

# Safety climate perceptions and attitudes of supervisors in the Korean Industry

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**Abstract:** Over the past 20 years in Korea, the incidence rate of industry accidents has been steadily decreasing from 2.66% in 1987 down to 0.99% in 1995. This reduction may be due to the proper management of hazardous machinery, Process Safety Management, Clean 3D Project, KOSHA18001 certification and more effective, technical and systematic approaches on safety. In 1998, the incidence rate was decreased to 0.68% and has remained at that rate for the last 13 years. This may be due to the various external industry environment changes. In particular, the disasters caused by unsafe behaviors are about 80% of the incidences. This criterion may need the attention and commitment of managers and administrators more than anything else at this time. Supervisors, usually at the forefront, have had direct involvement in injury accident prevention. We investigated the safety climate perceptions and attitudes of the supervisors. 1,507 sites out of total 11,883 worksites' random proportional samples were chosen based on industry type, size strata. On a five point scale questionnaire, 42 items were developed through expert advisory committee meetings. Safety and health awareness perceptions and attitude scores were calculated. Reverse coding was used for the negative questions asked. Supervisors' perceptions and attitudes on safety and health awareness had a mean of 3.61, and a standard deviation of 0.713, respectively. In particular, this number varied by the size of business, the age, gender, and longevity at the current work.

**Keywords:** Industry accident rate, Safety, Survey

## 1. INTRODUCTION

Over the past 20 years in Korea, the incidence rate of industry accidents had been steadily decreasing from 2.66% in 1987 down to 0.99% in 1995 (Figure 1). This reduction may be due to the proper management of hazardous machinery, Process Safety Management, Clean 3D Project, KOSHA18001 certification and more effective, technical and systematic approaches on safety. In 1998, however, the incidence rate was decreased to 0.68% and has remained at that rate for the last 13 years. This may be due to the various external industry environment changes. In particular, the disasters caused by unsafe behavior partake about 80% of the incidences. This criterion may need the attention and commitment of managers and administrators more than anything else at this time. Supervisors that are usually at the forefront have had direct involvement in injury accident prevention.

