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SAFETY-SPECIFIC TRANSFORMATIONAL LEADERSHIP, SAFETY CLIMATE AND OCCUPATIONAL ACCIDENTS

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ABSTRACT

Despite the fact that safety-specific transformational leadership had been reported to have favorable outcomes on workplace safety, there is limited work on identifying its role in decreasing occupational accidents at workplace. The current study looks to fill this void by proposing safety-specific leadership approach to combat occupational accidents via safety climate. Data were collected from 270 production workers of Oil and Gas Industry across four states of Malaysia. Results showed strong support for our suppositions. Safety climate mediated the relationship between safety-specific leadership and occupational accidents. The supposition linking safety-specific transformational leadership to safety climate and safety climate to occupational accidents also found considerable support. The results are discussed in the light of previous literature and the contributions made by the study.

Keywords: *Safety-specific leadership, Safety performance, Safety Climate, Malaysia, Oil and Gas*

INTRODUCTION

According to Hepburn, Kelloway, and Franche (2010) occupational accidents may or may not require small medical treatment but does not require absence from work. The definition clarifies the fact that occupational accidents does not cause injuries which keeps workers away from work or for which compensation has to be paid by the organization. Thus, occupational accidents cover a wide spread safety situation which might not be covered by occupational injuries which are only recorded when a worker remains away from work or compensation is paid to him/her.

Accidents usually happen because of some existing dangers which make system vulnerable (Reason, 2000). These can be the unsafe work environment, job demands or lack of resources which can cause accidents at workplace (Nahrgang, Morgeson, & Hofmann, 2011). In addition to that organizational involvement and physical environment (Oliver, Cheyne, Tomás, & Cox, 2002), psychological distress (Siu, Kong, Phillips, & Leung, 2004) were also strongly related to accidents, and safety climate was also reported to be negatively related to occupational accidents (Zohar, 2000).

One of the earlies study which discussed the important role of leadership in reduction of accidents was of (Zohar, 2002). He stressed that instead of focusing on personal or organizational factors organizations need to focus on leadership and improving safety climate perceptions to reduce workplace accidents. He stated that "such support has much theoretical and practical significance, since traditional approaches to accident prevention, focusing on better engineering and work-site monitoring, have ignored the role of line managers" (p. 89). The emergence of safety-specific transformational leadership (Barling, Loughlin, & Kelloway, 2002) established the important role of leadership as well as safety climate in reduction of accidents at workplace. However the meta-analysis of (Christian, Bradley, Wallace, & Burke, 2009) reported that leadership and safety climate have moderate relationship with workplace accidents. We believe this is due to the nature of the organizations in which the safety related incidents happens, and majority of studies have been conducted in organizations which are not safety sensitive (Pilbeam, Doherty, Davidson, & Denyer, 2016).

Hence, the objectives of this paper are twofold: first, given the theoretical description of safety-specific transformational leaders and their uncompromising focus on safety (Barling et al., 2002) they will be in better position to manage the occupational accidents at workplace. Second and most importantly, the safety literature has repeatedly reported that the relationship between safety-specific transformational leadership and safety outcomes is not direct rather mediated by safety climate (Clarke, 2013; Clarke & Ward, 2006; Kelloway, Mullen, & Francis, 2006; Zohar & Tenne-Gazit, 2008; Zohar & Luria, 2004). Based on the empirical evidence we also propose safety climate as a mediator between this relationships by using rational of social learning theory (Bandura, 1971).

LITERATURE REVIEW

Safety-specific transformational leadership and safety climate

Safety climate perceptions are developed by employees on the basis of policies or actions implemented by organization to improve the safety situation (Zohar, 2010). In their review on safety climate literature (Neal & Griffin, 2002) noted two important points; first that not much research has been conducted to identify various organizational factors that can build and retain safety climate; second, they identified leadership to be one of the most important factors in ensuring safety climate which has not been given due consideration. Few other studies have also agreed with their view about leadership being an important factor in creating and maintaining safety climate (D A Hofmann & Morgeson, 1999).

