

**Management Commitment to Safety and Safety
Training: Mediating Role of Safety Compliance for
Occupational Accidents
A Study on Oil and Gas Industry of Malaysia**

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Abstract

In high-risk hazardous organizations, workers face occupational accidents and safety challenges. The purpose of this study was to investigate the impact of management commitment to safety and safety training on occupational accidents via safety compliance in the context of the oil and gas industry of Malaysia. The sample size was calculated by employing G-Power version 3.1, and 194 responses were collected by using the convenience sampling technique and Smart-PLS was used for data analysis. Hence, based on data analysis, developed hypotheses have been accepted. In addition, this study is also helpful for managers and safety leaders to understand the importance of management commitment to safety and safety training to reduce the rate of occupational accidents. In the future, this study can be conducted with large sample size, and variables safety participation, safety behavior, and workers' involvement can be added to develop a theoretical framework.

Keywords: Safety Training, Occupational Accidents, Safety Compliance, Oil and Gas industry

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1. Introduction

The root cause of the majority of occupational accidents is a lack of safety training and management commitment to safety (Ajmal et al., 2021). However, literature investigation on occupational accidents in high-safety sensitive organizations revealed that human error simultaneously occurs for occupational accidents (Acar & Acar, 2014). In addition, researchers and academicians are continuously working to improve workplace safety and reduce risks for occupational accidents in industries where occupational accident rates are high e.g., oil and gas, construction, and manufacturing industry

Moreover, in the last three decades, research on occupational health and safety has become prominent to reduce the cost of safety by providing valuable knowledge to employees (Al-Mekhlaf et al., 2021). Several factors compel top management of companies to improve occupational health and safety performance and reduce are of occupational i.e., protection of employees, maintain workers attendance, and lower leaves from work and also lost working days (Almost & Hulle, 2019). Employees are considered the most important asset of organizations that play a

significant role in achieving organizational goals and objectives (Lingaswaran, 2019). The employee's safety training provides knowledge and skills to work safely at the workplace (Baldassarre, Mucci, & Lecca, 2020). Furthermore, companies spend a huge amount of budget on employee safety training and are equipped with safety rules and procedures (Baldassarreet al., 2020).

The literature investigation on safety training shows that numerous studies have found a positive impact of safety training on employees' safety behavior (Barakat & Hassan, 2019). Similarly, safety training is an integral part of employees' job to acquire safety instructions, skills, and knowledge of safety rules to perform job tasks safely (Blume et al., 2010). The successful plan of safety training depends on organizational commitment for safety in an organization (Christian & Bradley, 2009). When top management is committed to improving safety performance and reducing occupational accidents so, safety training programs are arranged to equip employees with safety knowledge and safety skills (Christian & Bradley, 2009). The management commitment for safety can be evident for organizations to reduce occupational accidents in various forms on the job safety training,

participation in safety programs, and job design of employees (Ajmal et al., 2020). These literature studies show the importance of safety training and management commitment to reduce occupational accidents in high-safety-sensitive organizations (Sabir & Isha, 2017). The oil and gas industry of Malaysia plays a significant role in creating employment opportunities and also supporting the economy of the country. According to the occupational health and safety department (OHSD Malaysia's oil and gas industry has serious concerns about the number of occupational accidents. This study has primarily focused on the oil and gas industry of Malaysia to investigate the impact of safety training and management commitment on occupational accidents via safety compliance.

2. Literature Review

The literature investigation shows that safety training is the best practice to provide safety knowledge and enhance employees' working skills and reduce occupational accidents (Fargnoli et al., 2019). However, in safety training, employees come to know about the working procedures and guidelines to perform their duties safely, and it helps to prevent them from

occupational injuries and workplace accidents (Flin et al., 2000).

In addition, safety training also provides clear direction to employees to adhere to safety rules and procedures at the workplace (Hair & Risher, 2019). In the past studies, it has been found that proper safety training programs have had a significant impact on reducing workplace accidents and injuries in the workplace in high-sensitive organizations (Kaynak & Toklu, 2016). Moreover, according to Bahsi and Kumar (2010), safety training is the best practice to improve safety performance because it provides an opportunity for an employee for learning behavioral skills, knowledge, and attitudes. Safety training of employees is recommended at the individual and organizational level because it provides an opportunity to prevent occupational accidents (Jafri et al., 2014). The top management of the organization is responsible for conducting safety training programs for new employees and also providing them safety mentors (Kaynak & Toklu, 2016). The literature investigation about safety management and accident investigation reports also highlighted the lack of proper implementation of safety management practices the management commitment to safety

organizations always focuses on improving safety performance and providing a risk-free environment for employees (Zulkifle & Noordiana, 2017). Training plays a vital role in equipping employees with competent skills and knowledge for job-related tasks. According to Muniandy et al. (2019) in a safety perspective, safety-related training helps to overcome the deficiencies for the occurrence of injuries. Safety training led to preventing accidents in work areas and improving the competencies of workers (Zulkifle & Noordiana, 2017).

