SAFETY CLIMATE IMPACT ON THE SAFETY BEHAVIOR IN CHEMICAL INDUSTRY OF THAILAND

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Abstract. The prime objective of the current study is to examine the link between safety climate, safety behavior, social support in the chemical industry of Thailand. Additionally, the study has also examined the mediating role of social support in the relationship between the safety climate and the safety behavior. widely known safety rules and procedures and their well enforcement by managers and supervisors may enhance the workers' safety behavior and minimize the occurrence of accidents. Summarizing, it is essential to understand the Thailand's safety climate in medical health sector, because of the emerging need to minimize workplace injuries among foreign workers and to improve safety behavior of all the medical staff. The response rate is turned out to be 73.2 percent which is significantly higher than the threshold level of 30 percent. The SEM-PLS is used to analyses the data. The findings of the study have highlighted that Social support is considered to be a possible mediating variable, since it may serve as a potential solution for assisting foreign medical health staff to overcome medical health related challenges, such as, unfamiliar working environment and stress management.

Keywords: safety climate; safety behavior; social support; chemical industry, Thailand

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1. Background

According to the International Labor Organization report, around 2.3 million people annually die as a result of occupational hazards (Prüss-Üstün, Wolf et al., 2016), which indicates that everyday around 6000 people on average die resulting from a disease associated with industrial product or process or from work-related accident, leading to approximately 2.3 million work-related deaths, annually (Reese, 2015). It includes 350,000 deaths following a workplace accident and 1.7 million work related diseases. According to ILO, occupational accident may be arranged into two groups, an accident which causes at least one person's death, or which left three or more people injured. Every year, hundreds of thousands of employees get injuries at work, followed by billion dollars of spending for disability payments, medical costs, decreased productivity and increased insurance premiums (Runciman et al., 2017). Such as, per week the estimated cost of these safety-related accidents is around US\$1 billion. These accidents give rise to huge social and economic costs and increased project completion time. In order to analyze the types of injuries, these figures can be further broken down. For instance, while considering the case of China, the hazardous accidents and the figures exhibit that the Occupational Safety and Health (OSH) department has dealt around 12,774 million cases during 2006-2010, which involve 160,000 advanced injuries (McLennan & Meyer, 2019). In addition, around 582,591 cases of non-fatal occupational injuries with a loss of at least on day work and around 586 fatal occupational injuries were registered in Spain in 2010. For each fatality, the estimated work-related injuries are

estimated to be around 500-2000 in number. Meanwhile, the occupational safety has gained enough significance and attention worldwide, as in every continent people are encountered with various hazardous working conditions.

However, besides workers and families, the organization and society also have to bear the economic cost associated with such type of occupational accidents. Such economic costs can be exhibited in the form of measurable or direct costs, such as, loss of production time, material damage, and financial loss through shared medical expenses, and increase in the insurance premiums, or in the form of hidden or indirect cost, such as, failure in industrial relationships. According to some researchers Feng et al. (2015), for a given organization, the hidden costs are estimated to be higher than the direct costs. In the Piekarz et al. (2015) report, higher injuries and fatality rates have been reported with 19,000 deaths and 14 million and above of the work-related injuries annually, in Middle East region. In Saudi Arabia, the occupational safety issues are the major challenges in the Healthcare industry. According to a report by the General Organization for Social Insurance (GOSI), a total of 261,076 serious injuries were reported annually during 2004-2010, which on average is equivalent to 3413.9 injuries. A total of 2176 deaths resulted from serious injuries indicate 28.3% of death rate on average per annum per 100,000 workers. In a comparative study, Moosa (2018) studied the worldwide cases of work-related deaths and injuries using statistical evidence available for Saudi Arabia in 2008 and recorded 28 death cases and 3117 major injuries per 100,000 injured workers.

In medical health care sector, the ineffective workplace safety and unsatisfactory occupational safety practices are the serious issues due to the high fatality rate and incidence of accidents among the medical healthcare staff (Rungsisawat & Jermisittiparsert, 2019). The issues of occupational safety management are of significant importance for the progress of a particular project as they may influence the project's timely completion and work quality. Since injuries and accidents have been emerged as serious areas of concern in occupational safety, therefore, it is vital to incorporate advanced occupational safety measures in the Thailand n medical healthcare industry which could enhance the performance and maintenance of safe working environment in Thailand n healthcare industry. In medical healthcare or any other industry, the safety requirements have been considered and accepted as the right way of receiving the benefits arising from the implementation of occupational safety management system, which has been received positively over the years. According to Sorensen et al. (2018), these safety management measures serve as effective means of reducing or eliminating work related hazards, also the adequate access to occupational safety services significantly contribute to the welfare of the workers.

