

Correlation between Safety and Health Education and Working Environment Crisis Management under the Occupational Safety and Health Act

- Centering on the Industrial Accident

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ABSTRACT

This study examines the causes of industrial accidents, which are human capital losses of workers due to active participation in safety and health education under the Occupational Safety and Health Act, and examines the impact of industrial safety and health education on industrial accidents. To this end, this study investigated the disaster status by industry, industrial accident death status, accident death rate by industry, and industrial safety and health education status of companies based on three years from 2018 to 2020. The effectiveness of industrial safety and health education was verified using explanatory variables such as business type, size, workplace environment, characteristics of worker members, participation in government support policies related to industrial safety and health, and possible time to expose industrial accidents. Regular industrial safety and health education for workers in general workplaces showed a significant role and effect in reducing the number of casualties. Nevertheless, industrial safety and health education alone lacked efforts to create a safe workplace environment for workers, and it did not have much effect on actively feeling and participating in industrial safety and health education, so improvement and support measures are essential in terms of institution and operation.

Key words: Occupational safety and health education; government support policies; industrial accidents, number of casualties, workers, occupational safety and health regular education; workplace

1. Introduction

Recently, the importance of industrial safety and health education has been emphasized, but like other industrial accident prevention activities, industrial safety and health education always has a problem of effectiveness, and it is difficult to evaluate its appropriateness. (Shin Sang-moon, Lim Hee-soo, Lee Yong-hee, Jung Hong-in, Won Jiyeon, Heo Ji-hee, Kim Jun-woo, 2017:25) Among human activities, providing labor to engage in working activities is the most basic part of maintaining economic life. Through labor activities, workers receive wages to generate income, which leads to consumption, and thus the economy circulates. Considering this, human work activities can be said to be the activities that underlie the economic cycle. In this sense, industrial accidents are

disconnected from human labor activities, and in the short term, workers' own economic life cannot be led, but in the long term, they can come as a loss of capital in a country's economy as a whole.

The Occupational Safety and Health Act proposes regulations related to basic industrial accidents, which can be seen as regulations that must be observed before industrial accident prevention policies. Therefore, following these basic regulations and systems is the most fundamental way to prevent industrial accidents. In this study, the effectiveness of the Occupational Safety and Health Act is judged by examining the relationship between the implementation of the Occupational Safety and Health Act and the system of the Occupational Safety and Health Act by looking for legal provisions related to the cause of industrial accidents. In addition, we attempt to consider the reduction of industrial accidents as a management approach in addition to the

efforts to reduce industrial accidents through the current engineering approach.(Jung Won-il, Jeon Yong-il, 2014:2)

1.1. Background and Purpose of research

The Occupational Safety and Health Act has the nature of the Social Security Act in that it is a law to realize not only the right to work under Article 32 of the Constitution, but also the "state must strive to prevent disasters and protect the people from those risks." The revised Industrial Safety and Health Act, which was made in the wake of Kim Yong-kyun's industrial accident in December 2018, is important under the Social Security Act in that the purpose of the law has expanded the scope of protection from workers to labor providers such as special types of workers and delivery workers. However, the contents of Article 31-2 of the Occupational Safety and Health Act (Basic Safety and Health Education for the Construction Industry) to be dealt with in this study are only the degree of revision in the amendment (Article 31), leaving a regret that there is no essential change. The causes of disasters in the construction industry can be divided into physical factors such as defective scaffolding and safety rails not installed, and human factors such as incomplete behavior of workers, and according to Heinrich's theory, educational factors account for the largest proportion (88%). Therefore, basic safety and health education for daily workers in the construction industry is the most fundamental means to prevent disasters caused by human factors. In addition, the decrease in disasters due to education will lead to a decrease in the industrial accident insurance premium rate, resulting in a joint benefit of lowering insurance premiums for business owners in the construction industry and guaranteeing safety and health for workers. (Choi Byung Jun, 2019:4)

Research on the cause of industrial accidents was mainly conducted with an engineering or social psychological approach. Swaen et al. (2004) examined how psychological or socio-demographic factors of workers affect industrial accidents, and in particular, Kim et al. (2009) suggested a study that

