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Influence of Safety Management Practices on Safety Performance with Safety Knowledge as Intervening Variable in Safety Representative

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***Abstract*— Phosphoric acid production companies have a lot of potential hazards that can lead to work accidents. The preventive actions taken by the company are by establishing a SHE (Safety, Health, and Environment) division and appointing a safety representative. Based on the results of the safety patrol record, it turns out that there are still a lot of unsafe actions and unsafe conditions that occur and the value of the frequency rate in 2021 is worth 0.23. This study aims to determine the influence of safety management practices on safety performance mediated by the safety knowledge of 40 safety representatives. The method used to analyze the relationship between variables is PLS-SEM (Partial Least Square – Structural Equation Modeling). The results showed that there was a positive and significant influence between safety management practices on safety performance with a p-value of 0.018. In addition, safety management practices also have a positive and significant impact on safety performance mediated by safety knowledge with a p-value of 0.004 and a VAF value of 49,59%. Recommendations that can be given are in the form of implementing safety training, installing safety signs in the workplace, updating and socializing standard operating procedures for work, and implementing safety talks and safety briefings.**

Keywords: safety knowledge, safety management practices, safety performance, safety representative.

I. INTRODUCTION

A Phosphoric acid production company is a chemical industry that has a fairly high risk of work accidents. Based on Keputusan Menteri Tenaga Kerja Nomor 187 Tahun 1999 concerning the Control of Hazardous Chemicals in the workplace, this company is classified as an industry with big potential for danger because it produces hazardous chemicals. The potential for this large accident has prompted the company to form a SHE (Safety, Health and Environment) Division which is expected to be able to develop good safety management practices. According to Vinodkumar & Bhasi (2010), Safety management practices are policies, strategies, procedures, and activities implemented by a company to target the safety of its workers. Another effort made is by appointing a safety representative for each work unit to supervise all work to optimize all safety and health programs that have been prepared.

The COVID-19 pandemic has caused safety representatives to become passive in carrying out their roles. So that there is a phenomenon of the lack of worker participation in solving safety problems in the workplace, safety communication in the company, and safety promotion policies. Another factor that influences the implementation of safety management practices is not optimal is the safety knowledge of safety representatives. This is evidenced by data that in 2021 the company has a frequency rate of 0.23. It can be concluded that there is at least 1 work accident that eliminates working days occurs for every 1,000,000 working hours of people. So, it is necessary to increase safety knowledge to reduce the potential for workplace accidents. According to Vinodkumar & Bhasi (2010), knowledge of workers about safety procedures will affect worker safety. In addition, the record from the results of routine safety patrols which note that there are still many unsafe actions also strengthens how the safety performance of workers is not yet optimal. Safety performance is a work behavior related to safety (Griffin & Neal, 2000).

Based on the facts, the researcher intends to research on the influence of safety management

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practices on safety performance intervened by safety knowledge. Previous research conducted by Vinodkumar & Bhasi (2010) said that there is a positive and significant influence between safety management practices and safety performance with intervention by safety knowledge. One method that can analyze this research is Partial Least Square – Structural Equation Modeling (PLS-SEM) using SmartPLS software. This method is used to determine the relationship between indicators and latent variables, which in this study contained safety management practices, safety knowledge, and safety performance. In addition, this method can find out how safety management practices affect safety performance intervened by safety knowledge. So, this research can be used to improve the safety performance of the safety representative.

II. RESEARCH METHODOLOGY

The population of this research is all safety representatives in each work unit in the phosphoric acid production company, totaling 40 people. Sampling was carried out using a saturated sampling technique, which means that the entire population was assigned as a sample. This is because the population is relatively small. Questionnaires were distributed to 40 safety representatives using google form media and researchers also received 40 responses, which means all respondents have filled out the questionnaire.