It has been noted by previous researchers that systems, human errors and technology are the three factors which could trigger the fatalities, accidents and injuries (Shappell et al., 2017). By technological perspective, we mean that those onsite accidents which take place as a result of technological errors, such as, complex systems, mechanical errors, design related technical inadequacies, imbalance among technical understanding and skills (Jasanoff, 2016). Contrarily, those errors which are associated with systematic features are commonly known as system errors caused by the operatives. These errors may involve lack of management training, information sharing and workers. In addition, the system errors also occur due to the ineffective inspection and amendments, ineffective prevention and implementation of safety measures because of in-availability or inefficient safety policies, limited fatality, injuries and accidents prevention standards, and lack of employee accountability (Martinez et al., 2019). Moreover, according to the third perspective, human errors are responsible for the workplace accidents.

Regardless of the availability of rich literature regarding safety climate, several prior researchers have reported its unpredictable impact on the safety behavior, particularly in the case of Thailand 's healthcare industry. Besides, in view of Dinger, Do Minh, & Heinemann (2016), the variation in safety behavior has not been adequately explained by effective safety climate. Therefore, it is essential to perform further research for determining the workplace safety practices' impact on the industry's safety behavior (Fang et al., 2015). Furthermore, the feeling of

discriminated, homesickness, anxiousness, and stressed out, etc. in foreign workers may cause the occurrence of workplace injuries. Although, providing adequate social support may help workers to deal with such feelings. Correspondingly, such social support practices may possibly serve as means for helping foreign workers to overcome workplace challenges, for instance, dealing with stress and anxiety while working with people from different cultures under unfamiliar environment. Therefore, it suggests that social support may act as a significant moderator while analyzing the association among safety behavior and safety climate.

For workers, social support may facilitate them since it allows them to handle their behaviors using social interactions. Alternatively, it may change the safety-related psychology of workers towards concerned safety behavior. Resultantly, social support may also play its role by enhancing their trust level and encourage them to establish a safe work environment. Most of all, it appears as a useful safety assistance for the workers that may assist them during their operational duties, by minimizing injuries and accidents, enhancing safety performance, and making them to behave well in accordance with the safety requirements (Martínez-Córcoles & Stephanou, 2017). Although, after reviewing the literature, it has found that the role of social support as a moderator in the safety behavior and safety climate relationship, has not been studied in prior researches, specifically with the context of safety behavior of foreign workers' in Thailand n medical health industry. Thus, given the various safety perceptions of workers, this research gap needs to be filled. The change in workers' behavior can clearly be observed when they are counseled, tutored and are facilitated with social support. According to Hurtado et al.(2018) social support in the form of support provision to the co-workers may improve their safety. Thus, there must be efficient exchange and interaction in an organization, which can only be possible through useful and frequent exchanges between employer and employees.

2. Literature Review

2.1 Safety Behavior

Safety behavior refers to the behavior of individuals associated with their health and safety promotion and working environment safety (Clarke, 2013; Bernardi, 2019; Reinhold et al., 2019). The individuals' safety behavior may tend to minimize the incidence of illnesses and injuries related to working methods, through using behavioral security. According to Bolino and Grant (2016), safety behavior security refers to the concern that the behavior of workers is likely to revolve around possible negative outcomes such as, unable to behave in a secure manner, which may result in the occurrence of negative consequences, such as, injuries and accidents. Basically, using worker's safety perception measures is an important safety performance indicator, meanwhile, the safety performance is also considered as an outcome of worker's safety behavior Various dimensions have been identified in a number of previous studies to measure the safety behavior, such as, the three dimensions that were used by Bolino and Grant (2016) for measuring the self-reported safety behavior include structural safety, interactional safety behavior and personal safety behavior. They suggested that personal safety behavior is concerned with the employee's behavior which promotes personal protection of employees, for instance, using and following safety rules and all the prescribed equipment for protection. Thus, similar personal safety behavior concept was used in Clarke (2013) study, i.e. safety compliance. On the other hand, structural safety behavior is concerned about the ability of workers to take part in organized safety practices, such as, risk assessment practices. Whereas, the interactional safety behavior is the safety behavior of employees while performing their tasks and interacting with management and co-workers, for instance, safety problem discussion with manager or fellow worker. Therefore, the safety participation variable found in Clarke (2013) study is in fact similar to the interactional safety behavior and structural safety behavior.