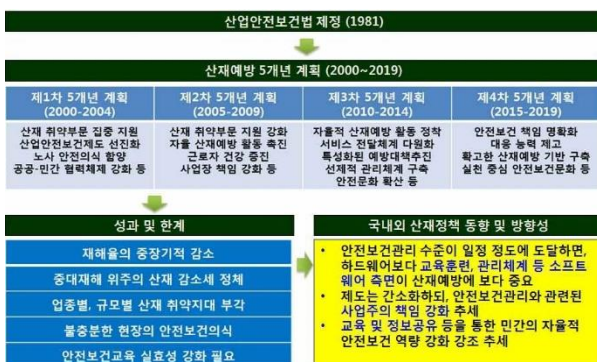
the higher the pressure on jobs, the higher the probability of industrial accidents.

[Figure 1-1] Research background

On the other hand, as an existing study that analyzed the cause of industrial accidents through an economic approach, Weil (2000) divides the loss of human capital due to industrial accidents into several stages. This is a separate definition of costs incurred when workers are unable to work due to industrial accidents, and domestic standards are also established. As a domestic study, Jung Won-il, Lee Gwang-seok, and Jeon Yong-il (2011) attempted an empirical analysis using the tobit model for foreign and domestic industrial accident occurrences by dividing the causes of their industrial accidents into deaths, injuries, and accidents and diseases. As a result of the study, it was found that foreigners were more likely to experience industrial accidents than Koreans, and the longer the number of years of service in the workplace, the lower the risk of accidents, but the higher the probability of disease.

In terms of implementing the Occupational Safety and Health Act, the industrial safety and health management structure is in contact with the legal part, and furthermore, the government's guidance and supervision, rather than the efforts of individual business owners. If the guidance and supervision of work is a factor that reduces industrial accidents, it can be said that legal regulations can also have this effect. Kim Sung-tae, Jung Won-il, and Jeon Yong-il (2011) investigated the relationship between the efficiency of guidance and supervision at local labor offices in each region and the occurrence of industrial accidents. Guidance and supervision is shown to have more efficient industrial accident prevention and reduction effects than other government policies (technical guidance, financial support), and if detailed legal regulations are added, issues to be focused on preventing industrial accidents can be derived.(Jung Won-il, Jeon Yong-il, 2014:3)

According to the Ministry of Employment and Labor's 2018 industrial accidents, the total number of casualties in 2018 was 102,305, up 13.9% (12,457) from the same period last year, and the death toll was 2,142, up 9.5% (185) from the same period last year. The increase in the total number of casualties was found to have increased due to the introduction of the estimation principle (2017 September), abolition of the employer confirmation system (2018 January), and expansion of workplaces covered by industrial insurance (2018 July). Looking at the overall industrial accident by



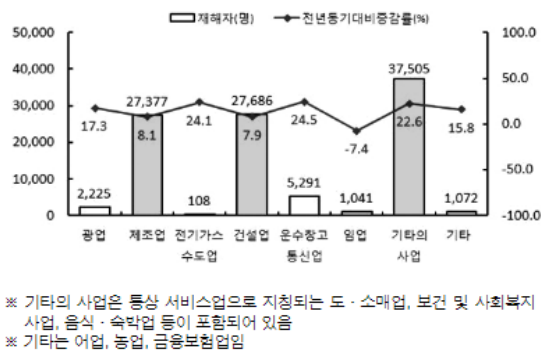
industry, the number of casualties occurred in the order of construction (27.1%) and manufacturing (26.8%), followed by other projects, and the construction industry accounted for 26.6% of the total deaths (Ministry of Employment and Labor)

In 2018, the accidental death rate from industrial accidents was 1.65‰, which was much higher than that of other industries (manufacturing 0.52 ‰, other 0.24 ‰), and the number of accidental deaths accounted for half of 485 (217 in manufacturing, 154 in service)

