

THE INFLUENCES OF WORK-LOAD, ACCIDENT EXPERIENCE, SAFETY LEADERSHIP AND SAFETY CLIMATE ON THE EMPLOYEES' PERCEIVED RISK OF ACCIDENT

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The purpose of this study was to identify the influences of workers' perceived work-load, accident experience, supervisors' safety leadership and safety climate of organization on the perceived risk of accident. Four hundred employees hired in a variety of manufacturing organizations in South Korea were asked to respond to the questionnaires and 376 employees provided valid data for data analysis. The results of hierarchical multiple regression analysis showed workload and accident experience positively influenced and supervisors' safety leadership and safety climate of organizations negatively influenced on the perceived risk of accident. The level of influence of workload and supervisors' safety leadership on perceived risk were greater than other variables.

Key words: Workload, Safety Leadership, Safety Climate, Perceived Risk of Accident, Accident Experience

I. INTRODUCTION

Occupational safety is still a great concern in South Korea. Specifically, according to the report of occupational accident of Korea Occupational Safety and Health Agency, accident rate has been decreasing steadily to the 0.50% in 2015(KOSHA, 2016), but it is still a high level in OECD. Thus, safety researchers continue to examine for possible antecedents of safety performance in order to develop and apply appropriate safety program. Among various antecedents, employees' perceptions of injury or accident risk that they will experience and injury in the workplace has been identified as one that predicts safety behavior and outcomes.

The perception of risk can be defined as the individual's assessment of the likelihood of undesired consequences (i.e. injuries, accident, disease) (Rohrman and Renn, 2000) and depends on the type of risk under consideration (Reisinger and Mavondo 2005; Gierlach et al. 2010). Perceived risk has been included in theoretical preventative health models, as well as in the theory of protection through motivation. These models suggest that workers adopt protective behavior when anticipating and wishing to avoid the adverse consequences of risky actions (Huang et al. 2007).

Moreover, worker attitude towards safety on the job is influenced by their perception of risk, as well as by management, safety procedures, and rules (Mohamed et al. 2009). Additionally, a relationship was found between perceived risk and a climate of safety (Meliá et al. 2008; Solís-Carca and Franco-Poot 2014). However a few study has been examined plausible antecedents of perceived risk and individual work-load and supervisors' safety leadership has not been considered thoroughly. Wilpert (1994) stresses that, in general, many incidents are not caused by a single operator, but occur as the result of a chain of factors that interact at various levels of the system. The purpose of this study was to identify the influences of workers' perceived work-load, accident experience, supervisors' safety leadership and safety climate of organization on the perceived risk of accident.

I.A. Safety Climate

Zohar (1980) first introduced the concept of safety climate to describe employees' perceptions of the value and role of safety in the organizations. Specifically, safety climate is defined as employees' shared perceptions of the importance and the

true priority of safety, safety policies, procedures, and practices in their organization (Griffin and Neal, 2000; Zohar, 2003). Safety climate have been examined as an important antecedent of safety performance (safety behavior, injuries and accident) in a various work settings (e.g., Griffin and Neal, 2000; Hoffman and Stetzer, 1996).

In addition, safety climate would be related to workers' perceived risk of injury and accident (Hale and Glendon, 1987; Mearns and Flin, 1996). Specifically, Mearns and Flin (1996) suggested that employees' risk perceptions were influenced not only by the physical working condition but also by the organizational safety culture (or climate). In support of this, Oliver et al. (2002) found that perceived safety management involvement subfactor of a safety climate negatively correlated with perceived physical work environment variables (including hazard perception).

Safety climate, also, precursor of proactive risk management of organization. Proactive risk management have an impact on employees' safety knowledge and motivation. These activities transmit to the employees the ability to comply with safety procedures and to work safely (Neal et al., 2000). In addition, conducting a proactive risk management transmits to employees the thought that their organization is safeguarding their health and safety at work, which leads to decrease in their risk perception. Based on the above research finding, we propose that a positive safety safety climate as an organizational factor may decrease workers' risk perception.

Hypothesis 1. Safety climate has a negative effect on perceived risk of accident

I.B. Safety Leadership

In recent years, the concept of safety leadership is gaining increasing acceptance in the field of occupational health and safety. Wu (2005) defines safety leadership as "*the process of interaction between leaders and followers, through which leaders could exert their influence on followers to achieve organizational safety goals under the circumstances of organizational and individual factors*". Zohar (2002) suggest that concern for employee safety is expressed and operationalized by supervisors or leaders' behaviors. When a consistent supervisory behavior and reaction with regard to safety is displayed, it promotes shared perceptions among the employees concerning the priority of safety. Hofmann and Morgeson (1999) proposed that employees have a tendency to commit themselves to safety and maintain an open communication on safety when they have good relationships with their supervisors and managers (Eid et al., 2012).

Prior research (Cooper and Phillips, 2004; Hofmann and Morgeson, 1999; Hofmann et al., 2003; Kelloway et al., 2006; Zohar, 2002) emphasize the importance of the leader in improving employees' safety behavior and safety outcomes.

