



The Effect of Employee, Management, Working Environment, and Safety Culture on Occupational Health and Safety Performance: A Case Study in an Oil and Gas Company in Indonesia

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Abstract: The level of workplace accidents, particularly in large companies such as the oil and gas industry, is crucial to be overcome. Encouragement of occupational health and safety (OHS) is one priority of strategies that must be carried out in the implementation of work in the workplace. This study aims to determine the impact of employee, management, work environment, and safety culture on occupational health and safety (OHS) performance. This paper also discusses the influence of moderating safety culture on the independent variables towards the achievement of safety performance. Using questionnaires to 220 respondents, findings indicate that the safety performance is significantly affected by employee, management, working environment, and safety culture. There are 19 attributes of 4 variables evaluated. All attributes have significantly influenced the OHS performance but 4 attributes of management variables. They are pre and post task safety review, safety work procedure, incident investigation, and detection and monitoring. The research provides the empirical evidence on the significance of Safety Culture as moderator. The safety culture moderates the positive relationship between management and OHS performance as well as working environment and OHS performance. Conversely, safety culture does not influence the positive relationship between employee and the OHS.

Keywords: Employee, Management, Working environment, Safety culture, Safety performance.

1. Introduction

Safety management systems are always used as a guideline by a company in carrying out its operations to achieve performance with reliable operations. Although work safety standards with a variety of good programs are already implemented, still work accidents are occurred [1]. It is found several cases generating accidents that lead to either workers injured or work stopped such as the occurrence of arc flash during the maintenance of electrical transformers, and cases of death against workers who were working in the operating area. [2] stated that safety at work is a complex circumstances in which the subject of safety performance across the industries is difficult and challenging to achieve due to lots of measures needed as well as policies to be implemented. Even though it is complex and difficult,

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improving the health and safety of the workplace give business benefits to the organizations. Reducing process interruption, occupational accidents, and employee sickness can increase productivity and reduce the cost of final product [3]. Organizations believe that occupational health and safety (OHS) is not only prevents people from being harmed or made ill through work, yet it is also a crucial part of being success [4]. A good implementation of an OHS will lead to brand value, investor confidence, maximise workers productivity, lower costs of accidents and illness, and worker motivation and commitment to the business.

A large organizations such as oil and gas industry will be treated differently related to OHS principles. They are required to apply higher standards of corporate governance and even greater transparency in reporting practices [4]. In 2016, there are 249,770 large enterprises in Indonesia. According to [5], the indicators of safety provided are to protect workers from occupational injuries, diseases, and death that are formulated into policies and programs. They are indicators of outcome, capacity and capability, and activities. The latest ILO data estimated more than 1.8 million work-related deaths occur annually in ASIA and the Pacific region. About 2/3 of global work-related mortality occurs in ASIA [6]. In 2013, ILO reported that one worker in the world dies every 15 seconds because of occupational accidents and 160 workers suffered work-related illness [7]. OSH status report Indonesia [8] explained that there were many incidents of occupational hazards affecting workers in Indonesia during 2011. Work injuries and illnesses continue to occur and the number of workplace accidents in Indonesia is quite high, even though several programs have been promoted such as the safety encouragement by government with banner campaigns and a National Occupational Safety and Health Month, and the workplace injuries and illnesses recorded in the media.

In Singapore, the current data provided by Ministry of Manpower informed that the amount of workplace injuries, dangerous occurrences and occupational diseases has been lower to 12, 498 cases in 2017 compared to 13, 041 cases in 2016 [9]. Particularly workplace injuries, the overview of the 2017 are as follows: 42 workers were fatally injured; 574 workers sustained workplace major injuries; 11, 882 workers sustained less severe injuries; 544, 687 man-days were lost; 1.6 incidents occurred for every million man-hours worked. The greater number of workplace fatal injuries occur in construction and manufacturing. While other industries including oil and gas industry is 19%. According to Jamsostek (Social Security Institutions) annual report 2011 in Indonesia, it is found 99,491 workplace accidents in 2011 that has increased 780 cases from previous year. In Indonesia, the contribution rates of an employee depend on the company's industrial risk classification. The Indonesian BPJS Ketenagakerjaan (the new form of Jamsostek), ILO and the Ministry of Manpower and Transmigration have carried out an agreement related to financial sustainability. They have formulated the contribution rates into 5 categories. Mining and Airlines are part of category V with the highest contribution rates of 1.74% [9]. It is known widely that occupational injuries extremely influence an individual's social and financial conditions, and the economy as a whole due to the loss of experienced workers. Therefore, the implementation of an employment injury system is profitable to all stakeholders as it is expected to ultimately decrease the cost of production and the price of goods and services.