In contingency situations, well-trained employees handle issues in a better way (Zohar, 1980). Safety in organizations demands management support for safety climate and employees training (Zin & Ismail, 2012). The previous research studies pieces of evidence show that many workplace accidents occurred due to inadequate training (Vredenburg, 2002). In the workplace, accidents occur because of a lack of skills and expertise to operate a plant (Vecchio-Sadus, 2007). It is argued that when safety training is upheld for an extended period, so, the safety of workers can be supported (Reason, et al., 1998). Safety training of employees to improve organizational safety culture has been addressed by many researchers (Lee, 2018). Practical training of employees in the

Oil & Gas industry can be the best way to improve safety culture (Memona et al., 2018). According to Rauner (2008), accidents such as falling from heights, physical injuries could be prevented by providing safety training. However, Erickson (1997) argued that safety training is an ongoing process, and orientation in the initial stage could not increase the performance of safety. Besides, previous studies (Kaynak et al., 2016) showed that organizations compel employees to attend training sessions, safety courses, and seminars to have better safety performance. Health and safety training support employees to acquire more significant skills and competencies to perform their jobs safely (Winch et al., 2008). A well-designed health and safety program for employees yield positive results more than what is desired by the company (Liu et al., 2020).

Training is the biggest challenge for organizations because it involves higher costs; the effectiveness measurement of training is also difficult for organizations (Baldwin & Ford, 1988). Employees can be trained in formal and also informal ways to enhance their overall performance. Health and safety issues create cost-increasing challenges for companies (Lee, 2018). Jafri et al. (2014) argued that when employees are well trained so, they will focus on

following safety practices and procedures in the workplace. Employees' training is most encountered in human capital development intervention to enhance job performance (Neal et al., 2000). The lack of adequate safety training and knowledge, and poor safety culture was the primary cause of poor safety performance (Baldassarre et al., 2020). Dilley (1995) argued that 85-95% of accidents are caused by a poor safety culture and also unsafe acts. Safety training put a significant impact on workers' safety commitment to improving safety culture (Saria, 2009).

According to Cohen and Colligan (1998), safety training has been used for change in safety behavior of employees and work practices to reduce illness, diseases, and injuries. These literature studies show the importance of employees' safety training from the perspective of health and safety. Several previous studies have shown the relationship between safety commitment and safety performance (Fagnoli et al., 2019). However, limited studies focused on safety communication and safety commitment (Andrei et al., 2019), to reduce workplace accidents and injuries prevention which led to reduced organizational safety costs. Besides safety commitment, most of

the studies also have been focused on management safety commitment to improving safety performance (Quist-Nelson et al., 2019). According to Guo et al. (2016), Ashour et al. (2018), Cooper and Philips (2004), and Garry (2018), management commitment plays an integral role in improving the level of employees' safety commitment. Therefore, in high safety, a sensitive organization like oil and gas employees' safety commitment is necessary to enhance safety outcomes and reduce the chances of accidents and injuries (Almost & Hulle, 2019). These types of steps contribute to reducing the expenses of health and safety issues (Saria, 2009). Researchers revealed that Safety commitment and safety communication also have a significant and positive relationship (Nordin et al., 2014). Safety improvement is a continuous process. It improves when organizations take serious initiatives (Garry, 2018). However, these initiatives include safety training and its implications of learned skills and knowledge (Saria, 2009). In the most hazardous workplace, employees face health and safety issues (Reason et al., 1998). However, these types of problems increase the employees' medical expenses for health (Jafari et al., 2014). According to Pinion et al. (2017), safety performance influences

employees' retention rate at the organization. Safety performance in an organization depends on employees' safety commitment level and engagement with co-workers (Thomas et al., 2010). In previous studies related to safety performance and employees' relationships, Ellinger et al. (2013) argued that when employees engage, they share safety information. Employees learn through formal safety training (Acar & Acar, 2014). Workers share information at the workplace when engaging in following safety rules and procedures (Thomas et al., 2010). Safety commitment behavior is the primary concern for safety performance (Ajmal et al., 2021). According to Sinha et al. (2014),