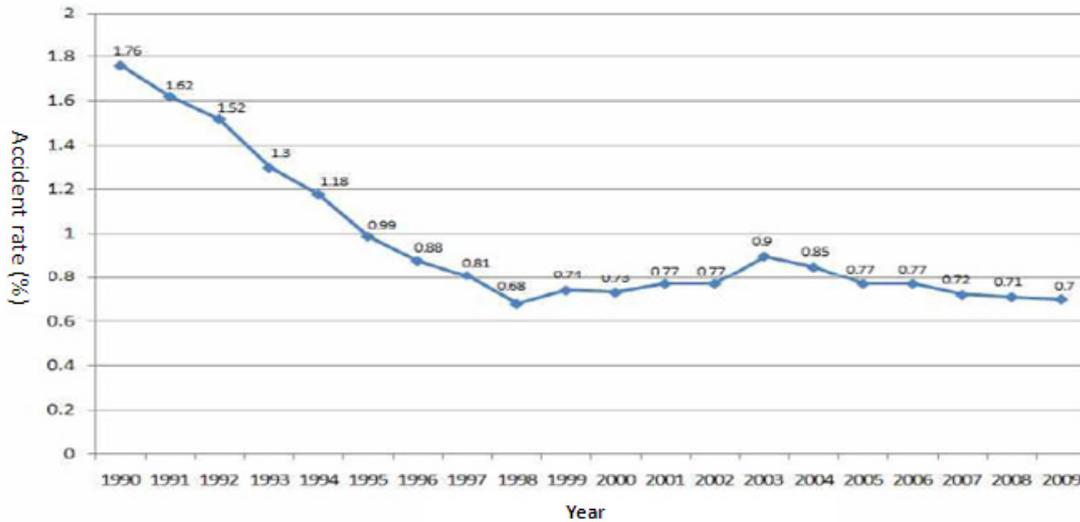


Figure 1. Accident rates from 1990 to 2009

The safety climate has been recently recognized as a fundamental and ultimate solution for improving workplace safety in various industries, including manufacturing industries such as chemical plants. Lord Cullen (1990) emphasized, during the Piper Alpha inquiry, that it is essential to create a corporate atmosphere or culture in which safety is understood to be, and is accepted as, the number one priority. Fennell (1988) stated that, following the Kings Cross fire, a cultural change in management is required throughout the organization. Petersen (1996) demonstrated that culture is to a large degree behind human-caused catastrophes. Zebroski (1991) found eleven attributes which have had medium to large degrees of commonality in the basis for the TMI-2, Chernobyl, Challenger, and Bhopal events.

There have been attempts to improve the safety culture and climate among industries as well as government agencies in Korea. However, there is a limited number of safety climate studies done in Korean manufacturing industries. We investigated the safety climate perceptions and attitudes of the supervisors. 1,507 sites out of total 11,883 worksites' random proportional samples were chosen based on industry type, size strata. On a five point scale questionnaire, 42 items were developed through expert advisory committee meetings. Safety and health awareness perceptions and attitude scores were calculated. Reverse coding was used for the negative questions asked.

## 2. METHODS

### 2.1. Data

We investigated the safety climate perceptions and attitudes of the supervisors. Random proportional samples were chosen based on industry type, size, and location. One thousand five hundred and seven sites out of total 11,883 worksites were selected. The research team developed a five point scale questionnaire with 42 items on it, and supplemented these through expert advisory committee meetings. Safety and health

awareness factors, perceptions, and attitude scores were calculated. Reverse coding was used for the negative questions asked.

**2.2. Analysis**

Analysis of the data was done using SPSS version 18.0. Descriptive statistics and further analysis were carried out. Significance level was set at alpha level of 0.05. The final measures contained 42 items in nine dimensions. Internal consistency reliability coefficients (Cronbach’s alpha) for the factors were all greater than 0.735 (Table 1).

Nine dimensions of the safety climate in Korean industries were identified:

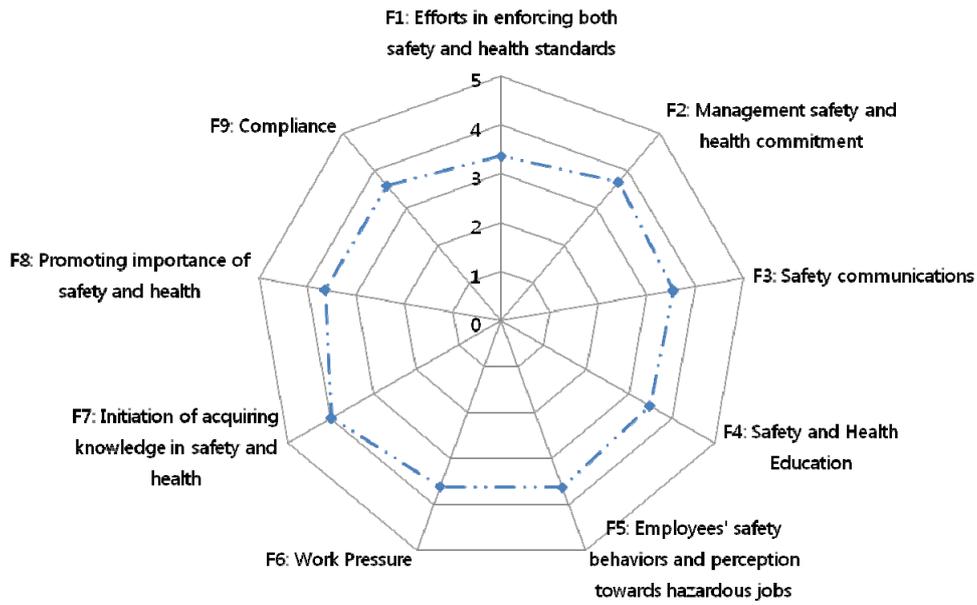
- F1: Efforts in enforcing both safety and health standards
- F2: Management safety and health commitment
- F3: Safety communications;
- F4: Safety and Health Education
- F5: Employees' safety behaviors and perception towards hazardous jobs
- F6: Work Pressure
- F7: Initiation of acquiring knowledge in safety and health
- F8: Promoting importance of safety and health
- F9: Compliance