Clarke and Ward (2006) in a detailed study explained that when soft tactics (discussion and motivation) were used by the leaders to persuade employees towards safety, it yielded much better results. In addition to that safety climate strongly mediated this relationship; moreover, they named this safety prone behavior as transformation of employees. A safety-specific leadership improves the safety climate of the organization to a far superior level (Wu, Chang, Shu, Chen, & Wang, 2011). There is also considerable amount of empirical evidence supporting the association between safety-specific transformational leadership and safety climate (Barling et al., 2002; Clarke, 2013; Kelloway et al., 2006; Mullen & Kelloway, 2009). Thus, it is proposed that:

H1: Safety-specific transformational leadership will be positively associated with safety climate

Safety climate and occupational accidents

One of the early studies on the relationship between safety climate and occupational accidents was done by (Hofmann & Stetzer, 1996) they reported significant negative association between

the two constructs. Subsequntly a study by (Hayes, Perander, Smecko, & Trask, 1998) also found similar kind of results. These studies were followed by the studies of, Zohar (2000) which provided a strong support for the importance of employees safety climate perceptions for the reduction of accidents. In the following study (Zohar, 2002) further established the results of the first study and also explicated that focus on safety climate has more theoratical and practical significance for both researchers and practitioners. He also specified that safety climate was actually missing in the accident reduction literature. Similar results were reported by (Neal & Griffin, 2006) for safety climate and accidents at workplace.

The meta-analysis of (Christian et al., 2009) found that there exists a reseonable relationship between safety climate and workplace accidents. Following that another detailed meta-analysis by, (Clarke, 2010) reported a significant stronger relationship between safety climate and workplace accidents, elucidating the importance of positive safety climate. Although she noted that there are very few studies which have directly tested this relationship. Given the fact that interest of researchers in the concept of safety climate was revived during 2000's (Clarke, 2006b), her observation is not a suprize. In the most recent reviews it is reported that safety climate and occupational accidents have a strong negative relationship (Hofmann et al., 2017; Nahrgang et al., 2011). Thus, it is proposed that:

H2: Safety climate will be negatively associated with occupational accidents

Mediating role of safety climate

To improve the workplace safety leadership plays the most significant and inimitable role (Clarke, 2013; Pilbeam et al., 2016). Also in case of occupational accidents leadership plays the most vital role (Hofmann & Morgeson, 2003). In one of the earlier studies on the relationship, Zohar (2002) found that safety climate completely mediates the relationship between general transformational leadership and occupational accidents. Moving forward these results were further verified in the study of (Zacharatos, Barling, & Iverson, 2005). In the meta-analysis of workplace safety Christian et al. (2009) do reported a reasonable association for this relationship and in a most recent review (Beus, McCord, & Zohar, 2016) also provided support for this mediating mechanism.

In one of the recent study (Koster et al., 2011) reported a significant relationship between safety-specific transformational leadership and occupational accidents. They also used safety consciousness as a mediator between these relationships but found that the path is not mediated by safety consciousness. Furthermore, they also suggested that safety climate can be a more appropriate mediator for this framework. There are strong reasons of their preposition about the mediating role of safety climate. Because even if workers are safety conscious but are confused that whether safety should be prioritized in favor of competing demands the consciousness will not translate into reduction of accidents (Wallace & Chen, 2005; Wallace, Popp, & Mondore, 2006). Only when safety climate perceptions are high workers infer that safety comes first and not to be compromised for any competing demands, it results in favorable safety outcomes (Zohar, 2010). And these safety inferences made by workers are totally dependent on leaders commitment towards safety (Zohar & Luria, 2004).

The theoretical rational for this association is rooted in the social learning theory (Bandura, 1971). It explicates the learning process of individuals is based on the environment in which they operate. Hence, when the leaders regularly indulge in safety-prone activities such as communication, and working on their safety motivation (e.g. Hofmann et al., 2003). It translates into developing strong safety climate perceptions in workers, which ultimately results in decreasing accidents at workplace (Wallace, 2016). Thus, it is proposed that:

H3: Safety climate will mediate the relationship between safety-specific transformational leadership and occupational accidents

METHODOLOGY

Procedure and Participants

The participants of the study were production workers of Oil and Gas industry working across 12 plants operating in 4 different states of Malaysia (Malacca, Kedah, Pahang, and Terengganu). The Oil and Gas industry is categorized as 'high-safety sensitive' organization in workplace safety literature (Mirza & Isha, 2017) because workers of such organizations operate under safety-sensitive conditions due to constant exposure to chemical and hazardous materials. Questionnaires were distributed during working hours and had a covering letter explaining the complete confidentiality and voluntarily nature of participation. The principal researcher remained in the organization during the process of questionnaire completion to clarify any queries or doubts about the questionnaire.