Related statutes include Articles 31-2, 32-2, 32-3 of the Industrial Safety and Health Act, 26-11-12, 13 of the Enforcement Decree of the same Act, 37-2-5 of the Enforcement Rule of the same Act, and 13-2 to 13-7 of the Industrial Safety and Health Education Regulations. A person who intends to establish a basic safety and health education institution can register with the Korea Occupational Safety and Health Corporation pursuant to Article 37-3 of the Enforcement Rules of the Industrial Safety and Health Act

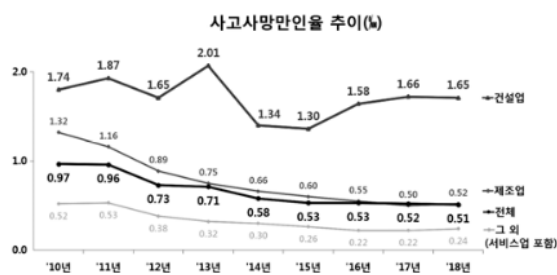
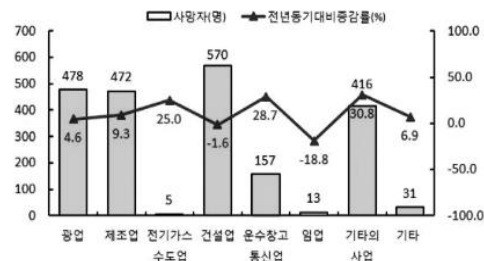
The state of industrial safety and health education is analyzed for major analysis of industrial safety and health education laws and the comparative analysis of advanced industrial safety and health education systems abroad is carried out sequentially (Shin Sang-moon, Lim Hee-soo, Lee Yong-hee, Hong In-won, Yeon-woo, Kim Jun-woo, 2017:10)

[Table 1-1] Status of casualties by industry in 2018



[Table 1-2] Status of industrial accident deaths by industry in 2018

[Table 1-3] Accident death rate by industry in 2018



Australia and Singapore are representative countries that legislate and operate the basic safety and health education system before us, and these countries have introduced a unique system called basic safety education as a preventive measure as the inflow of migrant workers into the construction industry continues to increase. In the case of the foreign system, it is different from the Korean system in that it has at least 2 hours more training time than us and has a system that can check the educational effect according to the post-education test or practical evaluation. Under the current domestic system, trainees can get a certificate of completion only if they attend education, so there is a limitation in that it is easy for trainees to decrease their immersion in class and measure the educational effect. In addition, Singapore needs re-education every two or four years, but in our case, there is a problem that the educational effect does not continue because there are no separate related regulations. In the case of Australia, efforts are being made to compensate for the problems caused by the system operation, such as disallowing education conducted by individual instructors and only through education institutions registered in government institutions. [Table 1-4] shows a comparison between the basic safety and health education system in the domestic construction industry and the systems in Australia and Singapore.(Choi Byung Jun, 2019, 5~9)

[Figure 1-2] Subjects and research methods of research on the current status of the system

[Figure 1-3] Actual practice of basic safety and health education in the construction industry



[Table 1-4] Comparison of Basic Safety and Health Education System for Domestic and Foreign Construction Industry

구분	대한민국	호주	싱가포르
교육 대상	건설근로자 (내·외국인)	건설근로자 (내·외국인)	건설근로자 (주로 외국인)
교육 시간	4시간	8시간	17시간
도입 시기	2012년	2001년	2007년

1.2. Current status and actual conditions of law implementation

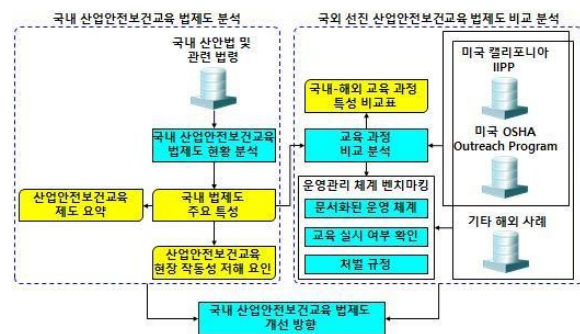
It can be said that the relationship between the implementation of the Industrial Safety and Health Act and the occurrence of industrial accidents in individual workplaces is very close. Compliance with the Occupational Safety and Health Act is the most basic part that can prevent industrial accidents in advance, so the possibility and preparation of industrial accidents can be examined by examining the implementation status of the law. The Occupational Safety and Health Act consists of a total of 72 provisions, and can be divided into general rules, safety and health management system, education and statistics management, and risk factor management. The legal provisions mainly dealt with in this study consist of a safety and health management system directly related to the prevention of industrial accidents and mainly analyzing provisions related to the management of risk factors at workplaces.

