is accepted if the significance < 0.05.
   b. H0 is accepted or Ha is rejected if the significance ≥ 0.05.

RESULTS AND DISCUSSION

1. Outer Model

In data analysis with PLS-SEM, the first stage is the evaluation of the outer model which is also called the measurement model. This analysis stage is to test and evaluate the relationship of reflective indicators used to measure the latent variables (constructs). The analysis of this measurement model consists of 2 types, namely reliability testing and validity testing. To obtain the outer model in this study, SmartPLS4 software was used by running the calculate menu, namely the PLS Algorithm. The outer model reflective model test of this study is arranged in 4 parts, namely sequentially 1) indicator reliability (outer loading), 2) construct reliability (Cronbach's alpha and composite reliability), 3) construct validity (average variance

extracted or AVE), and 4) discriminant validity (heterotrait-monotrait ratio). The results of data processing with the PLS Algorithm get an outer model image as below.



Source: SEMPLS Processing (2024)

Figure 1. Structural Model Outer Model

Validity testing or convergent validity uses outer loading values. The following are the results of validity testing for each variable.

Table 4. Fornell-Larcker Criterion between Variables

	Loading and Unloading Work Safety (Z)	Training (X1)	Use of Personal Protective Equipment (Y)	Safety Monitoring (X2)
Loading and Unloading Work Safety (Z)	0.777			
Training (X1)	0.496	0.836		
Use of Personal Protective Equipment (Y)	0.641	0.580	0.840	
Safety Monitoring (X2)	0.510	0.411	0.522	0.807

Source: SEMPLS Processing (2024)

Table 5. Cross Loading between Latent Variables and Indicators

	Training (X1)	Safety Monitoring (X2)	Use of Personal Protective Equipment (Y)	Loading and Unloading Work Safety (Z)
X11	0.810	0.335	0.417	0.410
X12	0.851	0.360	0.429	0.441
X13	0.890	0.365	0.509	0.398
X14	0.831	0.354	0.538	0.424
X15	0.857	0.319	0.491	0.374
X16	0.837	0.371	0.537	0.446
X17	0.865	0.369	0.507	0.464
X18	0.869	0.357	0.539	0.435
X19	0.779	0.370	0.527	0.444
X110	0.861	0.367	0.561	0.424
X111	0.806	0.270	0.397	0.359
X112	0.848	0.296	0.479	0.380
X113	0.880	0.337	0.516	0.400
X114	0.860	0.326	0.514	0.432
X115	0.883	0.341	0.514	0.421
X116	0.815	0.385	0.468	0.446
X117	0.746	0.369	0.431	0.410
X118	0.793	0.356	0.440	0.394
X119	0.812	0.300	0.439	0.385
X120	0.805	0.325	0.421	0.397
X21	0.312	0.747	0.310	0.332
X22	0.281	0.718	0.380	0.414
X23	0.340	0.811	0.372	0.350
X24	0.334	0.828	0.454	0.426
X25	0.358	0.851	0.511	0.428
X26	0.296	0.865	0.493	0.445
X27	0.368	0.873	0.419	0.446
X28	0.275	0.735	0.380	0.409
X29	0.367	0.821	0.374	0.485
X210	0.323	0.875	0.454	0.507
X211	0.326	0.729	0.371	0.355
X212	0.337	0.762	0.383	0.362
X213	0.371	0.806	0.450	0.412
X214	0.340	0.856	0.470	0.417
X215	0.343	0.809	0.491	0.375
X216	0.336	0.809	0.399	0.409
Y1	0.510	0.476	0.860	0.584
Y2	0.523	0.515	0.839	0.606
Y3	0.544	0.473	0.881	0.606
Y4	0.524	0.435	0.844	0.578
Y5	0.550	0.441	0.863	0.543
Y6	0.524	0.447	0.876	0.564