2.2 Safety Climate

Safety climate refers to the individual perceptions towards workplace safety related procedures, practices and policies. The prior studies have taken the safety climate variable to exhibit the perception of workers regarding how an organization values their workers safety (McFadden et al., 2015). Safety climate perceptions differ from individual attitudes to safety attitudes which signifies disagreement level to the level of agreement. Therefore, Ismail and Nyarko (2014) argued that the safety climate explains the workers' attitude towards safety which is developed through the interaction of workers with their environment. A quantitative study was conducted by Liao et al. (2013) in Scotland on the National Health Service (NHS) acute hospitals. They distributed 1866 questionnaires to NHS staff members and attempted to examine the safety climate in hospitals and whether the obtained scores represent the medical staff's safety behavior and workers and patients' injuries. The findings of their study suggest that a safety climate in hospital setting which support patient care is also likely to ensure the safety of its workers. Opatá (2015) also studied the case of South African chemical manufacturing organization by employing 623 employees and tried to capture if there is any association among safety climate and its impact on risk behavior, where safety climate includes safety priority, production pressure and management's commitment towards workers safety. The study also reported negative relation among employee's risk behavior and management's priority and commitment about safety. It has been further indicated that the superiors must show their concern, support and commitment for safety, at both managerial and professional levels.

2.3 Safety Climate and Safety Behavior

Agnew et al. (2013) defined safety climate as the policies, procedures, activity endorsements and strategies that are applied using organizational activities, for improving the employees' safety. The present research tries to examine the safety climate elements as the safety behavior antecedents. In order to predict the workers safety behavior, it is essential to observe the industry's safety climate, since relevant and common safety controlling procedures were suggested in previous study as well as encouraging the safety behaviors to avoid accidents and injuries. In another study, Bosak et al. (2013) suggest that safety climate is capable of controlling onsite injuries and accidents, and controlling safety behaviors of workers, thereby reducing the human errors since these errors are the major contributory factors in the occurrence of accidents, injuries and unsafe working environment. Furthermore, it is the role and responsibility of the management to practice and efficiently implement a certain code of conduct among the medical staff, such as, procedures, drills, information, rules, and trainings, to maintain workplace safety (Epstein, 2018). Hence, it is presumed that working conditions can be improved by developing safety climate, and this climate also positively influences the workers' behaviors and attitudes concerning safety, thereby reducing the occurrence of accidents.

With respect to present research, it is presumed that safety climate is comprised of medical staff's perceptions regarding procedures, practices and policies of workplace safety, these include priority of safety, management commitment, safety communication and feedback, safety training and safety rules, work pressure and worker's involvement in safety. These practices and policies are implemented by management to prevent the occurrence of any possible injuries or accidents to the medical staff at their workplace (Clarke, 2013). The aim of this research is to analyze how various safety climate dimensions listed above, may affect the safety behavior of medical staff in Thailand's healthcare industry. A number of prior researchers have found safety climate dimensions to be capable of minimizing and controlling the rate of workplace accidents and their essential role to assess whether the employees comply with the safety rules implemented by the organization. Therefore, safety behavior of workers can be improved by aligning the safety climate dimensions. Such as, one of the main drivers of safety performance

of employee is the management commitment in various sectors, as it is a basic factor in developing safety programs. Besides management commitment, another essential safety climate dimension is the work pressure which is likely to affect the safety behavior of the workers. Priority of safety is another important aspect of safety climate that has been continuously reported to be capable of predicting the safety behavior. Moreover, one of the basic methods to improve workplace or onsite safety of workers is the safety training, through which workers are provided with training about safe behavior methods, risk awareness and developing understanding about safety requirements and occurrence of accidents at the workplace. Wachter and Yorio (2014) suggested a vital safety dimension, i.e. worker's involvement which is expected to continuously deal with safety issues and enhance occupational safety, and consequently facilitate the management in resolving issues using greater participation. Another key dimension is the safety communication and feedback, and this dimension significantly improves the workplace safety levels (McCaughey et al., 2013). Lastly, in view of Meeks et al. (2014) safety rules and procedures are also explained as the significant health sector dimension. Therefore, widely known safety rules and procedures and their well enforcement by managers and supervisors may enhance the workers' safety behavior and minimize the occurrence of accidents. Summarizing, it is essential to understand the Thailand's safety climate in medical health sector, because of the emerging need to minimize workplace injuries among foreign workers and to improve safety behavior of all the medical staff. The study has proposed the following hypothesis.