employees' positive safety commitment behavior encourages coworkers related to safety and measures and follows the rules. Therefore, organizational safety performance is indirectly the result of employees' job performance (Almost & Hulle, 2019). Previous studies of Yusof et al. (2019) and Sadus et al. (2007), organizations need to improve the measurement of the safety performance process because despite ample training for safety still face accidents and injuries problems (Saria, 2009). Numerous past studies have addressed that human error and employees' unsafe acts play an essential role to increase the number of accidents and injuries rate (Zohar, 1980).

Table 1: Research Hypotheses

Number	Statement
H1	Management commitment to safety compliance will have a positive relationship
H2	Safety training will have a positive relationship with safety compliance
H3	Safety compliance will mediate the relationship between management commitment to safety and occupational accidents
H4	Safety compliance will mediate the relationship between safety training and occupational accidents
H5	Safety compliance will have a positive relationship with occupational accidents

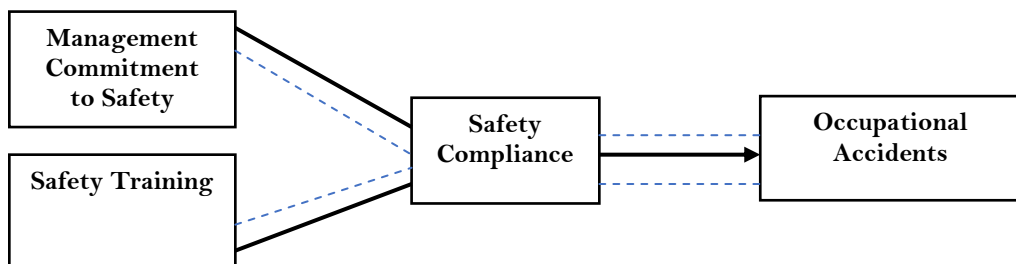


Figure 1: Theoretical Framework

3. Methodology

The cross-sectional technique was used for data collection, and this study was based on a quantitative design. In the current study, data were collected from production and operation workers from the oil and gas industry of Malaysia. However, the oil and gas industry are highly sensitive; therefore, a convenience sampling technique was used for data collection as recommended (Acar & Acar, 2014). The reason to use the convenience sampling technique was safety concerns, and data collection was challenging; therefore, the adopted technique was effective to collect data from respondents of the study (Hair & Risher, 2019). The items were adopted from (Jacinto & Aspinwall, 2004; Vinodkumar & Bhasi, 2010), and the data collection instrument was translated in Malay version and was also validated by experts. The content and face validity analysis were conducted to improve translated questionnaire (Ajmal et al., 2021). For sample size calculation G-Power version 3.1 was used and the minimum sample size was 119. For data collection contacts were made with safety leaders and questionnaires were sent along with a consent form. Moreover, 240 questionnaires were sent via email. 213 responses were received and 198 were valid for data analysis 17 were excluded because of

improper filling and the response rate was 88%. The Smart-PLS was used for data analysis (Hair et al., 2016).

3.1. Data Analysis and Results

3.1.1. Demographic Information

The demographic information shows in the table.2 that 148 (76.3%) were male respondents and 46 (23.7%) were females and the total number of respondents was 194. The majority of respondents 109 (56.2%) from the operation department and 85 (43%) were from the production department. In the survey 156 (84.4%) were having Malay origin and 24 (12.4%) were from Chinese and 14 (7.2%) were having Indian background. The association of respondents shows that 79 (40.7%) workers were with the organization from 0-5 years and 26 (13.4%) were having experience from 6-10 years and 37 (19.1%) were having experience between 11-15 years and 24 (12.4%) respondents were having experience from 16-20 years and 28 (14.4%) were having above-20 years of experience. In the current study as discussed earlier, Smart-PLS was used to perform data analysis, measurement model and structural model two-way approaches were followed. To examine the factors loading, composite reliability, Average Variance Extracted (AVE) and Cronbach's Alpha (see table 2.

Assessment model) and items of study first measurement model was assessed. In current study measurement model have four constructs and 7 items to measure safety training (ST), 5 items for management commitment to safety (MCS), 6 items for safety compliance (SC), and 5 items for occupational accidents (OA). The Cronbach's

Alpha was used to measure the internal consistency of items and values show that all items were within acceptable range safety training (.891), management commitment to safety (.886), safety compliance (.855), and occupational accidents (.786), therefore there was no issue of internal consistency.