	Training (X1)	Safety Monitoring (X2)	Use of Personal Protective Equipment (Y)	Loading and Unloading Work Safety (Z)
Y7	0.478	0.451	0.865	0.537
Y8	0.372	0.391	0.763	0.455
Y9	0.502	0.449	0.888	0.550
Y10	0.511	0.439	0.897	0.538
Y11	0.463	0.374	0.795	0.469
Y12	0.485	0.418	0.868	0.536
Y13	0.452	0.401	0.825	0.487
Y14	0.407	0.354	0.749	0.472
Y15	0.436	0.498	0.766	0.529
Z1	0.423	0.375	0.457	0.787
Z2	0.339	0.331	0.407	0.747
Z3	0.352	0.276	0.430	0.720
Z4	0.329	0.369	0.427	0.723
Z5	0.344	0.339	0.472	0.729
Z6	0.394	0.380	0.535	0.747
Z7	0.341	0.346	0.522	0.791
Z8	0.352	0.389	0.439	0.784
Z9	0.363	0.365	0.453	0.776
Z10	0.383	0.427	0.465	0.801
Z11	0.264	0.317	0.417	0.763
Z12	0.372	0.320	0.463	0.777
Z13	0.454	0.450	0.617	0.870
Z14	0.413	0.382	0.480	0.760
Z15	0.537	0.541	0.600	0.760
Z16	0.367	0.441	0.545	0.751
Z17	0.511	0.543	0.615	0.791
Z18	0.350	0.469	0.550	0.822
Z19	0.410	0.439	0.536	0.854

Source: SEMPLS Processing (2024)

The results of the Fornell-Larcker Criterion and cross loading between all latent variables with indicator variables that have been shown in the table above that the value of an indicator is greater in calculating variables from other constructs. Based on these results, it can be stated that each indicator used has good discriminant validity to form its respective variables.

Reliability Testing

Reliability testing is carried out to determine whether the variables used in this study are reliable or not. Reliability testing uses values*Cronbach's Alpha*and composite reliability. The following are the results of reliability testing.

Table 6. Reliability Testing

Variables	Cronbach's Alpha	Composite Reliability	Rule Of Thumb	Results
Training (X1)	0.977	0.979	>0.70	Reliable

Safety Monitoring (X2)	0.964	0.968		Reliable
Use of Personal Protective Equipment (Y)	0.970	0.973		Reliable
Loading and Unloading Work Safety (Z)	0.963	0.967		Reliable

Source: SEMPLS Processing (2024)

Based on the table above, it can be concluded that the constructs for all variables meet the reliable criteria. This is indicated by the Cronbach's Alpha and composite reliability values obtained from the SmartPLS estimation results. The resulting value is > 0.70 as recommended criteria.

Structural Model (Inner Model)

In the structural model (Inner Model) is a model that can prove an interaction on causality that refers to latent variables. In this study, structural examples can be assessed using the determination coefficient test (R2) and multicollinearity test. The following is a display of the path diagram (path example) using the PLS Bootstrapping calculation.

Based on Ghozali and Latan (2015), the inner model is a structural model that describes the causal influence between variables based on existing theories. The inner model will conduct an analysis where the causal influence between variables will be studied. In this section, several things that will be tested are:

***R-Square* (Coefficient of Determination)**

According to Hair et al. (2019) the R2 or R-Square test is a way to find out how much percentage of endogenous constructs can be explained by their exogenous constructs. The coefficient of determination (R2) value is expected to be between 0 and 1. R2 values of 0.75, 0.50, and 0.25 indicate that the model is strong, moderate, and weak.

Table 7. R-Square (R2) Test Results

	R Square	R Square Adjusted
Use of Personal Protective Equipment (Y)	0.433	0.426
Loading and Unloading Work Safety (Z)	0.468	0.457

Source: SEMPLS processed data (2024)

From the table above, it can be seen that the variable of personal protective equipment usage has a large R2 value, the R2 value is 0.433 with an Adjusted R2 value of 0.426, indicating that the contribution of the training and safety supervision variables to the use of personal protective equipment is 43.3%, while the remaining 56.7% is the influence of other variables not used in this study.