2. Improvement measures, countermeasures, and policy suggestions

2.1. Improvement measures

Measures to prepare education costs at the industrial level and to be claimed by educational institutions in the future may face controversy over equity in the formation and distribution of funds due to the nature of the construction industry that repeats creation and extinction. In order to solve the problem related to the subject of the burden of education costs, it is desirable to give employers the responsibility to comply with the educational obligations, but to dualize the education costs to those borne by the government such as the Ministry of Employment and Labor. However, considering the difficulties of securing budgets and administrative supervision, it is considered to gradually expand cost support limited to the vulnerable, such as the elderly, the disabled, and the long-term unemployed, rather than uniformly applying it to all targets. In addition, since most of the education, such as the industrial accident prevention rate system education conducted by the Korea Occupational Safety and Health Corporation, and the risk assessment business owner education, is free of charge, it can be an alternative. In addition, due to poor educational conditions and cost avoidance at construction sites, most daily workers will be able to avoid circular education at the site by changing the expression 'when hiring' to 'before hiring'. Therefore, in this study, as shown in [Table 3-1], we would like to propose amendments to the text, delete clues, and establish new additional provisions.

[Table 3-1] Amendment No. 31-2



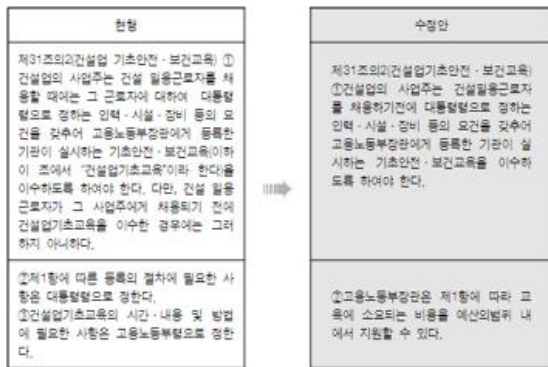
learned in education or become insensitive to safety.

대분류	소분류	교육대상	관련 법령
근로자 안전보건교육	정기교육	근로자 및 관리감독자	-산업법 제31조 (안전보건교육) -산업안전보건 규정 제2조(정의)
	채용 시 교육	채용 후 직무 배치 전 근로자	- 산업법 시행규칙 [별표8의2] 제1호 라목
	작업내용 변경 시 교육	변경된 직무 배치 전 근로자	
	특별교육	법정 고위험 직무 배치 전 근로자	
직무교육	건설업 기초 안전보건교육	건설 일용근로자	- 산업법 제31조의2(건설업 기초 안전보건교육)
	안전보건관리책임자	(좌동)	- 산업법 제32조 (관리책임자 등에 대한 교육)
	안전관리자	(좌동)	
	보건관리자	(좌동)	
안전보건관리담당자	(좌동)		

[Table 3-2] Major laws and regulations related to the obligation to implement industrial safety and health education

법령종류	법령명	시행일자	소관부처
고용노동부령	산업안전보건기준에 관한 규칙	2017.03.03.	고용노동부
고용노동부고시	공작기계 안전기준 일반에 관한 기술상의 지침	2015.02.09.	고용노동부
고용노동부고시	운반하역 표준안전 작업지침	2015.09.20.	고용노동부
고용노동부고시	화확물질의 분류표시 및 물질안전보건자료에 관한 기준	2016.04.06.	고용노동부
고용노동부고시	근골격계부담작업의 범위	2017.07.24	고용노동부