Table 2: Demographic Characteristics

Demographic	Frequency (N = 194)	Percentage
Gender		
Male	148	76.3%
Female	46	23.7%
Department		
Operation	109	56.2%
Production	85	43.8%
Ethnicity		
Malay	156	80.4%
Chinese	24	12.4%
Indian	14	7.2%
Experience		
0-5	79	40.7%
6-10	26	13.4%
11-15	37	19.1%
16-20	24	12.4%
Above – 20	28	14.4%

The recent literature to measure the internal consistency recommends composite reliability (CR), therefore in the current study composite reliability was measured and values show that all constructs exceeded the threshold level of composite reliability 0.7 and all items of study have considerable internal consistency. The item loadings of constructs measure that item of study

is consistent with what intended to measure. However, the acceptable range of item loading is 0.7 and loading below 0.4 recommended for deletion. Therefore, item loading below 0.4 – 0.7 is recommended for deletion to increase the average variance extracted (AVE) and composite reliability. The results of the item loading of the study show that majority of items have greater than 0.7 item loading.

Table 3: Assessment of Measurement Model

Variables	Items	Loadings	Cronbach's Alpha	Composite reliability	AVE
Safety Training	ST1	.446	.891	.925	.701
	ST2	.838			
	ST3	.764			
	ST4	.818			
	ST5	.839			
	ST6	.805			
	ST7	.834			
Management Commitment to Safety	MCS1	.828	.886	.911	.600
	MCS2	.771			
	MCS3	.578			
	MCS4	.695			
	MCS5	.779			
Safety Compliance	SC1	.874	.855	.897	.638
	SC2	.645			
	SC3	.779			
	SC4	.789			
	SC5	.798			
	SC6	.875			
Occupational Accidents	OA1	.925	.786	.853	.541
	OA2	.711			
	OA3	.861			
	OA4	.934			
	OA5	.727			

The convergent validity measures the items that are measured and converging which are associated with specific items of constructs. However, the convergent validity of ascertained from the average variance extracted (AVE), which is derived from factor loading. In the current study average variance extracted (AVE) values are presented in table 2.

Assessment of measurement model. In addition, average variance extracted (AVE) values are extracted from item loading and the threshold level to be considered average variance extracted (AVE) adequate is 0.5 and above. Hence, (see table 2. Assessment model) all values of average variance extracted are within an acceptable range.

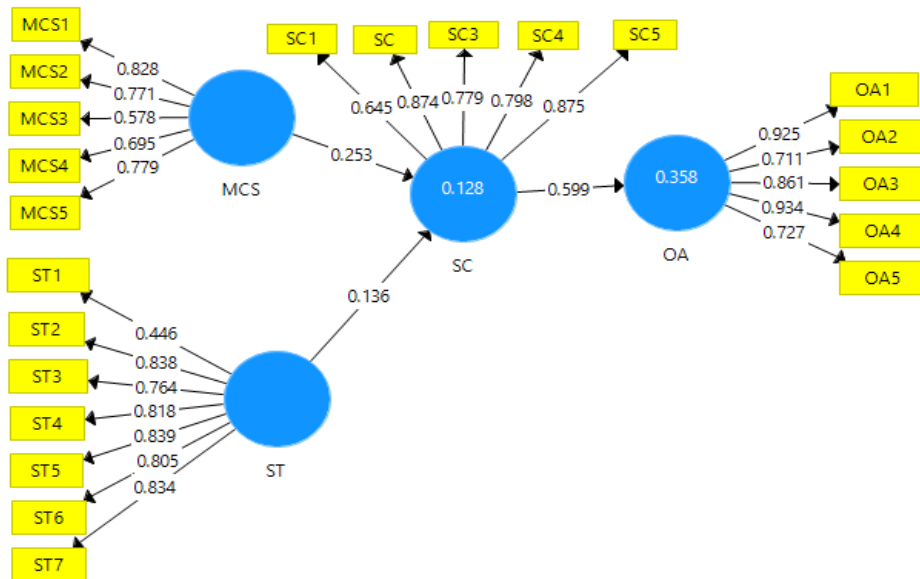


Figure 2: The Measurement Model

The discriminant validity was established to know that each latent variable (LV) is distinct from others and also measures different theoretical concepts. In addition, discriminant validity assesses that each construct is different and also measures unique concepts. However, the criteria of discriminant validity are all average variance extracted

(AVE) values should be greater than correlation values of variables. Hence, in table 3.