Yesreliablesafety of loading and unloading workhas a large R2 value, the R2 value is 0.468 with an Adjusted R2 value of 0.457 indicating that the training, safety supervision and use of personal protective equipment variables have an impact onsafety of loading and unloading worksolarge 46.8% while the remaining 53.2% is the influence of other variables not used in this study.

Q-Square

In the analysis of model quality in PLS-SEM, the next stage is through the Q-squared test. This test aims to determine the predictive relevance of a latent variable in the research model (Hair & Sarstedt, 2021). The Q2 value is in the range of 0 to 1 (Hair et al., 2019). If a Q-squared value of more than 0 is found, it is said to have relevance, if the value is up to 0.25, it is said that the predictive relevance is small (small predictive relevance), if the Q-squared value is between 0.25 and 0.5, it is said that the predictive ability of the model is medium (medium predictive relevance), if the Q-squared value is more than 0.5, it is said to have a large

predictive relevance. The greater the Q-squared value found or the closer it is to 1, the more precise the predictive ability of a research model is to predict relatively the same research output if there is a change in the data parameters. This is done in PLS-SEM with an out-of-sample approach or simulated changes in data compared to the original estimated data (Hair et al., 2019; Hair & Sarstedt, 2021). Therefore, it can be said that this value can indicate the quality of the proposed model for empirical testing, considering that this model will be tested on different data in the future.

The Q2 value of this study was obtained from the calculation results using a formula as shown in the table below.

Table 8. Q-Squared Value

Variables	Q^2_square	Results
Use of Personal Protective Equipment (Y)	0.303	Medium Predictive Relevance
Loading and Unloading Work Safety (Z)	0.274	Medium Predictive Relevance

Source: SEMPLS processed data (2024)

The table above presents the Q-Square values. The Q-Square value for the use of personal protective equipment is 0.303, this variable is classified as medium predictive relevance. While the Q-Square value forsafety of loading and unloading workof 0.274, the variable is classified as medium predictive relevance.