A research examines the effect of cultural factors on the safety performance of global oil and gas industry because it is a high risk sector and substantial losses in case of accidents [10]. According to [11], this sector reported the highest average value of insurance claim over 2009-2013 accident years at about €20.8 million per claim, followed by aviation for which average claim value was €5.27million. Another study revealed that there is essential safety hazards in the operations of the oil, gas, and related energy industries that lead danger to life, property, and the environment if they are not supervised properly [12]. On the OHS skills report in 2016 by ILO [13], some oil and gas production operating in the Northern Hemisphere has resulted in serious accidents. Due to the accidents caused by oil spill in Arctic seas, for example, have directly affected economics costs and damage to reputation. Safety performance monitoring becomes an important program to conduct particularly in high-risk offshore oil and gas operations as it is a main contributor to the economy in Malaysia [14].

Indonesia has historically been started in the oil and gas sector since 130 years ago after its first discovery in North Sumatra in 1885. Indonesia, with reserves of 102 Trillion Cubic Feet (TCF) in 2016, is in the top 20 of the world's oil producers as well as in ranked 10th related to global gas production, [15]. Playing a critical role to the economic of Indonesia, it must be assured for workers that they work in a safe environment and prevent them from a work injury or illness as it is their fundamental right.

On the other hand, occupational injuries and accidents occur caused by many indicators such as lack of communication [16, 17], wearing personal protective equipment [18], self-assessment of human performance [19], 2002, fit for duty [20], employee's involvement into safety [21, 22] Workplace accidents are influenced by lack of knowledge, training, supervision, and adherence to the implementation of occupational safety and health regulations, as well as human error that can trigger ignorance, lack of accuracy in workers, and lack of monitoring and control of workers [23].

The accident data given as well as the adverse occurred clearly recommend that workplace safety is critical issue of further research. Based on the variables identification from safety literatures above, this paper address the research gap by evaluating the effect of employee, management, work environment, and safety culture on the occupational health and safety (OHS) performance. The safety culture becomes a moderating function to specify the relationship of employee, management, and working environment towards the OHS performance. We proposed that it can moderate these relationship due to the following reasons: first, improved safety behavior can reduce the frequency of work-

related accidents and injuries, and safety behavior is often associated with performance quality [24]. Second, the recent empirical study has presented that management must be proactive in demonstrating its commitment in OHS. The importance of management's commitment to safety is to influence safety performance in the workplace [25]. Safety culture can affect employee commitment, behavior and actions towards reducing accident rates and increasing the success of OHS. Third, [2] confirmed that safety culture has a direct and positive effect on working environment variable toward occupational health and safety performance. Fourth, safety culture and safety performance show a significant relationship. As an intermediary variable, Job satisfaction has a partial intermediary role in the relationship between safety culture and safety performance. These results point out that human factor has the most important role in the prevention of occupational accidents. Thus, companies and employees should create and distribute safety culture in their organizations [26]. Fifth, it is revealed a significant positive relationship (0.60) between safety climate and safety performance in retrofitting works [27].

Therefore, in this study we also investigate the moderating influence of safety culture on relationship between employee, management, working environment, and the OHS performance. Hence, the objectives of this study are: (1) to examine the influence of employee, management, working environment, and safety culture on the occupational health and safety (OHS) performance, and (2) to evaluate the moderating role of safety culture on the relationships.

2. Materials and Methods

2.1 Occupational Health and Safety Performance

Occupational injury (or safety) and occupational illness (or health) are frequently discussed together which is called as discussion of occupational health and safety (OHS). However, both occupational injury and illness are different [28]. Occupational injury (or safety) describes an unintentional or intentional critical exposure to energy (chemical, kinetic, electrical, thermal, and radiation) caused by a particular event, incident, or series of events within a single workday or shift. It is classified into several common occupational injuries: cuts and lacerations, burns, strains and sprains, bruises and contusions, fractured bones, and dislocated joints. Meanwhile, occupational illnesses are any uncommon situation or disorder caused by exposure to factors associated with employment. It includes acute and chronic illness or disease that may be caused by ingestion, inhalation, absorption, or direct contact.