H1: Safety climate (SCL) has significant impact on the safety behavior (SB).

2.4 Social support as mediator

Several previous researches which have investigated the safety climate relationships have studied and observed different safety dimensions, such as, workers' involvement management commitment safety rules and procedures safety training safety communication and feedback safety behavior, and work pressure (Lin et al., 2013). However, inconsistent findings are obtained from these researches and these studies can be extended by adding a mediating variable. According to Ospina et al. (2018) moderating variables are generally incorporated when a non-significant, weak or inconsistent relationship is found among the dependent and independent variables. Previously, a number of safety variables have already been examined particularly in safety-related researches, including organizational commitment towards ethical motive, perceived job features, safety-specific trust, safety climate, and competency levels of subordinates with respect to leadership. Thus, in the current study, social support is added as a mediator in the safety behavior and safety climate relationship. Foreign workers tend to feel discriminated, homesick, anxious, and stressed (Browne, 2018), which may increase the worksite injuries and affect the safety behavior of staff members.

Social support is considered to be a possible mediating variable, since it may serve as a potential solution for assisting foreign medical health staff to overcome medical health related challenges, such as, unfamiliar working environment and stress management (Ammigand et al., 2019). Those foreign workers who are well aware about the safety climate, such as, safety feedback and communication, rules and procedures related to safety, management commitment, and safety priority, involvement of healthcare staff in work and safety pressure are likely to exhibit adequate safety behavior (Amponsah-Tawaih & Adu, 2016). Although, receiving social support may possibly enhance their safety behavior (Meeks et al., 2014). This argument advocates that a worker's safety behavior can be influenced and controlled through providing social support, because of its ability of assisting the social interactions among the workers. This role of mediator may alter the safety-related psychology of workers in healthcare industry from unconcerned to the concerned safety behavior, resulting in the improvement of developing trust and safe environment. Thus, it has been concluded by Ospina et al. (2018) that social support is found to have the power to control extra-role performance of healthcare workers even if they lack adequate skills, information and in-hand

experience. Hence, their performance can be enhanced by providing social support to these workers. Based on the literature reviewed the study has proposed the following hypothesis.

H2: Safety climate (SCL) has significant impact on the social support (SS).

H3: Social support (SS) has significant impact on the safety behavior (SB).

H4: Social support (SS) mediates the relationship between the Safety climate (SCL) and safety behavior (SB).

3. Methodology

The study has used the survey-based approach in Data has been collected through survey. A questionnaire based on structured questions was developed with reference to the objectives of the research. The data was analyzed using structural equation modelling that is regarded as technique of second generation. This is referred as second-generation technique due to some limitations of first-generation techniques. Researcher is enabled to estimate the relation among the variables for a number of complicated models simultaneously in PLS-SEM method (Hair et al.,2014). Research study has determined unobserved variables through measurement errors and indicators in the same model. Therefore, it can be said that the first generation's limitations are resolved in SEM modelling that is technique of second generation (Hair et al.,2011). The response rate is turned out to be 73.2 percent which is significantly higher than the threshold level of 30 percent.

3.1 Results

The study has employed the structural equation modelling using SEM-PLS. The SEM-PLS comprises of two steps namely, the assessment of the measurement model and the assessment of the structural model. In the measurement model we assess the reliability, and validity, of construct and items. The measurement model of the current study is shown in the figure 1.

Figure 1. Measurement Model

The construct validity is shown in the table 1. The items with loading below than 0.70 are deleted from the analysis. The items namely, the LS6, EP2, and EP6 are deleted from the analysis.