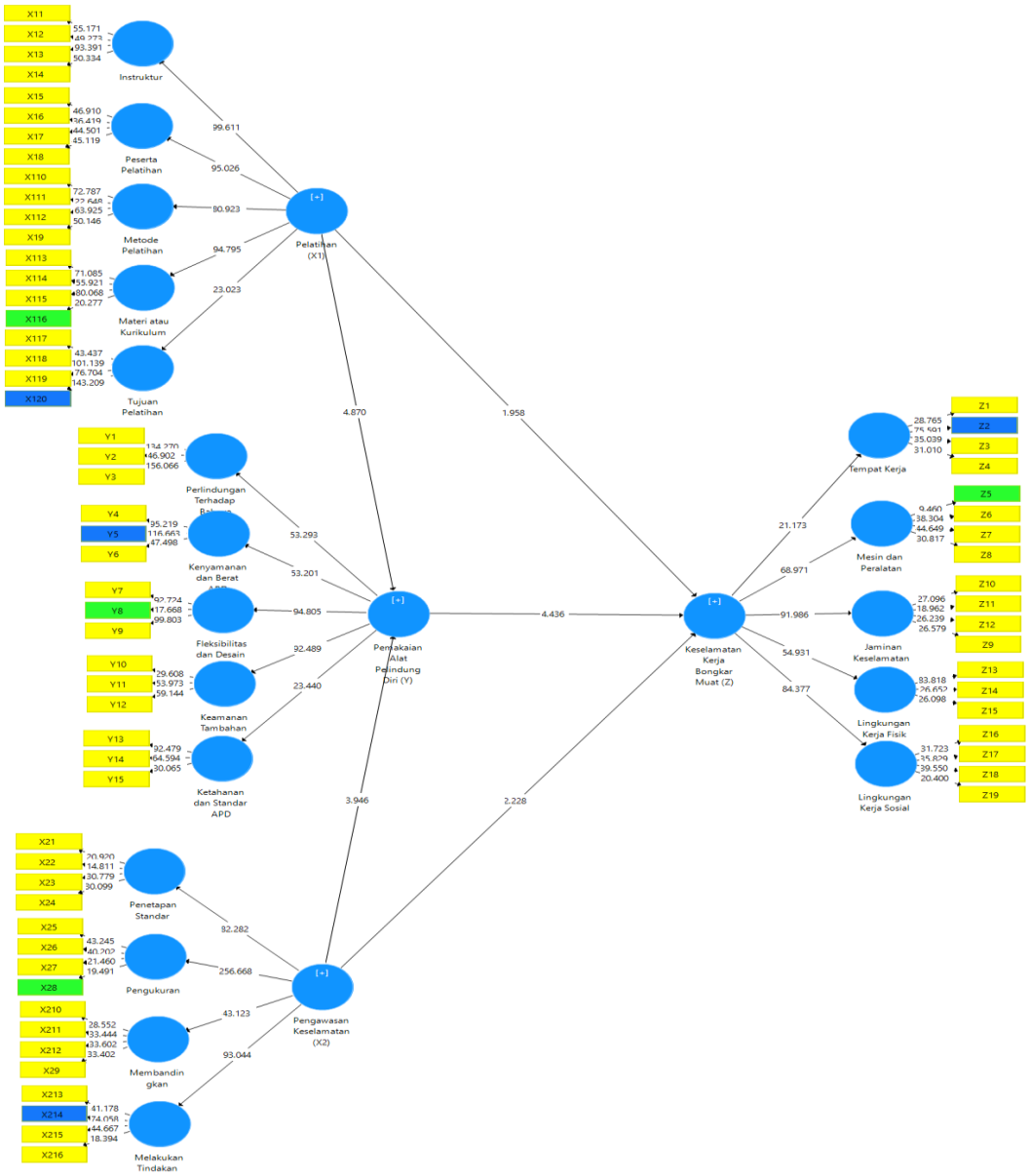
Research Hypothesis

The significance of the estimated parameters provides very useful information about the relationship between the research variables. The basis used in testing the hypothesis is the value contained in the output path coefficient.

Table 9. Direct and Indirect Influence Analysis

Hypothesis	Influence	Original Sample (O)	T Statistics (|O/STDEV|)	P Values	Information
H1	Training (X1) -> Use of Personal Protective Equipment (Y)	0.440	4,870	0.000	Positive and significant
H2	Safety Supervision (X2) -> Use of Personal Protective Equipment (Y)	0.341	3.946	0.000	Positive and significant
H3	Training (X1) -> Loading and Unloading Work Safety (Z)	0.151	1,958	0.025	Positive and significant
H4	Safety Supervision (X2) -> Loading and Unloading Work Safety (Z)	0.219	2.228	0.013	Positive and significant
H5	Use of Personal Protective Equipment (Y) -> Loading and Unloading Work Safety (Z)	0.439	4.436	0.000	Positive and significant
H6	Training (X1) -> Use of Personal Protective Equipment (Y) -> Work Safety in Loading and Unloading (Z)	0.193	3,062	0.001	Positive and significant
H7	Safety Supervision (X2) -> Use of Personal Protective Equipment (Y) -> Loading and Unloading Work Safety (Z)	0.150	3.180	0.001	Positive and significant

Source: SEMPLS Processing (2024)



Source : Output Program Smart PLS (2024)

Figure 2.Boostrapping First Order and Second Order

Based on the direct influence hypothesis testing above, it can be explained as follows.