Weather and malfunction equipment have greater contribution to the cause of world offshore accidents [13]. The workers not only participated in the operation and maintenance of oil and gas equipment, but also the service activities additional to the operations. Moreover, the workplace connected to toxic substance or immoderate noise is required to conduct systematic hygiene supervision to control the workers' exposure to noise and chemical. Thus, it needs an intervention from management into human in order to achieve a safety behavior. According to [2], the success of occupational safety and health performance was strongly influenced by management practice and leadership behavior. This study refers to [2] as a basic conceptual model shown in Fig. 1 below.

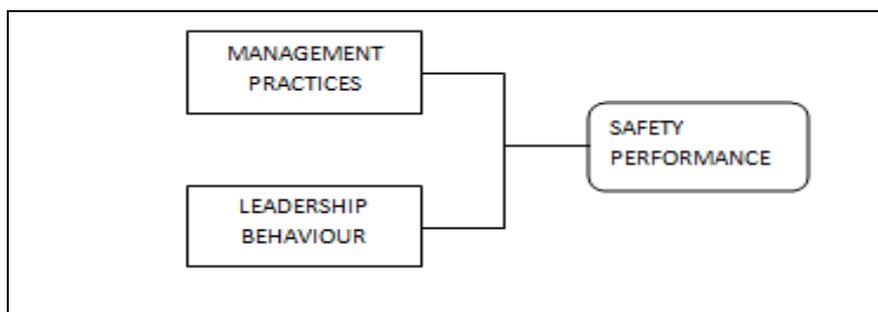


Fig. 1 – Conceptual Model of Occupational Health and Safety

The second basic conceptual model used is the Cheese Swiss Model consisting of several safety layers, namely engineering safety layer, safety layer administration, and individual safety layer. If each safety layer can work according to its function, an accident will not occur. Vice versa, an accident can occur if each safety layer does not run its function properly. This can be seen from the block diagram in Fig. 2.

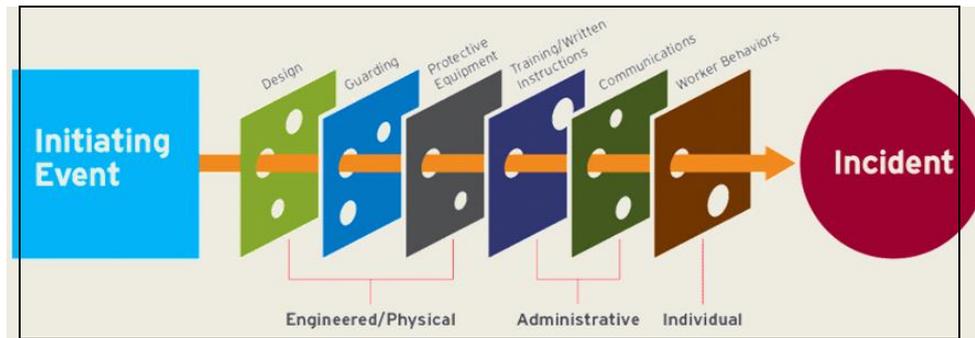


Fig. 2 – Cheese Swiss Model Adaptep from Reason

According to the block diagram above, there are several steps must be completed first when an employee initiate a work, so that the accident will not occur. Regarding the engineering or physical section, it is required to check that the design, guard, and protective equipment are provided as well as their proper function. Likewise, the SOP (Standard Operating Procedure) and a good communication will support an employee to accomplish a work properly. The last, in order to avoid an accident, employee behaviour play an important role that he or she must obey the regulations given, e.g. wear the personal protective equipment. Employee motivation and performance improvement by means of behavior constraints are linked to the behavioral factor [2]. It more focuses on effort of behavior instead of the results. The behavior of safety will reduce the risk behavior which leads to decreasing the accident and injuries.

Furthermore, those 2 basic conceptual models are adopted to define there 3 main independent variables: employee, management, and working environment. We assign another variable, safety culture, as moderator variable of relationship between the independent variables (employee, management, and working environment) and dependent variable (OHS performance) in order to determine the effect of safety culture implementation on the independent variables to the success performance of OHS. Then these variables are reflected by several attributes variables as in the following Table 1 as well as the conceptual model is shown in Fig. 3.