법령종류	법령명	시행일자	소관부처
법률	산업안전보건법	2017.10.19.	고용노동부
대통령령	산업안전보건법 시행령	2017.01.07.	고용노동부
고용노동부령	산업안전보건법 시행규칙	2017.02.03.	고용노동부
고용노동부고시	산업안전보건교육규정	2017.10.27.	고용노동부



[Table 3-3] Other laws and regulations related to industrial safety and health education

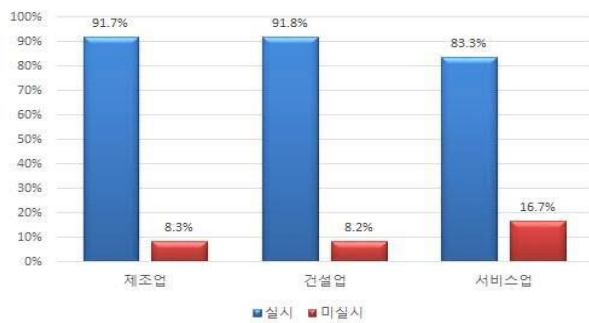
[Table 3-4] Curriculum Classification System

According to the Ministry of Employment and Labor's 2014 analysis of industrial accidents, the number of disasters in the construction industry was 21,669 and the number of deaths was 486, of which 67% (15,844) of them were killed, and 70.4% (342) of them were urgently needed. In an interview with an official from a basic education institution conducted in this study, he said, "The most urgent change from the basic safety education system is the re-education system," adding, "It is a pity that trainees cannot continue to encounter changing disaster cases." (Choi Byung-joon, 2019:13-15)

An empirical analysis was conducted and the effectiveness of industrial safety and health education was verified using explanatory variables such as the company's industry, size, worker composition characteristics, government support policies related to

Currently, there are no separate regulations related to retraining basic safety and health education in the construction industry, so there is a problem that the educational effect does not continue after the initial education. According to a study by German psychologist Hermann Ebbinghaus, 80% of the learning content is forgotten a month after learning. Workers who have completed basic education once are still exempted from basic education whenever they are hired at other sites, so over time, they are bound to forget disaster cases

industrial safety and health. As a result of analyzing the factors affecting the number of disasters through Poisson regression analysis, it can be concluded that regular industrial safety education for non-office workers at service sites plays a significant role in reducing the number of disasters. However, since industrial safety and health education has not had much effect in the overall aspect, improvement in the institutional and operational aspects of industrial safety and health education seems to be essential.(Jung Won-il, Jeon Yong-il, Lee Myung-sun, 2013;2)



The link between safety education and industrial safety education organized by life cycle is expected to lead to a change in workers' perception of industrial safety and health education. In addition, it is necessary to seek ways to expand high-quality public education services through the development of various industrial safety and health education contents, and to present effective measures for customized industrial safety education considering the characteristics of educators based on the learning pyramid of NTL (National Training Laboratories).(Shin Sang-moon, Heo Ji-hee, Lee Yong-hee, 2017:33)

Since the enactment of the Occupational Safety and Health Act, domestic industrial accidents have continued to decline, but despite the policy emphasis on industrial safety and health education, it is pointed out that industrial safety and health education is not sufficient.(Kim Jun-woo, Heo Ji-hee, New Moon,2017:34)

2.2. Countermeasures

Although industrial safety and health education is an important means of preventing industrial accidents, it is pointed out that it is still formal or false in the workplace, and safety insensitivity in the workplace is still prevalent and the problem of poor safety education continues. Occupational safety and health education is one of the most effective means to realize safety and health management capabilities, and in Korea, the Korea Occupational Safety and Health Agency is leading the spread and spread of safety and health education to workers.(Shin Sang-moon, Lim Hee-soo, Lee Yong-hee, Jung Hong-in, Won Ji-yeon, Heo Ji-hee, Kim Jun-woo,

