The Effect of Safety Management Practices Through Safety Knowledge Towards Safety Performance on Workers of Pt. Masmindo Dwi Area

Ummu Kamilah[1], Syamsiar S. Russeng[1], Masyitha Muis[1], Yahya Thamrin[1], Masni[2], Fridawati Rivai[3], Rizky Maharja[4]

[1]Student Master Program, Department of Occupational Health and Safety, [2]Lecturer, Department of Biostatistics and Reproductive Health, [3]Lecturer, Department of Hospital Management, Faculty of Public Health, Universitas Hasanuddin, Indonesia, [4]Lecturer, Department of Industrial Hygiene, Occupational Health and Safety, Sekolah Tinggi Ilmu Kesehatan Makassar, Indonesia

Abstract

Accidents in a workplace are caused by many human errors in form of unsafe behavior. One of the efforts to prevent work accidents is to improve safety performance in form of participation and obedience. Improvement of safety performance in workplace is affected by management and individual factors. Management factor is mainly associated with safety management practices while individual factor is associated with individual characteristics and occupational health and safety knowledge and training. This study aims to analyze the effect of individual factors and safety management practices on safety performance among workers at PT. Masmindo Dwi area. This research is a quantitative research using analytic observational and cross sectional design which was conducted in November-December 2020. Interviews were conducted on 72 workers out of 289 workers. The methods used in assessing safety management practices, individual factors and safety behavior are questionnaires, observation and interviews. The results showed that there is a direct (p=0,024) and indirect effect (p=0,001) of safety management practices on safety performance with safety knowledge as a mediating variable. Writer highly advise that in improving safety performance, the management have to be consistent, show commitments to safety rules and procedures that have been made, improve safety training programs, and increase the quantity and quality of training programs.

Keywords: *safety performance, safety knowledge, safety management practices*

Introduction

Indonesia has various industrial sectors, one of them is mining which included the mineral and coal mining industry. The mineral and coal mining industry in developed and developing countries has implemented sophisticated technology but the dangers and risks faced by this field of work are still there, as evidenced by the many accidents of work occurred in the mining sector.

Corresponding Author:
Ummu Kamilah, S.KM
ummukamilah.kod@gmail.com
+6282243497159, Public Health Faculty, Universitas Hasanuddin, Makassar, South Sulawesi, 90245

Statistical Data of Mine Safety and Health Administration noted that injuries which occurred in US coal mines in 2007 reached 3,203 cases with the number of cases in open cut-mining reaching 733 cases or 23% of the total injuries[1]. In Indonesia, the incidence of work accidents in the mining sector is also still experiencing a significant increase every year. Based on data from the Ministry of Energy and Mineral Resources (ESDM) on all mining companies in Indonesia as per September 30, 2019, it showed that the total mining accidents that occurred from 2012 to 2019 were 1,318 cases, consisting of 194 accidents resulting in death, 674 serious work accidents and 450 minor work accidents[2].

Heinrich et al. argued that generally work accidents might occur due to two main factors, namely unsafe working conditions and unsafe behaviour[3]. Research by Kamilah shows that there was a significant corelation between unsafe behaviour and the incidence of work injuries on construction workers[4]. The Ministry of Energy and Mineral Resources also conducted an analysis upon the results of investigation of mining accidents which resulted in death during 2012 – 2019[2]. The analysis showed that 19% the causes of the accidents were from unsafe behaviour factor, specifically due to not following applicable work procedures (SOP). Then the analysis continued on personal factors which became the leading causes, with 52%. Most of it were due to lack of knowledge related to safety. In addition, another 19% came from the occupational factors due to job hazards that had not been well identified and 18% due to insufficient leadership and supervision. According to Hughes and Ferret, a person's behaviour can be influenced by factors from the individual himself, both the conditions and their own characteristics[5].

The government has shown its commitment to reduce the number of work accidents and protect the safety and health of mining workers by issuing several policies related to occupational safety and health in mining sector. Ministry of Energy and Mineral Resources has obliged all mining companies to implement SMKP (Safety Management System for Mining) which is a derivative of the Occupational Safety and Health Management System (SMK3). The success of implementing occupational health and safety regulations in a company will never be separated from the personal compliance attitude of both employees and managerial parties in implementing OHS-related regulations and policies. The role of employees is of course very much needed to support the success of occupational health and safety management efforts, by displaying safety performance[6]

Safety performance is a performance that is measured based on a person's safety related behaviour. According to Neal & Griffin, safety performance is formed from Safety Compliance and Safety Participation[7]. Safety compliance is safety performance carried out by employees in maintaining safety, while safety participation is employee behaviour to participate in safety activities or safety behaviour.