2.2 Employee

According to Cheese Swiss Model, employee or individual means worker behaviors that leads to incidents. As dynamic person who is likely to change, diverse approaches have been applied in reducing unsafe behavior in the workplace such as penalties, supervision, codes and procedurs to follow, guidance, and training. The safety is determined by situated actions of human beings who is a critical resources for safety [13]. In [27], it is validated safety performance by two (2) factors namely safety climate and safety behavior, then both of them have become significant contributors in evaluating the organizational safety performance. In order to bring safety at work, it is required a strong commitment and the involvement of the individual employee to future prevention strategies and activities [40]. Thus, the following hypothesis was developed:

H1: The application of employee has a direct and positive effect on the success of occupational health and safety performance.

2.3 Management

There are 2 activities within management: training or written instructions, and communication. It has been proved that there is a significant effect on unit-level climate and perception of colleagues's safety knowledge and behavior toward safety performance [41]. From social exchange perspective, unit leaders and top managers (i.e., with positive safety climate) would perform their dedication toward safety and pay attention on employees if they value the priority of safety. Then employees would act in a safe behavior for an implied responsibility. The study has also discovered that perceptions about other's believe and observation of other's behavior influences employee's safety behavior. In the work setting, safety knowledge/behavior of a colleague would be a guidance for them. Mostly workers would do so in the same manner if they believe their partners are working safely. Education and training can minimize the number of occupational accidents [42]. The training comprises 4 components: material consisting OSH basic theory in the construction industry; toll/equipment to learn the skill as well as maximizing the utilization of the environment; learning/training method using Competency Based Learning, Cooperative Learning, and Contextual Learning; learning/training evaluation in the form of portfolio. These findings has suggested that by providing a good training and development activities around health and safety as well as building a proper communication, an employee will improve his/her commitment towards attitude to health and safety, and increase the engangement as well [40]. Therefore, another hypothesis is proposed:

H2: The application of management has a direct positive effect on the success of occupational health and safety performance.

Table 1 – Variables and Indicators Influence the Occupational Health and Safety Performance

Variable	Attribute	Explanation
Employee (individual)	<i>Personal Protective Equipment (PPE)</i>	Lack of awareness and dislike of employee wearing personal protective equipment is a major problem causing accidents [18].
	<i>Fit for duty (FFD)</i>	Fit for duty is the ability of an employee to do a work safely and is competent doing his work [20].
	<i>Human performance</i>	Human Performance Engineering (HFE) is a knowledge focusing on improving human performance and reducing errors caused by humans in such a complex system [19].
	<i>Communication</i>	Communication is an important factor in work safety in order to maintain the safety of employees [16].
	<i>Cooperation facilitation</i>	Cooperation between facilities in an organization can be used to prevent an accident [17].
Management (administration)	<i>Pre and post task safety review</i>	Pre-startup safety reviews are needed for new and modified facilities where the modification is very significant [29].
	<i>Safety work procedure</i>	A Safe Operating Procedure (SOP) is the direction of an organization setting the standard action [30].
	<i>Hiring for safety training</i>	Explained that 80% to 96% of all workplace accidents were caused by human error. The process of hiring workers is an initial assessment of prospective workers. Workers with good occupational health and safety knowledge will produce employees with good levels of adherence [31].
	<i>Incident investigation</i>	Accident investigations are determining the facts of an accident by investigating, observing, examining and analyzing facts to obtain the cause of the accident, and deciding the actions to prevent the incident to be occurred again in the future. TBCS: Treasury Board of Canada Secretariat [32].
	<i>Detection and monitoring</i>	When quality and cost are relatively good, the continuously measurement and monitoring of occupational safety and health can be a problem if they are not followed by an audit or detection and monitoring process. This will possibly lead to failure [33].
Working Environment (engineering)	<i>Safe task assignment</i>	General Mental Ability (GMA) may be one of the most important, especially for performing complex tasks. Therefore, there must be a special program which the employees are delivered specific knowledge of the work to be carried out [34].
	<i>Safety in design</i>	Rate of accidents were strongly related to the role of the workplace or working environment [35].
	<i>Housekeeping</i>	The main element in workplace management practices is the provision of an environment in which work is completed without causing harm to others. With a lot of activities during the work, workers tend to neglect things related to housekeeping [36].
	<i>Occupational Health and Safety-Industrial Hygiene</i>	Human resources are the most critical variable in the company as well as in the implementation of the production process. Therefore, the company must pay attention on the sustainability of OHS [37].
	<i>Environmental monitoring</i>	Development has a significant impact on the environment. This inspires awareness of the importance of regulations arrangement in environmental management [38].