In line with this emerging research, safety leadership can serve as a important factor with regard to reducing the level of perceived risk among employee. In the Nielsen et al. (2011), there is negative correlation between authentic leadership and risk perception. Based on the above research finding, we propose that a positive supervisors' safety leadership as group or team factor may decrease workers' risk perception.

Hypothesis 2. Safety leadership has a negative effect on perceived risk of accident

I.B. Workload & Accident Experience

Workload can refer to a number of different yet related entities, however, workload results from mental processes when performing tasks, depending on the worker's capabilities and the task demands. When employees have to do more work than can be accomplished comfortably or do difficult task beyond their skills and abilities, workload can be stressful and serve as a stressor for employees. Workload has been linked to a number of strains, including anxiety, fatigue (Ganster and Rosen, 2013). As a work demand, workload is also relevant to the job demands-resources model of stress that suggests that jobs are stressful when demands (e.g., workload) exceed the individual's resources to deal with employee (Demerouti et al., 2001).

Turner, Chmiel, and Walls (2005) found that employees reporting high job demands defined their safety role with respect to their jobs more narrowly, and higher strain is associated with more accidents and near misses (Goldenhar, Williams, and Swanson, 2003; Murray, Fitzpatrick, and O'Connell, 1997; Siu, Phillips, and Leung, 2004). Increasing workload will lead to higher job strain indicating the operation of compensatory processes, and that the latter will lead employees to look for less effortful ways to deal with goals related to safety. Thus, workers with high workload will be difficult to comply safety regulation, and likely to perceive high risk of accident.

Besides workload, accident experience, also, can influence the risk perception. Workers who have witnessed peers' accident or experienced accidents are more likely to perceive higher accident. In the driving studies, driver experienced accident and near-miss reported high risk of accident than novice driver (Tinsley et al., 2012).

Hypothesis 3. Work load has a positive effect on perceived risk of accident

Hypothesis 4. Accident experience has a positive effect on perceived risk of accident

II. METHOD

II.A. Samples

Four hundred employees hired in a variety of manufacturing organizations in South Korea were asked to respond to the questionnaires and 376 employees provided valid data for data analysis. The worker to supervisor ratio was 68.6 to 31.4 and male to female ratio was 76.6 to 23.4. The mean age of sample was 49.53 ($SD = 10.43$) years and the work experience ranged from 1 to 41 with a mean of 16.31 years ($SD = 10.21$). The number of workers in the sample included below 10 workers (20.2%), 22-29 (25%), 30-49 (45.7%), and above 50 (9.1%). The status of marriage in the sample included single (13.3%), married (84%), and etc. (2.7%) (See TABLE I)

TABLE I. Demographic Characteristics of Sample

Variable	Item	Frequency	Percent (%)	Variable	Item	Frequency	Percent (%)
Position	Worker	258	68.6	Age	20-29	14	3.7
	Supervisor	118	31.4		30-39	55	14.6
Number of Workers	Below 10	76	20.2		40-49	97	25.8
	11 -29	94	25.0		50-59	138	36.7
	30-49	172	45.7		Above 60	72	19.2
	Above 50	34	9.1	Marriage	Single	50	13.3
Sex	Male	288	76.6		Married	316	84.0
	Female	88	23.4		Etc.	10	2.7
Total		376	100.0	Total		376	100.0

II.B. Measures

II.B.1. Safety Leadership

Safety leadership was measured using five items that were extracted from Zohar (2000) group safety climate scale consisting of two subscales: supervisory action and expectation. The supervisors measured their safety leadership, and workers responded to the line supervisors' safety leadership. A sample item is "My supervisor says a good word whenever he sees a job done according to the safety rules" and "My supervisor seriously considers any worker's suggestion for improving safety." Participants indicated their level of agreement with each item on a 5-point scale (1= strongly disagree, 7 = strongly agree). The Cronbach's α in the present study was .743.

II.B.2. Safety Climate

Safety climate was assessed by four subscales used in Griffin and Neal (2000) and total sixteen items including safety management values, safety communication, safety education & training, and safety systems. Manager Values were assessed by four items that asked about the degree to which managers valued safety in the workplace ($\alpha = .860$). An example item was "I think management is sincere in its efforts to ensure employee safety." Safety Communication was assessed by four items that asked about the way in which safety issues were communicated ($\alpha = .859$). An example item was "There is open communication about safety issues within this workplace." Safety Education & Training was assessed by five items that asked about the degree to which staff were trained in safety procedures ($\alpha = .876$). An example item was "The contents of the health and safety education and training provided my organization easy to understand." Safety system (or regulation) were assessed by three items that asked about the effectiveness of safety system in the organization ($\alpha = .876$). An example item was "Safety regulations of our organization are well operated, it is effective and useful for preventing risk behaviors." Employees responded on a five-point scale ranging from "Strongly Agree" (1) to "Strongly Disagree" (5).

II.B.3. Workload & Accident Experience

Workload was measured using five items that were extracted from Occupational Stress Scale for Korean Employees developed by Jang et al., (2005). Sample items are “I did a lot of work and chased to deadline always.” and “Often, I need to do another task before finishing the current task.” The Cronbach’s α in the present study was .819 and supervisors and workers responded on a five-point scale ranging from “Strongly Agree” (1) to “Strongly Disagree” (5).