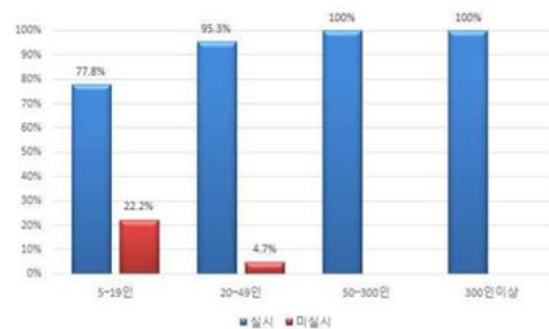
2017:4)

[Figure 4-1] Current status of health and safety education by industry

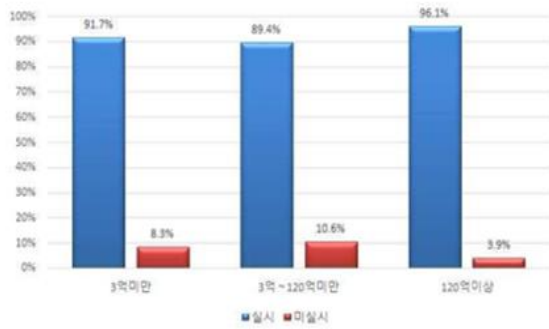
[Figure 4-2] Status of health and safety education by region



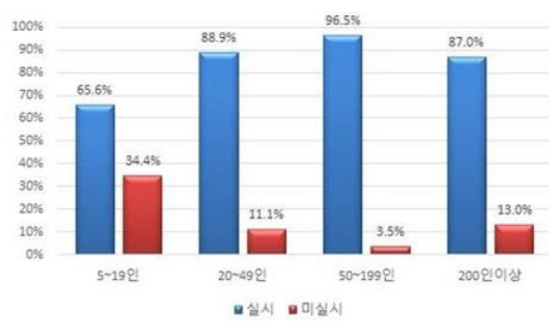
[Figure 4-3] Current status of safety and health education by size of manufacturer



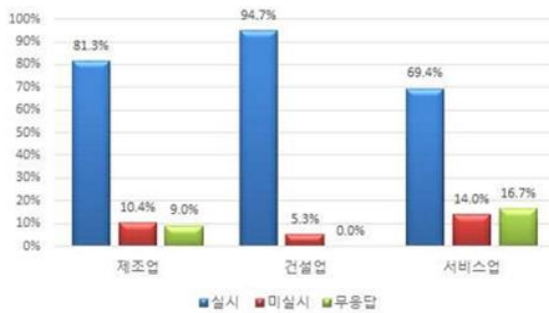
[Figure 4-4] Current status of safety and health education by size of construction companies



[Figure 4-5] Conducting health and safety education by size of service provider



[Figure 4-6] Current status of management supervisor training by industry



Although safety is considered important in front-line industrial sites, industrial safety education was not properly conducted due to the absence of safety management personnel, difficulty in preparing educational materials, and busy field work. Industrial safety and health education is generally conducted, but there were many cases that fell short of legal time. It was found that the activation of safety education and tool-based meeting (TBM) in 10 minutes before the start of the work could help strengthen the field operability of industrial safety and health education. It was also evaluated that it would be effective to provide mobile-based educational content and an app for educational performance manage-

ment. Expanding safety-related experience facilities to science museums and experience facilities visited by elementary, middle and high school students with their families as well as workers in the field could help strengthen the operability of industrial safety education and spread the industrial safety culture. (Jeong Heung-in, Kim Jun-woo, Shin Sang-moon, 2017:35)

Since the enactment of the Labor Standards Act in 1953, Korea's Occupational Safety and Health Education has been systematically managed and operated only in 1981, starting with the Labor Health Management Rules in 1961 and the Labor Safety Management Rules in 1962. It cannot be denied that safety and health education has played a major role in preventing industrial accidents, but small businesses still have a low rate of safety and health education, and problems such as formal education as a means of avoidance are to be solved. As the evaluation of industrial safety and health education is only a fragmentary survey evaluation, a systematic quantification performance evaluation plan is needed to improve the field operation of education. In addition, performance evaluation should lead to operational management and continuous improvement of industrial safety and health education. (Lee Yong Hee, Heo Ji Hee, Jeong Heung In, 2017:37)