The Questionnaire used in the study contained 52 statements, 34 of which were safety management practices questionnaires from the research of Vinodkumar & Bhasi (2010) to measure the perception of safety representatives regarding the practices, roles, and functions created by the company to improve the safety and health of workers. The safety management practices questionnaire is composed of several indicators, namely Management Commitment (MC), Safety Training (TR), Worker's Involvement in Safety (WI), Safety communication and feedback (CO) Safety rules and procedures (SR), and Safety Promotion Policies (SP). Furthermore, there are 6 statement items that are also indicators of safety knowledge from the research of Vinodkumar & Bhasi (2010) to measure safety representative knowledge of safety procedures and practices in the workplace. The next safety knowledge indicator will be written as Z1, Z2, Z3, Z4, Z5, and Z6 to make it easier to explain. Finally, there are 12 safety performance statements from the same research, namely Vinodkumar & Bhasi (2010) to measure the perception of safety representatives on work behavior related to safety that has been carried out in the workplace. Safety performance has 2 indicators that compose it, namely safety compliance (COM) and safety participation (PAR). Overall, there are 50 positive statement items and the remaining 2 are negative statement items. Furthermore, each statement item will be assessed using a Likert scale from 1 to 4 as follows :

	Strongly Disagree	Disagree	Agree	Strongly Agree
Positive statement items	1	2	3	4
Negative statement items	4	3	2	1

Next is to test the validity and reliability of each questionnaire item with SPSS Software. The value of the questionnaire item's validity is seen from the calculated r-value which must be greater than the r-table value, which is 0.320. While the reliability value is seen from the value of Cronbach's alpha coefficient which must be greater than 0.6. A Hypothesis test is using the PLS-SEM method through the SmartPLS software and calculations to find out how influential safety knowledge is as an intervening variable on indirect effects can be done using the VAF (Variance Accounted for) formula, which is as follows (Kusmeri, 2018):

$$\text{VAF} = \frac{a \times b}{(a \times b) + c} \times 100\%$$

Where: a = effect of the independent variable on the intervening variable
b = effect of the intervening variable on the dependent variable
c = effect of the independent variable on the dependent variable

If the calculation result of the VAF value is above 80%, it shows the role of the intervening variable as a full mediation. However, if the VAF value is between 20% - 80%, it shows the role of the intervening variable as partial mediation. And if the VAF is less than 20%, it means that there is no intervention or mediation

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effect from the intervening variable or no mediation (Hair Jr et al., 2013; Kusmeri, 2018). The research hypotheses to be tested include:

H1: Safety management practices have a significant effect on safety performance

H2: Safety management practices have a significant effect on safety performance by being intervened by safety knowledge

III. RESULT AND DISCUSSION

The result of the validity and reliability test by using SPSS software shows that all the questionnaire items are valid and reliable based on the assessment conditions. All the questionnaire items have a calculated r-value greater than 0,320 and a value of Cronbach's alpha coefficient greater than 0.6.

The research hypotheses were tested using the PLS-SEM analysis method using the SmartPLS software. PLS-SEM consists of two stages there are evaluation of the measurement model and the structural model (Haryono, 2016). The following figure is the research model to be tested which is modified from Rosalita et al. (2016) and Vinodkumar & Bhasi (2010).