Accident experience was measured using one item questioning the direct or indirect experience. The item is “Have you ever witnessed or suffered an accident directly within a year?”

II.B.4. Perceived Risk

Perceived risk was measured using five items that were extracted from Rundmo (2000), Melia et al., (2008) and report of Loughborough University Business School (2009). Perceived risk refers to the worker’s perception and anxiety about his or her own probability of suffering a work-related accident or illness. Sample item are “I am always worried about being injured on the job in this workplace.” and “In my workplace the chances of being involved in an accident are quite large.” Employees responded on a five-point scale ranging from “Strongly Agree” (1) to “Strongly Disagree” (5). The Cronbach’s α in the present study was .884.

III. RESULTS

Table II shows the means, standard deviations, and correlation coefficients of the measured variables. The results indicated that there were positive significant correlations between perceived risk and accident experience and workload, however, negative significant correlations between perceived risk and safety climate and safety leadership. All the correlation coefficients among these variables were statistically significant at the .01 level. In addition, safety climate have a positive significant correlation with safety leadership, but negative significant correlation with workload and accident experience. Safety leadership have a negative significant correlation with safety workload, but, no significant correlation with accident experience.

TABLE II. Means and Standard Deviations and Result of Correlation Analysis of Main Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Sex	–													
2. # of Workers	.086	-												
3. Working Hour	-.004	.199**	-											
4. Age	-.008	-.142**	.026	-										
5. Working Year	-.107*	-.153**	.091	.333**	-									
6. Safety Management Value	-.033	-.039	-.080	-.085	.017	-								
7. Communication	-.089	.068	-.159**	-.122*	-.010	.718**	-							
8. Education & Training	.004	.072	-.284**	-.105*	-.023	.528**	.728**	-						
9. Safety System	-.075	-.046	-.196**	-.135**	-.058	.582**	.657**	.792**	-					
10. Safety Climate	-.056	.012	-.212**	-.130*	-.025	.797**	.880**	.889**	.896**	-				
11. Safety Leadership	-.018	-.064	.010	-.022	.032	.561**	.574**	.564**	.593**	.661**	-			
12. Work load	-.086	.188**	-.005	-.091	-.045	-.211**	-.200**	-.195**	-.232**	-.243**	-.331**	-		
13. Accident Experience	-.087	-.014	.060	.035	.019	-.036	-.074	-.187**	-.135**	-.129*	-.035	.243**	-	
14. Perceived Risk	.023	.046	.005	.083	.004	-.287**	-.254**	-.256**	-.346**	-.334**	-.397**	.476**	.256**	-
<i>M</i>	1.23	2.51	8.37	49.53	16.31	4.42	4.20	3.88	3.68	4.04	4.00	2.67	0.17	2.71
<i>SD</i>	0.42	1.10	0.71	10.40	10.21	0.59	0.59	0.67	0.80	0.57	0.61	0.62	0.38	0.78

The results of hierarchical multiple regression analysis (See TABLE III) showed workload and accident experience positively influenced and supervisors' safety leadership and safety climate of organizations negatively influenced on the perceived risk of accident. Specifically, at the step 1, demographic variables have no influence on the perceived risk, safety

climate account for 11.1%, safety leadership 5.1%, and accident experience and workload 15.3% of the variance of perceived risk. The level of influence of workload ($\beta = .358$) on perceived risk were greater than other variables.

TABLE III. The Results of Hierarchical Multiple Regression Analysis

Step	Step 1		Step 2		Step 3		Step 4	
	β	t	β	t	β	t	β	t
Constant		3.977		7.522		7.382		4.177
Sex	.010	.197	-.010	-.193	.000	.007	.049	1.117
Age	.070	1.177	.034	.597	.043	.793	.085	1.709
Working Hour	-.008	-.155	-.084	-1.645	-.027	-.525	.003	.070
# of workers	.055	1.029	.072	1.408	.038	.767	-.016	-.352
Marriage	.048	.814	.037	.676	.051	.948	.009	.192
Safety Climate			-.345	-6.790**	-.123	-1.802	-.070	-1.125
Safety Leadership					-.312	-4.724**	-.215	-3.476**
Accident Experience							.155	3.415**
Work-load							.358	7.314**
R ²	.012		.109**		.158**		.310**	
F	.901		8.528		10.925		19.519	
ΔR^2			.111		.051		.153	

IV. CONCLUSION

These results of this study showed that individuals who work for a company with more positive safety leadership and safety climate perceive less accident risk than those working for companies with lower safety leadership of supervisors and safety climate of organization. In addition, those who work in companies with lower frequencies of injury and workload have perceptions of less accident risk than those working for companies with higher accident frequencies and workload. However, the positive or negative influence of perceived risk on safety performance (behavior, injuries and accidents) and psychological and physical health of employees will be different in the long-term and short-term perspective. Thus, future discussion and researches are needed to develop the model on antecedents and consequences of perceived accident/injury risk of employees.

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