Table 1. Outer Loadings

	SB	SCL	SS
SB1	0.861		
SB10	0.822		
SB2	0.836		
SB4	0.913		
SB5	0.902		
SB6	0.918		
SB8	0.877		
SB9	0.848		
SCL10		0.882	
SCL11		0.890	
SCL2		0.857	
SCL3		0.877	
SCL4		0.846	
SCL5		0.902	
SCL6		0.873	
SCL7		0.895	
SCL8		0.845	
SCL9		0.896	
SS1			0.805
SS10			0.835
SS11			0.768
SS2			0.756
SS3			0.837
SS4			0.856
SS5			0.796
SS7			0.836
SS8			0.825
SS9			0.818
SCL1		0.882	

The reliability of the current study is accessed through the Cronbach alpha and the composite reliability. Whereas the, convergent validity of the current study is examined using the average variance extracted (AVE). We have followed laid down the criterial Hair et al. (2011) and Fornell and Larcker (1981). PLS results shows that values of AVE for constructs have met the minimum threshold values.

Table 2. Reliability

	Cronbach's Alpha	rho_A	CR	(AVE)
SB	0.955	0.957	0.962	0.762
SCL	0.970	0.971	0.973	0.769
SS	0.943	0.944	0.951	0.662

The discriminant validity of the current study is shown in the table 3. The values in the table show that the there is no issue of discriminant validity in the current

Table 3. Validity

	SB	SCL	SS
SB	0.873		
SCL	0.713	0.877	
SS	0.702	0.806	0.814

The second step in the assessment of the structural model which explain the relationship between latent and the hypothesized variables of the research namely, SCL, SS, SB The study has employed the bootstrapping procedure with 1000 bootstraps, the structural model of the currents study is showing in the figure 2 below

Figure 2. Structural model

The direct relationship between the SCL, SS, SB are shown in the table 4 below. the findings of the study have shown that the all the direct paths namely EM -> EP, EM -> LS, and LS -> EP are significant at p less than 0.05. See table 5 below.

Table 4. Direct Relationship

	(O)	(M)	(STDEV)	T Statistics	P Values
SCL -> SB	0.713	0.716	0.066	10.839	0.000
SCL -> SS	0.886	0.886	0.023	38.710	0.000
SS -> SB	1.252	1.240	0.087	14.405	0.000

The findings of the study have provided support to the hypothesized results that the safety climate, and social support has significant impact on the safety behavior. Meanwhile, safety climate has significant impact on the social support as well (Guo et al., 2008).

One of the objectives of the current study is to examine the mediating role of SS in the relationship between the safety climate and the safety behavior (Henseler et al., 2015). The results are providing support to the notion broached in the research that the social support mediate the relationship between the SCL and SB. The findings of the study are revealing the fact that the in the presence of the social support the impact of the safety climate on the safety behavior will be more significant. See table 5 below.

Table 5. Indirect Relationship

	(O)	(M)	(STDEV)	T Statistics	P Values
SCL -> SS -> SB	1.108	1.099	0.073	15.242	0.000

One of the criteria, that explained the determination of the phenomena (dependent variables by the factors (independent variables) is the coefficient of the determination. The study has examined the coefficient of the determination and the value of the coefficient is above the threshold value (see table 6)

Table 6. R-square

	R Square
SB	0.847
SS	0.784

Conclusion

The Thailand n health sector is deteriorated despite the provision of state-of-the-art-equipment, in addition, there is lack of proper maintenance and spare parts, resulting in non-operational health centers and hospitals. Presently, the Thailand n health sector is neither observing any quality standards nor being monitored or regulated. The ongoing conflict in Thailand has nearly collapsed the country's health sector making 80% foreign health workers to leave the country. It is difficult to recruit new workers since the already working health providers are functioning under highly difficult conditions. The humanitarian aid and militarization of health facilities have greatly affected the working conditions and health access, since the medical staff are beaten, kidnapped and threatened at gunpoint. The shelling, destruction and looting of medical facilities have given rise to severe equipment and drug shortages, increase in medicine prices and staff shortages. The medical service providers face serious challenges and these challenges affect their ability of providing healthcare facilities. Other challenges include the medical provider's exposure to communicable diseases such as, TB(Garges et al., 2016). Furthermore, due to lack of safety measures for the healthcare providers they are exposed to a number of diseases, infections or injuries. The prevalence of

extreme threatening circumstances may demoralize the workers and they may feel poorly motivated because of poor career progression prospects, poor working conditions, low pay and exposure to communicable diseases. Therefore, staff training regarding their own safety must be provided, followed by the provision of incentives in the form of opportunities or financial gains to improve their responsiveness and effectiveness towards patient and their own safety behavior (Oakley, 2013).

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