



## Original Article

# Unions, Health and Safety Committees, and Workplace Accidents in the Korean Manufacturing Sector

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## ABSTRACT

**Background:** Despite the declining trend of workplace accidents in Republic of Korea, its level is still quite high compared with that in other developed countries. Factors that are responsible for high workplace accidents have not been well documented in Republic of Korea. The main purpose of this paper is to estimate the effects of unions and health and safety committees on workplace accidents in Korean manufacturing firms. We also allow for the interactions between unions and health and safety committees in the analysis. The results obtained in this paper will not only contribute to the literature in this field, but might also be useful for employers and worker representatives who are trying to find an effective way to reduce workplace accidents.

**Methods:** This paper utilizes the 2012 Occupational Safety and Health Trend Survey data, which is a unique data set providing information on workplace injuries and illness as well as other characteristics of participatory firms, representative of the manufacturing industry in Republic of Korea.

**Results:** In estimating the effects of unions and health and safety committees, we build a negative binomial regression model in which the interactions between unions and health and safety committees are permissible in reducing workplace accidents.

**Conclusion:** Health and safety committees were found to reduce the incidence of accidents whereas unionized establishments have higher incidence of accidents than nonunionized establishments. We also found that health and safety committees can more effectively reduce accidents in nonunionized establishments. By contrast, nonexclusive joint committees can more effectively reduce accidents in unionized establishments.

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## 1. Introduction

Despite the declining trend of workplace accidents in Republic of Korea, its level is still quite high compared with that observed in other developed countries. For example, in 2011 the work-related fatality rate of Republic of Korea was 13 per 100,000 workers, which sharply contrasts with 3.5 for the United States and 0.6 for the United Kingdom [1]. Even compared with countries with a similar-size GDP (gross domestic product) such as Australia and Mexico, the Korean fatality rate in 2011 was still much higher, with Australia's and Mexico's, respectively, being 2.0 and 10.5 per 100,000 workers [1].

Factors that are responsible for high workplace accidents, however, have not been well documented in Republic of Korea. In particular, the roles of unions and workplace institutions such as health and safety committees have not been studied much in reducing workplace accidents in Republic of Korea. Often, unions and health and safety committees are believed to increase the workplace safety level more effectively than any government efforts because they can better identify the level of risk involved in jobs and share information about how to organize work in reducing the incidence of accidents.

Unfortunately, there is no consensus on the impact of unions and health and safety committees on workplace accidents. By

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examining coal mining industries, Boal [2], Garen [3], and Wallace [4] found that unions increased the workplace safety level, leading to a lower accident rate. By contrast, Fenn and Ashby [5] and Donado [6] provided evidence—contrary to the general belief—that firms with a higher proportion of unionized workers are associated with a higher number of workplace accidents. Taking a different avenue, Reilly et al [7] examined the interaction effects of unions and health and safety committees on workplace accidents. They found that health and safety committees reduced workplace injuries more significantly when employee representatives are appointed by unions. Their results, therefore, indicate the importance of effective interactions between unions and health and safety committees in workplaces.

The main purpose of this paper is to estimate the effects of unions and health and safety committees on workplace accidents of Korean manufacturing firms. To achieve the goal, this paper utilizes the 2012 Occupational Safety and Health Trend Survey data, which is a unique data set providing information on workplace injuries and illness as well as other characteristics of manufacturing firms in Republic of Korea. In estimating the effects of unions and health and safety committees, we build a negative binomial regression model in which the interactions between unions and health and safety committees are allowed in reducing workplace accidents. The results obtained in this paper will not only contribute to the literature in this field, but will also be useful for employers and worker representatives who are trying to find an effective way to reduce workplace accidents.

## 2. Materials and methods

### 2.1. 2012 Occupational Safety and Health Trend Survey data

In order to estimate the effects of union and health and safety committees, we used the 2012 Occupational Safety and Health Trend Survey data, which were collected and released by the Occupational Safety and Health Research Institute of the Republic of Korea Occupational Health and Safety Agency. The data set was constructed in the pursuit of providing information on the health and safety conditions of Korean establishments in order to develop proper health and safety policies at governmental as well as at firm level. A sample of 3,000 establishments (with five or more workers) in manufacturing industries and 3,000 establishments in service industries were randomly selected to represent the Korean manufacturing and service sectors, respectively. The survey contains information on health and safety education and training, union status, health and safety organizations and committees, number of accidents as well as employment characteristics of establishments. Because of a low incidence of workplace accidents in the service sector, our analysis focused on the 3,000 establishments from the manufacturing sector.

### 2.2. Negative binomial regression model

Our statistical model was a negative binomial regression model. The model can be used for overdispersed count data when the conditional variance exceeds the conditional mean [8]. It can be considered as a generalization of Poisson regression in which the unobserved heterogeneity of an establishment is included and assumed to distribute following a gamma function. Our model was very similar to the one adopted by Fenn and Ashby [5], who examined the relationship between union density and workplace accidents. The estimation of our model was done with the maximum likelihood method using Stata version 13.

### 2.3. Variables

All variables were measured at the establishment level in 2012. The following are the descriptions of dependent and independent variables:

#### Dependent variable

- *Accident*: the number of accidents (injuries and illness) that occurred

#### Independent variables

- $\ln(emp)$ : the natural logarithm of the total number of employees at the establishment
- *Office*: the share of office workers
- *Female*: the share of female workers
- *Older*: the share of workers aged 55 years or older
- *Foreign*: the share of foreign workers
- *Weekhr*: a categorical variable for the weekly hours of work; *Weekhr* = 1 if fewer than 40 hours; *Weekhr* = 2 if as many as 40 and fewer than 50; *Weekhr* = 3 if as many as 50 and fewer than 60; *Weekhr* = 4 if as many as 60 hours
- *Salesperwkr*: the amount of sales per worker (million Korean won)
- *Union*: a dummy variable, which equal is to 1 if there exists a union; 0 otherwise.
- *Hscommittee1*: a dummy variable, which is equal to 1 if there exists an exclusive health and safety committee; 0 otherwise
- *Hscommittee2*: a dummy variable, which is equal to 1 if there is no exclusive health and safety committee, but where a joint committee exists, dealing with health and safety issues and other matters

In general, the number of accidents is expected to decrease as the number of employees increases because, generally, larger establishments have more resources that can be devoted to health and safety measures [5,9]. The proportions of office workers and female workers are expected to be negatively associated with the incidence of workplace accidents. The effect of the proportion of older workers on the number of accidents might be ambiguous. On the one hand, older workers may have fewer accidents because they are more experienced workers. On the other hand, older workers may have more accidents because they can be limited in physical strength as well as mental concentration. The proportion of foreign workers is expected to increase accidents because of their shorter tenure at the workplace.

Employees with longer weekly hours of work are more likely to be exposed to workplace danger and hazard, so that the incidence of accidents is expected to increase as the number of work-hours increases. The sales per worker is a proxy variable for the quality or the wage level of the job. If workers take dangerous jobs for high wages, we expect this variable to be positively correlated with accidents [6]. By contrast, if workers with higher incomes take safer jobs, we expect this variable to be negatively correlated with accidents [10]. Therefore, the effect of the sales per worker on accidents is an empirical matter.

Finally, as discussed in the Introduction section, there is no consensus on the impact of unions and health and safety committees on workplace accidents. A traditional belief is that unions provide information on hazards involved in jobs and protect workers who refuse to accept dangerous assignments, so that unions reduce accidents. However, unions might increase the number of reported accidents because of they have a better monitoring system and provide protection for workers who report injuries and illness [6]. Evidence of the role of health and safety committees is less

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