PT. Masmindo Dwi Area (PT.MDA) is the only company holding a 7th Generation of Work Contract which engaged in gold mining with its working area in Latimojong District, Luwu Regency, South Sulawesi Province with area of 14,390 hectares square. The majority of PT MDA employees work on fields where the risk of accidents is very high due to the use of many heavy equipment, high-risk work locations (mountains and adjacent to ravines), several drilling activities that requires precision in carrying out the work and unsafe environmental conditions.

The results of previous observations by the author, there were still several work locations with unsafe conditions which pose risk of work accidents and even fatality. Likewise, the safety performance of workers was still low which could be seen from the poor compliance of workers in implementing company OHS-related rules and SOPs and also the lack of safety participation in reminding or reprimanding working colleagues who did not comply to safety.

Safety management practices are practices, roles and management functions designed by companies to improve employee safety, which consists of 6 dimensions, namely management commitment related to safety, safety training, employee involvement in solving safety problems, safety communication, safety regulations and procedures and safety promotion policies. Vinodkumar and Bhasi found that safety management practices had an effect on safety performance, through safety knowledge[8]. Based on the explanations above, this research aimed to determine the effect of safety management practices through safety knowledge as an intervening variable towards safety performance on workers of PT. Masmindo Dwi Area.

Materials and Method

This research was conducted at the Awak Mas Site, the Contract of Work area of PT. Masmindo Dwi Area

(MDA), Luwu Regency. The type of this research was observational using a cross-sectional study design.

The population was all workers at Awak Mas site of PT. Masmindo Dwi Area. 72 people from several departments were then selected as samples by using proportional stratified random sampling who already stated their willingness to participate in this study by signing the informed consent that had been issued by the Ethics Committee of the Hasanuddin University Faculty of Public Health.

Data collection was carried out by researchers. Safety management practice data including management commitment, safety training, worker involvement in safety, safety communication and feedback, safety rules and procedures, safety promotion policies, safety knowledge and safety performance were measured by interview using a questionnaire.

Individual factor data and frequency distribution were processed using SPSS 21 for windows. To assess the effect of safety management practices towards safety performance, a multivariate "path analysis" was conducted using the smartPLS application.

Result

Table 1. Characteristics of Workers at PT. Masmindo Dwi Area

Variables	Frequency	Percent
	(n)	(%)
Department		
Department of Geology	12	16.7
Department of MSE	3	4.2
Department of FA	1	1.4
Department of FM	4	5.6
Department of GA/ Logistic	9	12.5
Department of HR	1	1.4
Department of EA	2	2.8
PT. MPM	5	6.9
CV. Alonzo	2	2.8
PT. Indodrill	7	9.7
PT .Tigenco	10	13.9
PT. Petrosea	2	2.8
PT. Golder Associates	3	4.2
PT. Puma Jaya Utama	11	15.3
Age Group		
Young <25 Years	10	13.9

Cont... **Table 1. Characteristics of Workers at PT. Masmindo Dwi Area**

Old ≥25 Years	62	86.1
Sex		
Male	66	91.7
Female	6	8.3
Work Period		
New (<1Years)	29	40.3
Old (≥1 Years)	43	59.7
Latest Education		
High School	39	54.2
Varsity	33	45.8
Health Status		
Fit to Work	39	54.2
Fit with Note	33	45.8
Management Commitment		
Poor	7	9.7
Good	65	90.3
Safety Training		
Poor	8	11.1
Good	64	88.9
Involvement of Worker		
Poor	2	2.8
Good	70	97.2
Safety Communication		
Poor	14	19.4
Good	58	80.6
Safety Regulations and Procedures		
Poor	23	31.9
Good	49	68.1
Safety Promotion Policies		
Poor	34	47.2

Cont... **Table 1. Characteristics of Workers at PT. Masmindo Dwi Area**

Good	38	52.8
Safety Management Practice		
Poor	13	18.1
Good	59	81.9
Safety Knowledge		
Poor	14	19.4
Good	58	80.6
Safety Performance		
Poor	16	22.2
Good	56	77.8

Table 1 shows the distribution of respondents based on departments at PT. Masmindo Dwi Area. The most respondent came from Department of Geology with 12 people (16.7%). Then the most age group was in the old age (≥25 years), 62 people (86.1%), the most sex was male, 66 people (91.7%), the most work period was the oldone (≥ 1years), 43 people (59.7%). Then, based on the latest education, the most recent education was high school, 39 people (54.2%) and based on the health status category, the most respondents were in fit to work health status category, 39 people (54.2%).