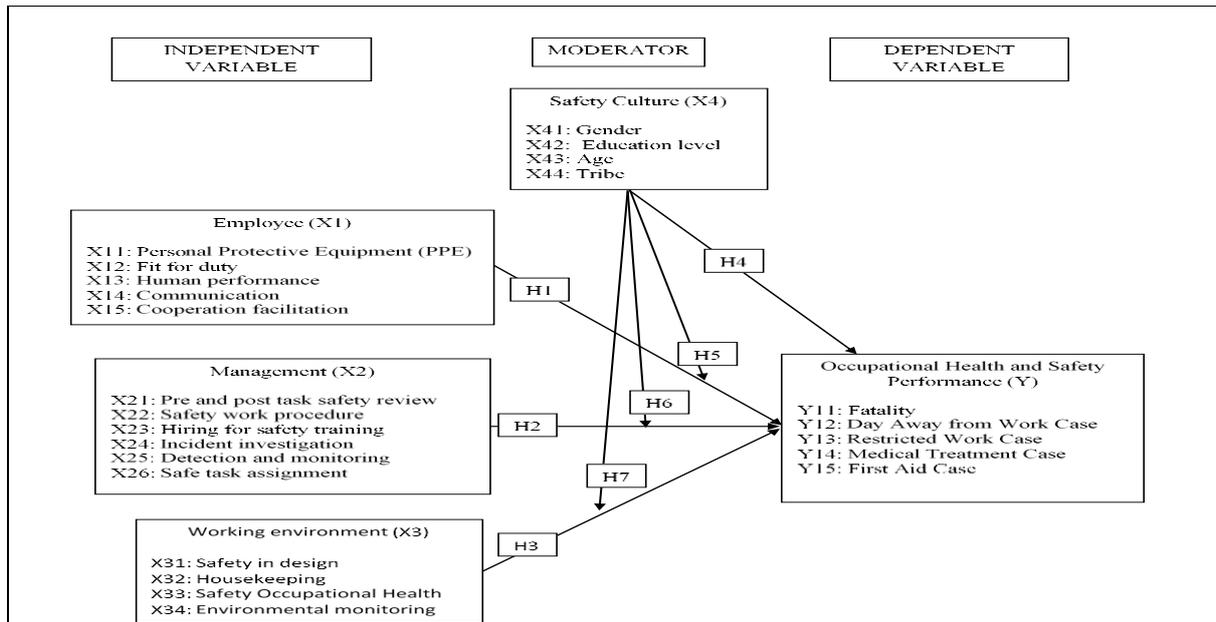


Fig. 3 – Conceptual Model

2.4 Working Environment

The working environment in a company, especially in the oil and gas industry is a very important factor to be considered by management. Although it does not carry out the production process, the working environment has a direct influence on the employees who conducts the production process. The working environment can be interpreted as a climate where employees perform work activities every day. According to Cheese Swiss Model, the engineering or so called working environment consist of design, guarding, and protective equipment. As we stated in the previous section that weather and malfunction equipments have greater contribution to the cause of world offshore accidents [13], it is prior to design a health and safety workplace supporting by the protective equipments for all workers. In order to support an organization's ability to operate safely in any situations and to deal effectively with any contingencies, standardized process for oil and gas industry are designed [13]. Safety climate and organizational factors (e.g., supervision, leadership, training, and work design) are the antecedents of working environment to reach safety performance [28]. Hence, the following hypothesis is made:

H3: The application of working environment has a direct positive effect on the success of occupational health and safety performance.

2.5 Safety Culture

Knowledge and skills are necessary for safety behaviors to specify the behaviors and by the motivation of people to exactly apply the behaviors. The safety climate plays role as an antecedent of organizational to individual safety behavior [28]. Behavior-based safety is an approach to increase a safety initiative led to total safety culture [40]. Therefore, organizations must provide a positive safety climate in order to create a safety knowledge and motivation as part of safety behavior. Since the safety behavior is connected with the knowledge and skill of an individual, we argue that age, education level, gender, and tribe will influence an employee's initiatives to the safety culture or climate. At the individual stage, employees bring a diversity of experiences, attitudes, and character to their work roles. These individual indicators may also affect knowledge, skill, behavior, and motivation at work.