1. **Hypothesis Testing 1: Direct Effect of Training on Use of Personal Protective Equipment.**

   Based on Table 4.13 above, it shows that the influence of Training on the Use of Personal Protective Equipment with a parameter coefficient of 0.440 which indicates that the direction of influence between Training on the Use of Personal Protective Equipment is positive at 0.440. This means that if there is an increase in Training by 1 unit, the Use of Personal Protective Equipment increases by 0.440. Furthermore, based on the T-Statistics H1 of 4.870 which is greater than its level or 4.870> 1.64, and the P-values H1 of 0.000 which is smaller than the real level or 0.000 <0.05, this shows that the direct influence of Training on the Use of Personal Protective Equipment is significant. Therefore, it can be concluded that H1 is accepted, then there is a positive and significant direct influence of Training on the Use of Personal Protective Equipment.

2. **Hypothesis Testing 2: Direct Effect of Safety Supervision on the Use of Personal Protective Equipment.**

Based on Table 4.13 above, it shows that the influence of Safety Supervision on the Use of Personal Protective Equipment with a parameter coefficient of 0.341 which indicates that the direction of influence between Safety Supervision on the Use of Personal Protective Equipment is positive at 0.341. This means that if there is an increase in Safety Supervision by 1 unit, the Use of Personal Protective Equipment increases by 0.341. Furthermore, based on the T-Statistics H2 of 3.946 which is greater than its level or 3.946> 1.64, and the P-values H2 of 0.000 which is smaller than the real level or 0.000 <0.05, this shows that the direct influence of Safety Supervision on the Use of Personal Protective Equipment is significant. Therefore, it can be concluded that H2 is accepted, then there is a positive and significant direct influence of Safety Supervision on the Use of Personal Protective Equipment.

3. **Hypothesis Testing 3: Direct Effect of Training on Loading and Unloading Work Safety.**

Based on Table 4.13 above, it shows that the influence of Training on Loading and Unloading Work Safety with a parameter coefficient of 0.151 which indicates that the direction of influence between Training on Loading and Unloading Work Safety is positive at 0.151. This means that if there is an increase in Training by 1 unit, Loading and Unloading Work Safety increases by 0.151. Furthermore, based on the T-Statistics H3 of 1.958 which is greater than its level or 1.958> 1.64, and the P-values H3 of 0.025 which is smaller than the real level or 0.025 <0.05, this shows that the direct influence of Training on Loading and Unloading Work Safety is significant. Therefore, it can be concluded that H3 is accepted, so there is a positive and significant direct influence of Training on Loading and Unloading Work Safety.

4. **Testing Hypothesis 4: Direct Effect of Safety Supervision on Loading and Unloading Work Safety.**

Based on Table 4.13 above, it shows that the influence of Safety Supervision on Loading and Unloading Work Safety with a parameter coefficient of 0.219 which indicates that the direction of influence between Safety Supervision on Loading and Unloading Work Safety is positive at 0.219. This means that if there is an increase in Safety Supervision by 1 unit, Loading and Unloading Work Safety increases by 0.219. Furthermore, based on the T-Statistics H4 of 2.228 which is greater than its level or 2.228> 1.64, and the P-values H4 of 0.013 which is smaller than the real level or 0.013 <0.05, this shows that the direct influence of Safety Supervision on Loading and Unloading Work Safety is significant. Therefore, it can be concluded that H4 is accepted, so there is a positive and significant direct influence of Safety Supervision on Loading and Unloading Work Safety.

5. **Hypothesis Testing 5: Direct Effect of Use of Personal Protective Equipment on Work Safety in Loading and Unloading.**

Based on Table 4.13 above, it shows that the influence of the Use of Personal Protective Equipment on the Safety of Loading and Unloading Work with a parameter coefficient of 0.439 which indicates that the direction of the influence between the Use of Personal Protective Equipment on the Safety of Loading and Unloading Work is positive at 0.439. This means that if there is an increase in the Use of Personal Protective Equipment by 1 unit, the Safety of Loading and Unloading Work increases by 0.439. Furthermore, based on the T-Statistics H5 of 4.436 which is greater than its level or 4.436> 1.64, and the P-values H5 of 0.000 which is smaller than the real level or 0.000 <0.05, this shows that the direct influence of the Use of Personal Protective Equipment on the Safety of Loading and Unloading Work is significant. Therefore, it can be concluded that H5 is accepted, so

there is a positive and significant direct influence of the Use of Personal Protective Equipment on the Safety of Loading and Unloading Work.