A total of 465 questionnaires distributed, 304 were returned back which makes it a response rate of 65.3% which is quite good, considering that generally response rate in Malaysia is usually on the lower side (Ali, Azimah Chew Abdullah, & Subramaniam, 2009). Out of the total sample 34 were discarded because they were incomplete, so the overall sample of the study was $N = 270$. The majority of the respondents were male (78.5%), in the range of 20-30 years (40%), having maximum organizational tenure between 0-5 years (42.2%). The large proportion of the respondents were of Malay origin (91.1%).

Measures

The recommended back-translation technique (Brislin, Lonner, & Thorndike, 1973) was used to translate all the items of the questionnaire except for psychological distress (already available in Malay). The bilingual questionnaire for all scales were used based to make sure they are easily understood by the respondents. Both English and Malay language experts had a background of psychology and had good command of both English and Malay.

Safety-specific transformational leadership was measured using the scale developed by (Barling et al., 2002) consisting of 10 items. The sample items of the scale are "My supervisor provides continuous encouragement to do our jobs safely", and "My supervisor suggests new ways of doing jobs more safely". The respondents recorded their response on a five point Likert-scale ranging from 1= Strongly Disagree to 5= Strongly Agree.

Safety climate perceptions were sought using the scale of (Zohar, 2000) comprised of 10 items. The scale included 5 reverse coded items, however due to the problem associated with the reverse coded items, the recent literature suggests not to use negatively stated items. We rephrased all the 5 reverse coded items of the scale making sure that the items do not lose their original meaning. The sample items of the scale are "My supervisor says a good word whenever he sees a job done according to the safety rules". The sample item after rephrasing changed from the original "Whenever pressure builds up, my supervisor wants us to work faster, rather than by the rules (R)" to "My supervisor wants us to follow the rules even during high pressure". The responses were recorded on a five-point Likert-scale ranging from 1= Strongly Disagree to 5= Strongly Agree.

Occupational accidents construct was measured using a ratio scale. There is no Likert-type scale available to measure occupational accidents. Thus, frequency of occupational accidents were

assessed using a ratio scale, as done previously in the literature (Clarke, 2006a; Siu et al., 2004). Respondents were asked to indicate the number of occupational accidents they had encountered during the past year.

Data Analysis and Results

The proposed model was assessed with Partial Least Square approach using Smart-PLS 3.2.7 software (Ringle, Wende, & Becker, 2015). We followed recommended two-staged analytical practice (Anderson & Gerbing, 1988) to assess the measurement and structural model.

Measurement Model

The measurement model involves two types of validity: convergent and discriminant validity. The convergent validity includes item loadings, average variance extracted (AVE) and composite reliability (Hair, Hult, Ringle, & Sarstedt, 2016). The validity of items considered adequate if their loadings are equal or higher than 0.7, if loading of an item is between 0.4-0.7 than it should be considered for removal only if it can improve AVE or composite reliability (CR), and if the item loading is lower than 0.4 the item should be deleted (Hair et al., 2016; Kock, 2014). Only 1 item SC10 was deleted because the loading was lower than 0.4. Item loadings for rest of the items were between 0.679-0.859 which are in acceptable range. The CR and AVE of all the constructs were greater than 0.5 and 0.7 which is in accordance with the required threshold value suggested in the literature (Chin, 2010; Hair et al., 2016). The loadings CR and AVE for occupational accidents were 1 because it was a single item measure as the data were collected using ratio scale.