2.3. Policy Recommendations

Preemptive prevention should be made effectively because the occurrence of a serious industrial accident can cause great damage to the victim's individual, the workplace, and even the region, and cause very large social costs nationwide. The role of government policies is very important in preventing industrial accidents worldwide, and Korea has been implementing a five-year plan for preventing industrial accidents step by step since 2000 (Shin Sang-moon, Lim Hee-soo, Lee Yong-hee, Jeong Hong-in, Won Ji-yeon, Heo Ji-woo, Kim Jun-woo, 2017:3)

The Industrial Safety and Health Act in Korea began with the Labor Standards Act. The Labor Standards Act was the first labor legislation enacted and promulgated as Act No. 286 on May 10, 1953, about five years after Article 17 of the Constitution of the First Republic of 1948 stipulated that "the standard of working conditions is set by law." The Labor Standards Act aims to ensure and improve the basic life of workers by setting standards for working conditions based on the Constitution and to promote balanced national economic development. (Korea Industrial Health Association, 2019:45)

There are three factors for disaster prevention: material, human, and management. However, since physical factors are also managed by humans, disaster prevention will eventually be most important to recognize and manage safety. According to the

Ministry of Labor's industrial accident analysis, among the management factors, about 35% of the accidents occurred due to educational causes, indicating that industrial safety and health education is a very important factor in preventing industrial accidents. (Kang Jong-cheol, Jang Seong-rok, 2004:144)

Life and health maintenance are the most basic rights for everyone, including workers. Since workers perform their work for the purpose of survival, they are sometimes exposed to various types of risks, so there is a great need to protect workers from such risks. The Factory Act (1833), the beginning of modern labor law, was enacted in the need to prepare measures necessary for recognizing the importance of industrial safety in the industrial era, indicating that the basis of labor law is industrial safety. (Korea Industrial Health Association, 2019:44)

[Figure 5-1] A plan to improve the diary of regular education



[Figure 5-2] New recruitment, change of work, and improvement of special education log



In [Figure 5-1], the improvement plan of the regular education journal requires managers and workers to prepare a checklist related to workplace safety and health management so that education needs can be identified before implementation and

a training plan can be established.

For new recruitment, work changes, and special education with relatively clear educational needs, the report composition items were reduced as shown in Figure 5-2, and education plans and individual education confirmation lists were also simplified compared to regular education. (Shin Sang-moon, Lim Hee-soo, Lee Yong-hee, Jung Hong-in, Won Ji-yeon, Heo Ji-hee, Kim Jun-woo, 2017:312-313)

In the case of the United States, the basic policy is to implement autonomous workplaces without direct government interference. Whether or not safety and health education is conducted is judged to be an important factor in the company's safety and health status. In addition, since legal responsibility is given to management supervisors who neglect safety management, many employers and workers participate in various industrial safety and health education conducted by the government. (Kang Jong-cheol, Jang Seong-rok, 2004:145)

Unlike the Korean legal system, U.S. Occupational Safety and Health Education emphasizes organic links between industrial safety and health education and other industrial safety management activities such as risk assessment and accident investigation, conducts regular training, and distributes various documented operation management tools. Safety and health education is not school education, but education for adults and should be conducted as a practical learning method centered on the field. In addition, if the disaster victims in the workplace are trained and utilized as safety education instructors, the effect of safety education will be doubled. The ultimate appearance of safety and health should be made as the development of autonomous safety management activities at workplaces, and the basis is the active safety management activities of employers and management supervisors. (Kang Jong-cheol, Jang Seong-rok, 2004:146)

Based on the Framework Act on the Promotion of Public Safety Education, we sought ways to develop safety and health education in connection with safety education by life cycle of the Ministry of Public Administration and Security. In summary, first, it is necessary to establish a safety education content portal site that can search for safety education contents scattered on safety education sites currently operated by various public and private institutions at once.