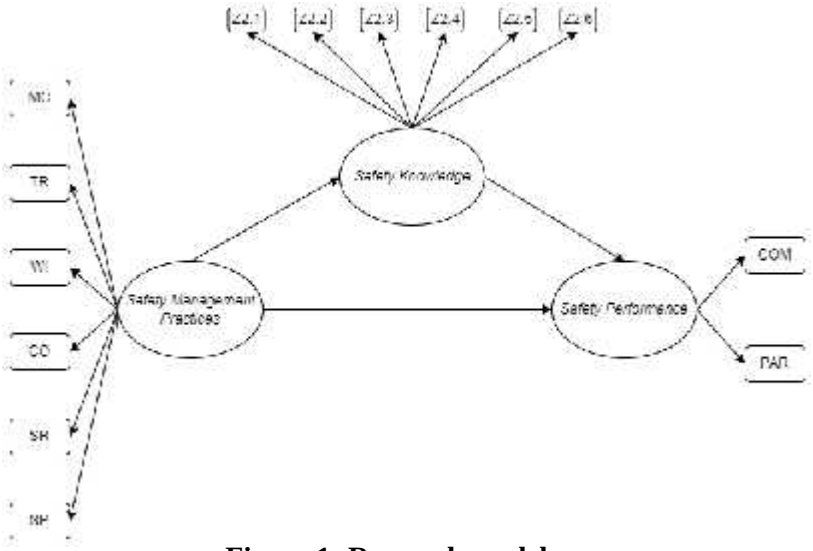

Figure 1: Research model

In this study, an evaluation was carried out on the reflective model. Evaluation of the measurement model tests the validity and reliability of all latent variables and their indicators. The first examination is individual item reliability which aims to see the magnitude of the correlation value between each indicator and its construct. This examination is seen from the loading factor value which must be ≥ 0.5 to be accepted (Hair et al., 2014; Effendi et al., 2019). Next is the examination of the composite reliability value, which is to see how reliable the variables of the research model are. According to Haryono (2016), the acceptable CR limit value is ≥ 0.7 and will get a satisfactory predicate if the CR value is ≥ 0.8. Equal to CR, the next examination is to see how reliable a variable is by looking at the AVE value. The minimum AVE value to be said to be reliable is 0.5 (Haryono, 2016).

According to Table 1, all of the indicators have an acceptance limit value of loading factor which is more than equal to 0,5. So, it can be declared that all of the indicators in this research are valid. CR value dan AVE value in table 2 show that all variables have acceptance limit value which is for CR value more than equal to 0,7 and AVE value more than equal to 0,5. It shows that all variables are reliable.

Table 1 Loading Factor

Variables	Indicators	Loadings
Safety Management Practices	MC	0,838
	TR	0,831
	WI	0,827
	CO	0,863
	SR	0,923
	SP	0,879
Safety Knowledge	Z1	0,890
	Z2	0,615
	Z3	0,902
	Z4	0,926
	Z5	0,891
	Z6	0,870
Safety Performance	COM	0,858
	PAR	0,896

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Table 2 CR and AVE Value

Variables	CR	AVE
Safety Management Practices	0,945	0,741
Safety Knowledge	0,942	0,732
Safety Performance	0,870	0,769

The second evaluation of this stage is the evaluation of discriminant validity which is carried out in two events, namely by looking at the value of cross-loading and the Fornell-Larcker criterion. Cross-loading can provide information about the relationship of indicators to the construct compared to other constructs (Haryono, 2016). In Table 3, it can be seen that all the indicators that make up the research variables have a greater value on the association construct compared to other constructs. The MC, TR, WI, CO, SR, and SP indicators have the highest cross-loading values for safety management practices. Meanwhile, indicators Z1 to Z6 have the greatest cross-loading value on safety knowledge as well as COM and PAR indicators which have the greatest cross-loading value on safety performance. Because the correlation value is higher than other constructs, it can be said that the measurement model already has good discriminant validity. While on the Fornell-Larcker criterion, the discriminant validity test is carried out by looking at the results of the correlation between variables in the form of the √AVE value (Haryono, 2016). Table 3 shows the √AVE value of each variable and the correlation between variables (vertical element), where the value of the diagonal element (0.862; 0.785; 0.855, and 0.877) is greater than the value of the vertical element (correlation with other variables). Thus, the discriminant validity conditions with the √AVE value have been met.