Meanwhile, based on safety management practice indicators, management commitment variable was rated the most in good category by 65 respondents (90.3%), safety training was rated the most in good category by 64 respondents (88.9%), worker involvement was rated the most in good category by 70 respondents (97.2%), safety communication was rated the most in good category by 58 respondents (80.6%), safety rules and procedures were rated the most in good category by 49 respondents (68.1%), and safety promotion policies was rated the most in the good category by 38 respondents (52.8%).

The overall safety management practices were assessed by respondents to be in good category by 59 people (81.9%), safety knowledge was rated the most in good category by 58 people (80.6%) and safety performance was rated the most in good category by 56 people (77.8%).

Tabel 2. Correlation of Safety Management Practices Through Safety Knowledge Towards Safety Performance on workers at PT. Masmindo Dwi Area

Variables	Safety Performance				Total	
	Poor		Good			
	n	%	n	%	n	%
Safety Management Practice						
Poor	11	84.6	2	15.4	13	100
Good	5	8.5	54	91.5	59	100
Safety Knowledge						
Poor	10	71.4	4	28.6	14	100
Good	6	10.3	52	89.7	58	100

Table 2 shows that out of 72 respondents, there were more workers who rated safety management practices in good category with good safety performance, 54 people (91.5%) compared to workers who rated safety management practices in poor category with poor safety performance, 11 people (84.6%). Furthermore, workers who have more safety knowledge tend to portrays good safety performance, 52 people (89.7%) compared to workers with poor safety knowledge who also tend to have poor safety performance, 10 people (71.4%).

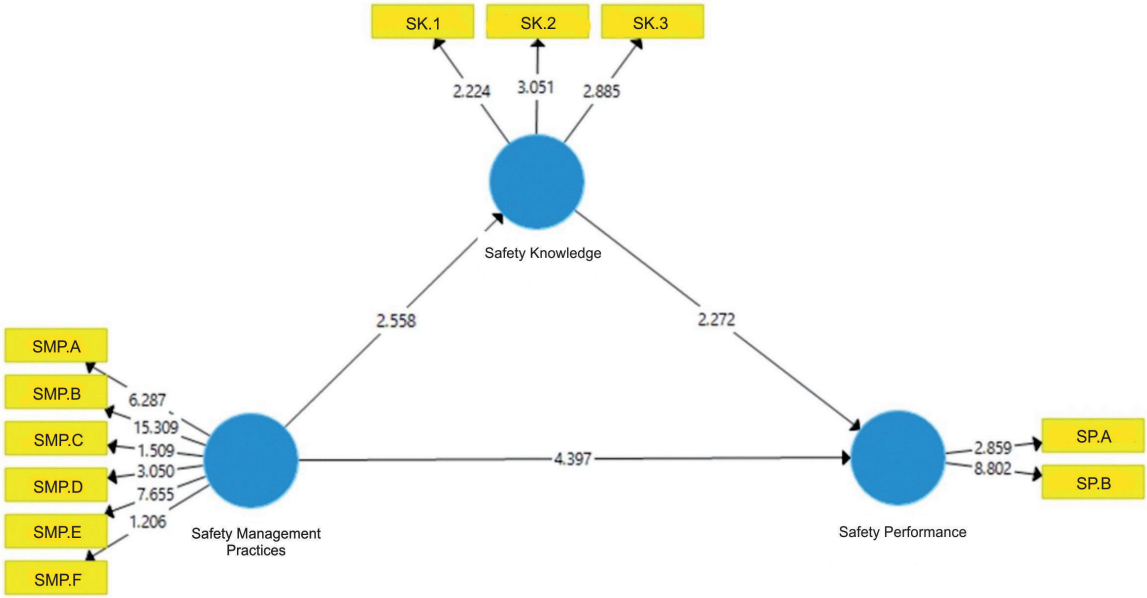

Figure 1 The Effect of Safety Management Practices Toward Safety Knowledge

Figure 1 shows the research result model using path analysis. The analysis found that the effect of safety management practices towards safety knowledge has a value of p = 0.011 with an estimated contribution of 2.558, safety knowledge towards safety performance has a value of p = 0.000 with an estimated contribution of 4.397 and safety management practices towards safety performance has a value of p = 0.024 with an estimated contribution of 2.272. Then the results of simultaneous analysis of the safety management practices towards safety performance through safety knowledge have a value of p = 0.001 with an estimated contribution of 3.194.