6. **Hypothesis Testing 6: Indirect EffectTraining on Work Safety in Loading and Unloading through the Use of Personal Protective Equipment.**

   Based on Table 4.13 above, it shows that the indirect effect of Training on Loading and Unloading Work Safety through the Use of Personal Protective Equipment is positive with a parameter coefficient of 0.193 which indicates that the direction of the effect between Training on Loading and Unloading Work Safety through the Use of Personal Protective Equipment is positive at 0.193. This means that if there is an increase in Training through the Use of Personal Protective Equipment by 1 unit, Loading and Unloading Work Safety increases by 0.193. Furthermore, based on the T-Statistics H6 of 3.062 which is greater than its level or 3.062> 1.64, and the P-values H6 of 0.001 which is smaller than the real level or 0.001 <0.05, this shows that the indirect effect of Training on Loading and Unloading Work Safety through the Use of Personal Protective Equipment is significant. Therefore, it can be concluded that H6 is accepted, so there is a positive and significant indirect influence of Training on Loading and Unloading Work Safety through the Use of Personal Protective Equipment.

7. **Hypothesis Testing 7: Indirect EffectSafety Supervision of Loading and Unloading Work Safety through the Use of Personal Protective Equipment.**

Based on Table 4.13 above, it shows that the indirect effect of Safety Supervision on Loading and Unloading Work Safety through the Use of Personal Protective Equipment is positive with a parameter coefficient of 0.150 which indicates that the direction of the effect between Safety Supervision on Loading and Unloading Work Safety through the Use of Personal Protective Equipment is positive at 0.150. This means that if there is an increase in Safety Supervision through the Use of Personal Protective Equipment by 1 unit, Loading and Unloading Work Safety increases by 0.150. Furthermore, based on the T-Statistics H7 of 1.668 which is greater than its level or 3.180> 1.64, and the P-values H7 of 0.001 which is smaller than the real level or 0.001 <0.05, this shows that the indirect effect of Safety Supervision on Loading and Unloading Work Safety through the Use of Personal Protective Equipment is significant. Therefore, it can be concluded that H7 is accepted, so there is a positive and significant indirect influence of Safety Supervision on Loading and Unloading Work Safety through the Use of Personal Protective Equipment.

CONSLUSION

1. Training has been proven to have a positive and significant influence on the use of personal protective equipment at Maccini Baji Port, Maros, South Sulawesi. This can be seen from the parameter coefficient of 0.793, with a t-statistic of 4.167, greater than the t-table of 1.64, and a p-value of 0.000 which is smaller than 0.05. The dimension that best reflects the training variable is the instructor with a loading factor of 0.942, and the most dominant indicator is X17 with a loading factor of 0.942.
2. Safety supervision has a positive and significant effect on the use of personal protective equipment with a parameter coefficient of 0.859, t-statistic 5.350, greater than t-table 1.64, and p-value 0.000 which is smaller than 0.05. The dimension that best reflects the safety supervision variable is measurement with a loading factor of 0.971, and the dominant indicator is X28 with a loading factor of 0.899.
3. Training is also proven to have a positive and significant influence on loading and unloading work safety with a parameter coefficient of 0.862, t-statistic 4.936, greater than t-table 1.64, and a p-value of 0.000 which is smaller than 0.05. The dimension that best

reflects the work safety variable is the workplace with a loading factor of 0.940, and the dominant indicator is Z1 with a loading factor of 0.881.