Table 1: Result of item loadings, composite reliability and average variance extracted

Variables	Items	Loadings	Composite Reliability	AVE
Safety-specific Transformational Leadership	STL1	0.725	0.916	0.523
	STL2	0.679		
	STL3	0.760		
	STL4	0.735		
	STL5	0.749		
	STL6	0.732		
	STL7	0.719		
	STL8	0.718		
	STL9	0.716		
	STL10	0.695		
Safety Climate	SC1	0.750	0.935	0.616
	SC2	0.790		
	SC3	0.819		
	SC4	0.783		
	SC5	0.774		
	SC6	0.813		
	SC7	0.780		
	SC8	0.684		
	SC9	0.859		
Occupational Accidents	OA	1	1	1

Discriminant validity explains the extent to which constructs are distinct from each other. We assessed the discriminant validity using the Fornell and Larcker (1981). The criterion required that square root of AVE for all constructs should be greater than correlations among all other constructs. Results of Table 2 explicate all the value on the diagonal were greater than the correlation values of all other constructs, thus establishing discriminant validity of the model.

Table 2. Discriminant Validity

	1	2	3	4
1. Safety-specific Transformational Leadership	0.723			
2. Safety Climate	0.695	0.785		
3. Occupational Accidents	-0.213	-0.268	1	

Structural Model

To assess the structural model, it is recommended to report R2 values (predictive power), beta-values and the t-values using a bootstrapping procedure of 5000 samples (Hair, Hult, Ringle, & Sarstedt, 2014). In a latest review on PLS, Kaufmann and Gaeckler (2015) stated it is advisable to also report f2, and Q2 values. The f2 value for STL→SC is moderate to substantial and for SC→OA is weak to substantial (Cohen, 1988). The Q2 values for both relationships is greater than 0 confirming predictive relevance of the model.

Hypotheses Testing

The first hypothesis of the study predicted a positive association between safety-specific transformational leadership and safety climate, and results supported this supposition ($\beta = 0.329$, $p < 0.001$) providing considerable support for Hypothesis 1. The second hypotheses was based on the supposition that safety climate will have a negative relationship with occupational accidents ($\beta = -0.268$, $p < 0.001$). Results confirms that safety climate had a significant negative relationship with occupational accidents; confirming Hypothesis 2. The third hypothesis of the study proposed mediating role of safety climate between safety-specific transformational leadership. We followed the mediation process recommended by (Preacher, Rucker, & Hayes, 2007) who suggested that the focus should be on the indirect effect if it is significant the mediation is achieved. The results supported the mediating process ($\beta = -0.088$, $p < 0.001$); thus Hypothesis 3 of the study was also supported.

Table 3. Results of Hypotheses Testing

Hypotheses	Beta	STEDV	t-value	R^2	f^2	Q^2	Decision
STL→SC	0.329	0.062	5.395**	0.174	0.154	0.372	Supported
SC→OA	-0.268	0.062	4.297**	0.072	0.077	0.063	Supported
STL→SC→OA	-0.088	0.027	3.317**	0.128	-	-	Supported

DISCUSSION

The first hypothesis of the study assumed that safety-specific transformational leadership will enhance the safety climate perceptions of the workers. The results provided statistical support for this relationship and improved workers safety climate perceptions. The results align with the previous research findings reported on this relationship (Barling et al., 2002; Kelloway et al., 2006; Mullen & Kelloway, 2009; Smith et al., 2016). The second hypothesis predicted that safety climate will be negative associated with occupational accidents. The results providing substantial support to this supposition and validating that employees' conviction about safety climate translates into reduction of accidents at workplace. The results are in line with the previous literature (Clarke, 2010; Hofmann et al., 2017; Neal & Griffin, 2006; Zohar, 2002) reporting a significant negative associated between safety climate and occupatinal accidents.

The results also provide strong support for the mediating process, and are in line with the previously reported mediating role of safety climate between general transformational leadership and occupational accidents (Christian et al., 2009; Zacharatos et al., 2005; Zohar, 2002). However,

there are very limited studies which have examined the mediating role of safety climate between safety-specific transformational leadership and occupational accidents. The current study makes an important contribution in this regard which was suggested previously (Koster et al., 2011) and results of the study approves the mediating role of safety climate in this relationship.

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