Discussion

Work accidents generally can occur due to 2 main things, namely unsafe working conditions and unsafe behaviour. Safety Performance or safety behaviour can refer to safety related behaviour. In the occupational safety model at workplace by Christian et al. shows that safety performance antecedents are classified into individual factors and situational factors that are mediated by safety knowledge and safety motivation[9]. Situational factors are related to safety climate and safety leadership[10,11]

The results explained before were in line with the statements of Vinodkumar and Bhasi who found that safety management practices had influence on safety performance[8]. Apart from being in line with the theory put forward by Vinodkumar & Bhasi, the results of this study were also in line with research by Froko et al. which found that there was a positive correlation between safety climate and safety performance that could predict compliance and safety participation[12]. Safety management practices had direct significant influence towards safety performance through its six indicators consisting of management commitment, safety training, worker involvement in solving safety problems, safety communication and feedback, safety rules and procedures, and safety promotion policies. Based on the results, most workers assessed that safety

management practices and safety performance were classified as good. This meant that management had maximized the implementation of safety management practices in order to improve worker safety performance so that work accidents could be avoided. However, even though it was dominated by workers with good safety performance, management also needs to pay attention to workers who had not been able to behave safely by assessing aspects of safety management practices which still could be improved.

Based on the observations result, the safety management practices at PT. Masmindo Dwi Area had been demonstrated properly based on safety management practice indicators. Management commitment indicators were shown through the application of the mining safety management system and the making of mining safety policies. Syamtinningrum suggests that OHS management in terms of commitment had a significant influence on unsafe behavior[13]. Safety training indicators were manifested through routine training for workers including refresher training. According to Saputra, workers who received training have a greater tendency to act and behave safely while working. Involvement of workers in safety at PT. MDA was demonstrated through the establishment of the Mining Safety Committee which was formed as a safety discussion forum for all workers through representatives of each department[14]. Safety communication and feedback at PT. MDA was demonstrated through the safety induction program, safety talk, pre shift meetings, and other safety programs. Geller states that one of the factors in behaviour that affects compliance in the safety triad theory is communication[15]. Based on this theory, it can be concluded that communication has an influence on the obedient behaviour of workers in the aspect of safety performance. Then the safety rules and procedures indicator were shown through making safety rules such as camp rules, standard operating procedures, working instructions, etc. However, even though management had maxed out the rules, there were workers who violate the rules and exhibit unsafe behaviour. The last indicator, namely the safety promotion policy. At PT.MDA, this indicator considered to be quite good but not optimal. This was because the safety reward and punishment program had not been implemented properly. Whereas Vredenburgh states that safety promotion policies which related to safety incentive programs could motivate employees to prioritize safety hence their safety performance might increase[16]. Maharja also said that reward system in the workplace affects the worker's safety behaviour[17].

Besides, Vinodkumar and Bhasi state that safety management practices affect safety performance through safety knowledge[8]. This study also shows results that were in line with Novi's research and also research by Griffin and Neal which states that safety knowledge could mediate the correlation between safety climate and safety performance[18,19]. The significance in this study indicates that the good safety management practices at PT. MDA causes workers' knowledge to improve where it led to a good safety performance. Safety knowledge was strongly related by employees' knowledge of safety procedures that were applied in the company. With safety knowledge, workers would be more aware of unsafe environments. Having knowledge would tend came with the application of attitudes, and this plays an important role in reducing the rate of work accidents[19]

The results showed that the majority of workers who rated safety management practices as good, also had good safety knowledge and had good safety performance. These results could conclude that if safety management practices were maximally implemented through the indicators such as management-made commitments then socialized to workers, safety trainings that were carried out routinely, involvement of workers in safety decisions making, good safety communication, rules and regulation and safety procedures were well made and enforced and also safety promotion policies through reward and punishment programs were also maximized, hence employees would possess and develop good safety knowledge and so in vice versa. In accordance with the results of the interview, worker's knowledge about safety was in good category since PT. MDA had several OHS programs in improving safety knowledge which

was also closely related to safety management practices, namely safety training and safety communication.

Conclusion

As the result that had been presented previously, we could conclude that there was a direct and indirect effect of safety management practices towards safety performance through safety knowledge as an intervening variable. Researchers would like to suggest PT. Masmindo Dwi Area to increase and maintain workers to actively participate in the safety programs, management was also expected to increase the socialization of all programs related to safety management practices and to improve the quantity and quality of safety training for new workers as well as the refresher training.

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Ethical Clearance: Health Research Ethics Committee, Faculty of Public Health, Universitas Hasanuddin

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