According to [43], based on the literature review identified various abilities that decline with age, including physical, perceptual, cognitive, and psychomotor abilities. Age sometimes becomes something that can have a positive or negative impact on the achievement of occupational health and safety performance. The education level will improve good behavior for workers in carrying out activities in their workplace. [44] reported that education and training of workers will affect their behavior in carrying out their work, and good and right worker behavior can reduce the level of workplace accidents as well as improve occupational safety and health performance. Gender is recognized as potential to be a functional variable for market segmentation because it meets the criteria for segmentation. [45, 46] say gender is one of the most common problems in research. Ethnic diversity can bring wider access to information networks, social and cultural, which in turn stimulates creativity, innovativity, and problem-solving abilities within the organization [47]. This makes collaboration between groups more likely to increase with creativity, innovativity and ease of ability to solve problems when doing work. Based on these findings, in terms of safety culture effect, we finally

hypothesized below:H4: The application on safety culture has a direct and positive effect on the occupational health and safety performance.

H5: The positive relationship between employee and occupational health and safety performance will be stronger when consideration of safety culture is high.

H6: The positive relationship between management and occupational health and safety performance will be stronger when consideration of safety culture is high.

H7: The positive relationship between working environment and occupational health and safety performance will be stronger when consideration of safety culture is high.

2.6 Methods

This study is undertaken at an oil and gas industry operating in east of Indonesia, namely PT ABC. The survey is conducted by spreading questionnaires to 220 respondents covering 9 departments: Operation, Maintenance Team, Food and Recreation, Facility Maintenance, Fire and Emergency Response Team, Marine, Warehouse, Construction, and Laboratory. The questionnaires consist of 2 sections, the first of 6 questions intends to get the respondent's demographics and occupations, and the second focuses on the importance of the factors affecting the occupational health and safety performance. Regarding the second questionnaire, there are 24 questions with 5 on employee, 6 on management, 4 on working environment, 4 on safety culture, and 5 on OHS performance. Likert scale is applied to obtain the importance of these factors in influencing OHS performance. The scale used is between 1 to 5: (1) strongly disagrees, (2) disagree, (3) neutral, (4) agree, and (5) strongly agree. In order to identify the possible variables that have an impact on OHS performance, it is referred to safety literatures discussing the safety performance.

The research methodology employed was quantitative research method to test the conceptual model that is seen in Figure 2. SPSS version 22 is utilized to analyze and calculate the data using several tests: reliability test, validity test, factor analysis, data verification and validation, correlation test, Kaiser-Meyer-Olkin (KMO) and Barlett test, classical assumption test (data normality test, multicollinearity test and test heterocedasticity), regression test. Regression test is used to investigate the relationship between variables as well as the mediator effect on the relationship between dependent and independent variables. These variables are also the constraints that this study focuses on.

3. Results and Discussion

There are 9 departments involved in this research consisted of 5 positions: team manager, team leader, group leader, specialist, and facility representative member. Most of respondents are male with 216 of 220. Less than 20 are 50 years old and more, while the youngest is 19 years old. Among them, almost 100 respondents ranged between 30 to 39 years old. High school of the education level is up to 65% followed by 34% undergraduate, 7.3% diploma, 5.9% junior high school, 4.1% elementary school, and 3.6% postgraduate. Due to vary tribes living in Indonesia, there are more than 12 tribes found such as Javanese, Bataknese, Padangnese, and Sundanese. Bugis has become the majority respondents' tribe.

3.1 Multiple Regression Test

This test is to predict the relationship between independent constructs or independent variables (employees, management and environment) to the dependent variable (occupational health and safety performance). Utilizing the significance value of <0.05, it has been proved that the relationship between independent variables and dependent variables has a significant effect.