Table 3 Cross Loading

Indicators	Safety Management Practices	Safety Knowledge	Safety Performance
MC	**0,838**	0,557	0,633
TR	**0,831**	0,485	0,523
WI	**0,827**	0,579	0,579
CO	**0,863**	0,468	0,475
SR	**0,923**	0,388	0,509
SP	**0,879**	0,564	0,615
Z1	0,535	**0,890**	0,623
Z2	0,373	**0,615**	0,510
Z3	0,529	**0,902**	0,756
Z4	0,534	**0,926**	0,621
Z5	0,620	**0,891**	0,661
Z6	0,450	**0,870**	0,591
COM	0,548	0,587	**0,858**
PAR	0,598	0,703	**0,896**

Tabel 4 Fornell-Larcker Criterion

	Safety Management Practices	Safety Knowledge	Safety Performance
Safety Management Practices	0,861		
Safety Knowledge	0,599	0,855	
Safety Performance	0,654	0,739	0,877

After passing the evaluation of the measurement model, the next step is to evaluate the structural model to test the model so that the existing hypothesis can be accepted or rejected. The t-value used as a reference can be a C.R (critical value) value with a value of ≥ 1.96 or P ≤ 0.05. If the p-value ≤ 0.05, then H_0 is rejected, which means that there is a significant relationship between the variables. In addition, there is an evaluation of the R-square value carried out to find out how significant the influence between the variables tested is. The criteria for the R^2 value consist of three classifications, namely the R^2 value of 0.67 (substantial), the R^2 value of 0.33 (moderate), and the R^2 value of 0.19 (weak) (Haryono, 2016).

Tabel 4 T-test Value

	Original Sample (O)	P-Value	Explanation
Safety Management Practices -> Safety Performance	0,330	0,018	$H_{0.1}$ rejected
Safety Management Practices -> Safety Knowledge-> Safety Performance	0,324	0,004	$H_{0.2}$ rejected

Tabel 5 R-square Value

	R-Square
Safety Knowledge	0,359
Safety Performance	0,616

Based on the analysis test results, it is known that hypothesis 1 has a p-value of 0.018. This explains that there is a significant and positive influence between safety management practices

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on safety performance. The result of the R-square value is 0.616, which means that the variables of safety management practices and safety knowledge contribute 61.6% in shaping safety performance. These results indicate that safety management practices play an important role in building good safety performance. However, considering that there are still many unsafe actions from safety representatives, it is necessary to improve every indicator of safety management practices. An increase in safety management practices will affect on increasing the safety performance of safety representatives so that work accidents can be avoided. This is in line with the research of Kamilah et al. (2021) which states that there is a significant influence of safety management practices on safety performance through its 6 indicators.

Furthermore, hypothesis 2 has a p-value of 0.004, which means that there is a significant and positive influence between safety management practices on safety performance being intervened by safety knowledge. This is in line with the results of Perera's (2021) research which states that there is a positive and significant influence between safety management practices and safety performance with intervention by safety knowledge. The R-square value of 0.359 means that the variable safety management practices contribute 35.9% to forming safety knowledge. This R-square value proves that there must still be improvements in safety management practices that focus on increasing safety knowledge so that the safety performance of safety representatives can be implemented even better. The results of research with safety knowledge as an intervening variable prove that the roles, functions, and policies of top management are still lacking in increasing safety representative knowledge about safety. The impact is not only felt by the safety representative, but also by all workers in each work unit who should receive a transfer of knowledge about workplace safety from the safety representative. If that happens, the safety performance of all workers will also be poor and increase the potential for workplace accidents. Several recommendations can be made by companies to improve worker safety knowledge through safety management practices, namely holding safety training, conducting safety talks and safety briefings as well as socializing SOPs.

The result of VAF calculation from the role of safety knowledge as an intervening variable is 49,59%. The VAF results mean that the role of safety knowledge in its role as an intervening variable that also influences the relationship between safety management practices and safety performance is 49,59%. This condition is called partial moderation where before and after the existence of safety knowledge as an intervening variable, safety management practices still affect safety performance.

IV. CONCLUSION

Based on the analytical test that has been carried out, it can be seen that there is a significant and positive direct effect between safety management practices on safety performance with a p-value of 0.018. In addition, there is also a significant and positive indirect effect between safety management practices on safety performance with intervention by safety knowledge with a p-value of 0.004 with a VAF value of 49,59% that indicate a partial mediation condition. Recommendations that can be given to companies are conducting safety training, carrying out safety talks and safety briefings, and socializing SOP.

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