Discriminant validity all values of correlation are lower than average variance extracted (AVE). The mean values are in line with the agreeableness of respondents with statements of items of study and all mean values are above 2.

Table 4: Discriminant Validity, Mean, STDV and Variance

	MCS	ST	SC	OA	Mean	STDV	Variance
MCS	.735				4.25	.732	.543
ST	.668	.775			3.90	.620	.675
SC	.334	.559	.779		4.50	.410	.520
OA	.335	.305	.240	.799	4.15	.560	.475

3.1.2. Results of Hypotheses

In this study total, five hypotheses were developed, however, the direct relationship of three hypotheses and mediation of two hypotheses was measured. Table 4. The result of the hypotheses shows that the first hypothesis H1 predicted that safety training will have a positive relationship with safety compliance hence it is supported with values of $\beta = 0.25$ ($t = 3.65$, $p < 0.001$). The second hypothesis was management commitment to safety will have a positive relationship with safety compliance and hence with values $\beta = 0.59$ ($t = 2.42$, $p < 0.001$), which proved the support.

The 3rd hypothesis was safety compliance will have a positive relationship with safety compliance and value of $\beta = 0.13$ ($t = 9.21$, $p < 0.001$) proved supposition and H4: was safety compliance will mediate the relationship between occupational accidents and management commitment to safety and with a value of $\beta = 0.15$ ($t = 3.42$, $p < 0.001$) is accepted and the last hypothesis was safety compliance will mediate the relationship between safety training and occupational accidents. However, with values of $\beta = 0.15$ ($t = 3.42$, $p < 0.001$) is accepted.

Table 5: Result of Hypotheses

Relationships	B	t-value	R ²	Decision	Hypotheses
ST -> SC	.25	3.65	.35	Supported	H1
MCS -> SC	.59	2.42	.12	Supported	H2
SC -> OA	.13	9.21		Supported	H3
MCS -> SC-> OA	.15	3.42		Supported	H4
ST -> SC-> OA	.08	2.36		Supported	H5

4. Discussion

In the current study, we examined the effect of management commitment to safety and safety training on occupational accidents via mediating role of safety compliance. The results of the study show that safety training (ST) and safety compliance (SC) have a direct effect

and management commitment to safety (MCS) also have a direct effect on safety compliance (SC). Furthermore, safety compliance (SC) also mediates the relationship between safety training and management commitment to and occupational accidents. Safety training plays the most significant role to improve workers' working

skills and knowledge and also helps to develop safety behavior (Gray et al., 2018). Moreover, top management focuses to conduct safety training and safety programs that contribute to developing a safety culture and safety standards (Liu et al., 2019; McGonagle et al., 2016). In high-sensitive organizations to reduce occupational accidents and lower safety, the cost is one of the biggest challenges, and analysis of the current study highlights that management plays a most important role to mitigate the safety-related challenges. The paramount of study results is that top management commitment to safety plays a significant role to conduct safety training and equip workers with safety-related knowledge and awareness about working conditions at the workplace.

5. Conclusion

This study has established an empirical relationship between management commitment to safety, safety compliance, and occupational accidents and also safety training. It has been tested that safety compliance mediates the relationships between safety training and management commitment to safety to reduce occupational accidents. Furthermore, this study has brought more attention to top management towards the role of safety training programs to

improve safety performance. The results of this study have contributed to improving theoretical to reduce workplace occupational accidents and also to reduce safety costs. Finally, this study is most important for top management and safety leaders to understand the importance of safety training and management commitment to safety and also the role of safety compliance to develop safety behavior.

5.1. Practical Implications and Directions

This research study has some most important implications for researchers and practitioners to lower the rate of occupational accidents in high-risk safety concerned industries e.g., oil and gas, manufacturing, and construction industry. However, the results of the study indicate that top management of organizations needs to focus on safety training of employees and also safety compliance to control occupational injuries and accidents. The desired results of safety improvement can be achieved when management shows safety commitment, in addition, management should focus to develop a safety culture. In the current study cross-sectional design was used to collect data from the respondents of the study. Moreover, the convenience sampling technique was for data

collection because safety concerned industry e.g., oil and gas data collection were challenging for a researcher.

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