Table 1. Dimension Means and reliability coefficients

Dimension	Number of items	Mean	Cronbach Alpha
F1: Efforts to enforce safety and health standards	6	3.36	0.735
F2: Management safety and health commitment	6	3.70	0.870
F3: Safety communications;	5	3.55	0.893
F4: Safety and Health Education	4	3.49	0.890
F5: Employees' safety behaviors and perception toward hazardous jobs	4	3.64	0.883
F6: Work Pressure	5	3.62	0.914
F7: Initiation of acquiring knowledge in safety and health	4	3.98	0.873
F8: Promoting importance of safety and health	4	3.63	0.893
F9: Compliance	4	3.59	0.900

**3. RESULTS**

Supervisors’ perceptions and attitudes on safety and health awareness had an overall mean of 3.61, and a standard deviation of 0.713, respectively. Initiation of acquiring knowledge in safety and health had the highest score (3.98) and efforts to enforce the safety and health standards had the lowest (3.36) (Figure 2). In addition, these scores varied by the size of business, age, gender, and longevity at the current work (see table 2). Gender differences were statistically significant for all the factors ( $P < 0.05$ ). Male had higher dimension scores across most of the safety and health dimension, except the safety and health education.



**Figure 2. Safety climate factor scores**

Table 2. Means of safety climate dimensions between gender

Dimension	Male	Female	p-value
Efforts to enforce safety and health standards	3.37	3.16	< 0.001
Management safety and health commitment	3.72	3.47	0.003
Safety communications;	3.57	3.37	0.016
Employees' safety behaviors and perception toward hazardous job	3.66	3.45	0.005
Work Pressure	3.65	3.30	<0.001
Initiation of changes in safety and health	4.00	3.74	0.008
Initiation of changes in a safer work environment	3.65	3.43	0.012
Compliance	3.61	3.40	0.005

In general, older age group had higher dimension scores across most of the safety and health dimension except the safety and health education and employees' safety behaviors and perception toward hazardous job (table 3).

Table 3. Means of safety climate dimensions by age group

Dimension	Age group					p-value
	20-29	30-39	40-49	50-59	60+	
Efforts to enforce safety and health standards	3.11	3.35	3.37	3.39	3.45	0.011
Management safety and health commitment	3.42	3.67	3.71	3.80	3.79	0.003
Safety communications;	3.24	3.55	3.55	3.63	3.69	0.002
Initiation of changes in safety and health	3.25	3.60	3.64	3.76	3.65	<0.001
Initiation of changes in a safer work environment	3.29	3.55	3.62	3.70	3.67	0.001
Compliance	3.32	3.60	3.64	3.76	3.65	0.001

#### 4. DISCUSSION AND CONCLUSIONS

The purpose of this study was to explore the levels of the safety climates in Korean industry. Especially the targeted plants proportion to size, location, and types of industry. So these industries meet with the pre-conditions for measuring safety climates suggested by HSE (HSE, 1999, 2000, 2002). 'F7: Initiation of acquiring knowledge in safety and health' was the highest among supervisors and 'F1: Efforts to enforce safety and health standard' was recorded as the lowest. Males showed higher scores across most of the domain, and older supervisors had higher scores. These results are a little different to the results from Correll (2000, 2001). In this study, plant size (number of employees) had a significant relationship to the level of the safety climate, in contrast to Correll (2001). The levels of safety climate showed an upside-down U-type distribution (Low-High-Low) by age group. Thus, it would be beneficial to have a regular and systematic continuing education and training for employees in order to reinforce safety in the workplace by each different age group and female workers.

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