Table 2 – Multiple Regression Test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig
		B	Std. Error	Beta		
1	(Constant)	-18.272	2.014		-9.073	.000
	Employee	.766	.074	.426	10.306	.000
	Management	.375	.049	.314	7.655	.000
	Working Environment	.859	.065	.541	13.203	.000
	Safety Culture	.179	.054	.138	3.340	.001

It is obtained a regression formula, $Y = -18.272 + 0.766 X_1 + 0.375 X_2 + 0.859X_3+ 0.179X_4$. Working environment has the highest coefficient 0.859 followed by employee. Safety culture is the least contributor to the OHS performance. If working environment variable increases by 1 unit while other variables remain, then the performance of occupational health and safety increases 0.859 points. According to Chesse Swiss Model, engineering or working

environment is the first step must be prepared in order to avoid accidents. Supported by the framework of conceptualizing safety climate and safety behavior [43], organizational factors such as work design and supervision is work environment predecessor to the safety performance. Employee who is related to working behavior based on Chesse Swiss Model, is also the individual antecedents of safety that must be considered together with work environment antecedents in order to achieve the safety performance. These results can be true in terms of safety climate and safety behavior framework.

Each indicator effect to the OHS performance is seen in Table 4 below. Utilizing the significance <0.05 , the indicators affecting OHS performance are: PPE (X1), Fit for duty (X2), occupational health safety (X3), Communication (X4), Hiring for safety Safety training (X8), Safe task assessment (X11), Safety in design (X12), Human performance (X13), Communication (X14), Cooperation facilitation (X15), Gender (X16), Education level (X17), Age (X18) and Tribe (X19).

Table 3 – Indicator Influence toward OHS Performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-19.318	2.030		-9.518	.000
	X1	.783	.258	.152	3.036	.003
	X2	.841	.224	.190	3.756	.000
	X3	.959	.228	.205	4.209	.000
	X4	1.003	.253	.197	3.961	.000
	X5	.469	.234	.096	2.008	.046
	X6	.266	.233	.058	1.145	.253
	X7	.438	.238	.090	1.845	.067
	X8	.629	.250	.132	2.517	.013
	X9	.279	.270	.050	1.032	.303
	X10	.248	.249	.051	.994	.321
	X11	.476	.221	.099	2.152	.033
	X12	.507	.225	.108	2.252	.025
	X13	.804	.286	.144	2.815	.005
	X14	.786	.274	.140	2.865	.005
	X15	1.214	.276	.214	4.401	.000
	X16	-19.318	2.030		-9.518	.000
	X17	.783	.258	.152	3.036	.003
	X18	.841	.224	.190	3.756	.000
	X19	.959	.228	.205	4.209	.000

Each indicator effect to the OHS performance is seen in Table 3 above. Utilizing the significance <0.05 , the indicators affecting OHS performance are: PPE (X1), Fit for duty (X2), occupational health safety (X3), Communication (X4), Hiring for safety Safety training (X8), Safe task assessment (X11), Safety in design (X12), Human performance (X13), Communication (X14), Cooperation facilitation (X15), Gender (X16), Education level (X17), Age (X18) and Tribe (X19).

3.2 Moderation

Regression test is to specify the effect of the independent variables with the dependent variable, still there will be differences if in the relationship a moderating factor is added. The moderating factor in its relationship can influence the relationship to be stronger or even weaken the influence of the correlation between the independent variable and the dependent variable.

- H5: The positive relationship between employee and occupational health and safety performance will be stronger when consideration of safety culture is high.

According to Table 4 below, it is found that safety culture moderation has no effect on employee and OHS performance with the significance value generated by 0.072. The Absolute Value Difference (SNM-1) does not affect the OHS performance either with the significance value of 0.062. Thus, safety culture does not affect the positive relationship between employee and OHS performance. Coefficient is negative means that the higher the value of safety culture, the lower the relationship between employees and OHS performance.

Table 4 – Moderating Safety Culture toward Employee

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	20.266	.454		44.630	.000
	Z score: Employee	1.686	.291	.388	5.800	.000
	Z score: Safety Culture	.481	.266	.111	1.810	.072
	SNM1	-.682	.364	-.129	-1.873	.062

- H6: The positive relationship between management and occupational health and safety performance will be stronger when consideration of safety culture is high.

As can be seen in Table 5, the result shows the moderation of safety culture influences the OHS performance by considering the significance value of 0.005. Yet, it is found that SNM2 has no effect on management OHS performance with the significance value of 0.392. Thus, it belongs to the prediction moderation category.