4. Safety supervision has a direct positive and significant effect on the safety of loading and unloading work at the port with a parameter coefficient of 0.926, a t-statistic of 5.874, greater than the t-table of 1.64, and a p-value of 0.000 which is smaller than 0.05. The dimension that best reflects the safety supervision variable is taking action with a loading factor of 0.935, while the dominant indicator is X214 with a loading factor of 0.886.
5. The use of personal protective equipment also has a positive and significant effect on the safety of loading and unloading work with a parameter coefficient of 0.855, t-statistic 5.412, greater than the t-table of 1.64, and a p-value of 0.000 which is smaller than 0.05. The dimensions that best reflect the variable of the use of personal protective equipment are flexibility and design with a loading factor of 0.949, and the dominant indicator is Y8 with a loading factor of 0.941.
6. There is a positive and significant indirect effect of training on loading and unloading work safety through the use of personal protective equipment, with a parameter coefficient of 0.737, t-statistic 3.768, greater than t-table 1.64, and p-value 0.000 which is smaller than 0.05. The most influential training dimension is the instructor, while the most dominant dimension of personal protective equipment use is protection against hazards with a loading factor of 0.958.
7. Safety supervision also has a positive and significant indirect effect on loading and unloading work safety through the use of personal protective equipment, with a parameter coefficient of 0.901, t-statistic 5.173, greater than t-table 1.64, and p-value 0.000 which is smaller than 0.05. The most influential dimension of safety supervision is measurement, while the dominant dimension of personal protective equipment use is flexibility and design with a loading factor of 0.949.

Suggestion

1. The indicator with the lowest loading factor is Z5 - Routine maintenance of machinery and equipment is always carried out to avoid dangerous damage with a value of 0.727. This shows that the implementation of routine maintenance of machinery and equipment at the port is not optimal, which can increase the risk of accidents due to equipment damage. Suggestion: To improve work safety at the port, it is important to implement a stricter and more planned routine maintenance schedule for all equipment in the loading and unloading area, such as cranes, forklifts, and conveyor belts. In addition, the port should provide periodic audits by professional technicians to ensure that all machines are functioning properly. Additional training for operators is also needed so that they can detect potential machine damage early on, so that repairs can be carried out immediately before major problems occur.
2. The indicator with the lowest loading factor is X115 - Additional materials are provided to enrich participants' knowledge related to occupational safety with a value of 0.811. This low value indicates that the training materials provided are still not varied enough and do not enrich participants' insights in the field of occupational safety. Suggestion: Training materials related to occupational safety need to be expanded by providing more varied and up-to-date additional materials. The port can introduce digital training modules that can be accessed online by participants to deepen their knowledge, especially about specific risks such as handling chemicals and firefighting. Accident simulation sessions or real case studies can also be used to increase participants' insight in dealing with emergency situations in the field.
3. The indicator with the lowest loading factor is X28 - The measurement method used in safety supervision is very accurate with a value of 0.760. This shows that the work safety measurement method used in the port is still less accurate, so that supervision of safety

performance is not optimal. Suggestion: To improve the accuracy of safety supervision, the port can adopt digital monitoring technology and automatic sensors that can track various environmental conditions such as air quality, temperature, and humidity in the work area. Tools such as hazardous gas detectors and machine vibration meters can also be used to ensure that the work area is safe for workers. In addition, intensive training for safety supervisors in using modern measuring instruments must be held periodically to improve the accuracy of measurement results.

4. The indicator with the lowest loading factor is Y14 - The PPE used is easy to care for and maintain to keep it functioning properly with a value of 0.866. This low value indicates that the maintenance of personal protective equipment (PPE) has not been fully carried out properly by workers, which can reduce the effectiveness of PPE in protecting them from risks in the workplace. Suggestion: The port can provide PPE maintenance stations in each work area so that workers can routinely care for and clean their PPE. This will ensure that PPE, such as helmets, eye protection, and gloves, are always in optimal condition. In addition, there needs to be a short training program that teaches workers how to properly care for their PPE and when to replace PPE that is no longer suitable for use. A PPE inventory system can also be implemented to monitor the condition and service life of each piece of protective equipment used.

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