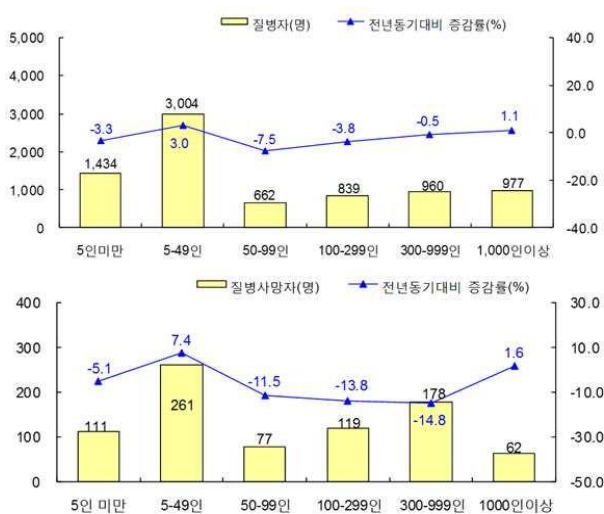
In order to raise the overall awareness and understanding of the Occupational Safety and Health Act in our society, systematic education on the Occupational Safety and Health Act is necessary. (Jeong Jin-woo, 2016:20)

So far, we have sought ways to develop safety and health education in connection with safety education by life cycle of the Ministry of Public Administration and Security based on the Framework Act on Promotion of National Safety Education to

spread the safety culture. In summary, first, it is necessary to establish a safety education content portal site that can search for safety education contents scattered on safety education sites currently operated by various public and private institutions at once. (Shin Sang-moon, Lim Hee-soo, Lee Yong-hee, Jung Hong-in, Won Ji-yeon, Heo Ji-hee, Kim Jun-woo, 2017:442)

In a study by Cho Heum-hak (2008), deaths of two or more people were higher in small and medium-sized workplaces with 300 or less employees than in large-scale workplaces, and in a study by Jang Gong-gu (2016), the average education rate was higher and the disaster rate was lower. Therefore, it is suggested that the subject of punishment education for business owners is targeted at all business owners with five or more employees and business owners at workplaces where a serious accident occurred.

[Figure 5-3] Ministry of Employment and Labor, industrial accident status (2016)



3. Conclusions

In order to prevent industrial accidents through industrial safety and health education, the Industrial Safety and Health Education Act and related laws in Korea specify the obligation to conduct industrial safety and health education, but due to the large amount of related provisions, there were many cases where they were not familiar with them. Finally, the direction of improvement of industrial safety and health education-related laws such as strengthening links with other safety and health management activities, dissemination of docu-

mented tools and forms, diversification of education methods, expansion of safety and health education for small workplaces, and adjustment of fines was derived.

The advancement and modularization of educational content are also necessary for interesting and beneficial education desired by workers in industrial sites. In fact, there are many demands from workplaces for new educational contents, so the advancement and modularization of educational contents are also very important for the advancement of safety education. It was found that small and medium-sized workplaces often provide safety education with the help of education agencies. There are also problems with the level of education and whether or not safety education is actually conducted, but it seems necessary to manage education agencies because it has the advantage of evaluating the risk of the field or training of experts.

As a result of the research on the development of the industrial safety and health education evaluation model, the evaluation of education is only a fragmentary evaluation (survey evaluation), so a systematic quantification performance evaluation model is needed to enhance the field operation of education. In addition, the evaluation of industrial safety and health education has a weak connection between the operation and management of industrial safety and health education and continuous improvement.

From a more fundamental and macroscopic point of view, the Ministry of Public Administration and Security proposed ways to strengthen the perception and field operation of industrial safety education by life cycle. In addition, a plan to expand high-quality public education services through the development of contents of various industrial safety and health education was prepared and presented. In terms of the spread of safety culture, changes in employers' perceptions are a very important part of strengthening the field operation of industrial safety and health education, and a penalized employer education plan was prepared and presented. (Shin Sang-moon, Lim Heesoo, Lee Yong-hee, Jung Hong-in, Won Ji-yeon, Kim Jun-woo, 2017:435-439)

Institutional improvements related to industrial safety and health education should be made. Due to the strengthening of legal regulations on industrial safety and health education, a system in which safety managers can be appointed by small and medium-sized companies to provide thorough industrial safety and health education should be supported.

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