Table 5 – Moderating Safety Culture toward Management

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	19.873	.450		44.191	.000
	Z score: Management	1.405	.320	.324	4.394	.000
	Z score: Safety Culture	.786	.275	.181	2.854	.005
	SNM2	-.296	.345	-.064	-.858	.392

- H7: The positive relationship between working environment and occupational health and safety performance will be stronger when consideration of safety culture is high.

Safety culture has moderated the relationship between working environment and OHS performance. It is supported by the result of significance value of 0,000 and SNM3 of 0,000. The results is provided in the following Table 6.

Table 6 – Moderating Safety Culture toward Working Environment

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.279	1.411		3.742	.000
	Z score: Safety Culture	1.740	.252	.401	6.891	.000
	SNM3	.891	.087	.598	10.271	.000

3.3 Discussions

The study examined the effect of employee, management, working environment, and safety culture on the occupational health and safety (OHS) performance. The results showed that the all variables are significantly influence OHS performance. The OHS performance is significantly influenced by employee [16-20], management [29-34], working environment [35-38], and safety culture [28, 40, 43-47]. Safety culture comprises 4 attributes: age, tribe, level of education, and gender. All of these attributes have a positive effect on OHS performance. All attribute within employee variables affected the OHS performance: PPE (X11), Fit for duty (X12), Human Performance (X13), and Communication (X14), and Cooperation Facilitation (X15). Increasing involvement and care of employees towards the duties and responsibilities in the workplace and adverse occurred will improve OHS performance [1]. Meanwhile, in mangament, only hiring for safety training (X23) and safety task assignment (X26) contributed to the OHS performance. Among 19 attributes of 4 variables, there are 3 attributes that do not significantly influence th OHS performance: pre and post task safety review (X21), safety work procedure (X22), incident investigation (X23), and detection and monitoring (X25). The remain attributes have significantly showed the positive effect on the OHS performance.

On the other hand, a good safety culture is expected to moderate employee factor so that occupational health and safety performance can be improved. Yet, the data does not provide a positive result. It is linked to the explanation before that as a dynamic person, human variable is challenging to be maintained due to the changing behavior. Therefore, this variable can be improved in accordance with applicable safety rules or Behavior-Based Safety (BBS)

approach. Management and working environment factors where both are moderated by safety culture towards improving OHS performance. Both management and working environment had a stronger influence to OHS performance when safety culture was considered consisted of age, education, tribe, and gender. For example, when the safety work procedure is followed properly, the OHS performance will increase. However, this safety work procedure is affected by gender, age, education, and tribe. A young-age worker compared to the old-age will have different obedience to the safety work procedure. We believe that Chesse Swiss Model have been proved through this study. All hypotheses proposed have been evaluated, yet it is found 1 hypothesis rejected, the positive relationship between employee and occupational health and safety performance will be stronger when consideration of safety culture is high (H5). A sequence into incidents is started from working environment and management. If the safety climate and organizational factors are well defined and designed, the employee factor of working behavior will be controlled and managed.

4. Conclusion

The study revealed that employee, management, working environment, safety culture has positively influence OHS performance. The attributes of age, tribe, level of education, and gender contribute to the achievement of OHS performance in oil and gas industry. The Key Performance Indicators (KPI) found are PPE, Fit for duty, human performance, communication, cooperation facilitation, hiring for safety training, safe task assignment, safety in design, housekeeping, OHS-industrial hygiene, environmental monitoring, gender, education level, age, and tribe. The findings suggest that the effect of management and working environment on OHS performance can be moderated by safety culture. While safety culture can not moderate the relationship between employee and OHS performance. This can be evaluated for further research. Another moderator can examined in order to obtain more information related to OHS performance as well as other independent variables and indicators considered.

4.1 Research Implication

The implications of this research are as follows: 1. Determining indicators of occupational health and safety; 2. Classifying indicators for input and output variables; 3. Calculating the value of significant relationships between variables using SPSS applications; 4. Creating target key performance indicators; 4. Searching the gap is found in the implementation of occupational health and safety rules; 5. Minimizing the gap for formulating improvements is conducted by making action items and achievement time targets called Specific, Measurable, Accountable, Relevant and Timeline (SMART) in order to reduce input and increase output as well. It also can be guided by OHSAS 18001 regarding occupational safety and health management.

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