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Overview and Analysis of S&H System According to the Life Cycle of A Construction Project in South Korea

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1. Introduction

The number of construction workers worldwide, including hereafter Korea, accounts for about 7% of the total number of workers in all industries. As a result of comparative analysis of the occupational accident fatality rate of construction, manufacturing and all industries from 2010 to 2020 in Korea, the accidental death rate in the construction industry is always higher than that of the manufacturing industry. To reduce work-related fatality at construction sites, the Korean government introduced the construction safety and health (S&H) system through the enforcement of the Occupational Safety and Health Act in 1982. Looking at the characteristics of the construction S&H system according to the Occupational Safety and Health Act, until the mid-2010s, the responsibilities and obligations for worker safety were mainly assigned to the contractor, and construction site safety management was operated and developed. However, since the construction accident reduction effect of the constructor-centered safety and health system is not clear, since mid-2010, the constructor-centered construction safety system has been changing to a system in which all stakeholders in the construction work participate. In addition, according to many studies that the safety and health system, which was centered on the construction phase, is most effective to remove risk factors from the construction project before the construction phase, which is the most ideal time, in terms of the preventive effect, the life cycle including the planning phase and design phase The safety and health management system of a construction project is being partially changed, and the safety and health ledger system was introduced as a representative example. In spite of the recent introduction of many construction safety and health systems, the number of occupational accident deaths at construction sites has continued to increase since 2016. appeared to be As one of these causes, it was argued that the stakeholders were constantly feeling confusion and burden of work due to excessive regulation of laws and regulations on construction safety. In terms of regulation of stakeholders who neglected safety management at construction sites, it is necessary to supplement the tight system as it is now, but it is necessary to additionally review the aspect of strengthening the implementation capacity of construction sites. Therefore, this study analyzed the construction safety and health management system stipulated in the Occupational Safety and Health Act from the perspective of construction stakeholders in Korea according to the life cycle of a construction project.

2. Method

In this study, for an overall analysis of Korea's construction safety and health system, major construction safety and health systems under the Occupational Safety and Health Act of Korea were analyzed according to the construction project life cycle. Opinions on major construction safety and health systems were analyzed. In this study, in the construction safety and health system, S&H ledger preparation or confirmation, estimation of the proper construction cost and period, hazard prevention plan preparation and implementation, appropriation of the occupational safety and health expenses and The usage system was mainly analyzed. Stakeholders consisted of contractors and safety managers, who play a key role in safety and health management at construction sites, and consisted of 5 or more per group. The interview contents consisted of on-site operability, advantages, disadvantages, limitations, problems, blind spots, and directions for improvement of the construction safety and health system.

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3. S&H system according to the life cycle of a construction project in Korea

Construction projects in Korea can be broadly divided into business plans and ordering phases, design phases, and construction phases. As shown in Figure 1, the major construction safety and health systems according to the Industrial Safety and Health Act at each stage mainly focus on the construction stage.

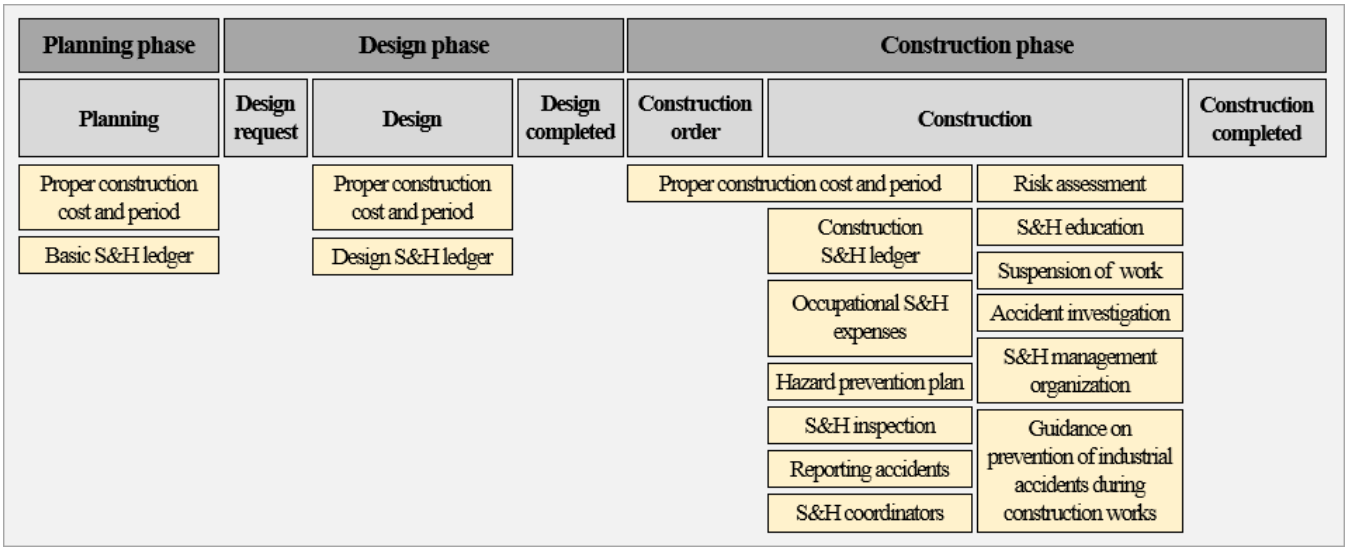

Figure 1. Safety and health system by construction project life cycle of the Occupational Safety and Health Act

Most of the construction safety and health systems in accordance with the Occupational Safety and Health Act must be complied with by the construction company, and with the introduction of the safety and health ledger system in 2019, the client's health and safety management obligation has given. Typically, the ordering party must prepare a health and safety ledger or check the health and safety ledger submitted by the designer or constructor. In the project planning stage, the client should prepare the basic S&H ledge by discovering the harmful risk factors to be mainly managed in the project and establishing risk reduction measures. In the design stage, the designer should design the safety and health of workers and prepare a safety and health design safety and health register based on this. The client shall receive the design S&H ledger from the designer, confirm the safety of the design, and provide the design safety and health record to the constructor. At the construction stage of construction work, the constructor shall prepare a construction S&H ledger with the safety and health measures implementation plan of the design safety and health register, the measures taken for the examination and confirmation results of the hazardous risk prevention plan, and changes in the occupational safety and health management cost, etc. shall check the implementation of the Construction Safety and Health Register.

Regarding the appropriate construction cost and construction period calculation system, the Occupational Safety and Health Act requires the client to calculate the appropriate construction period and construction amount, but does not separately provide relevant calculation standards. In other words, although the Occupational Safety and Health Act prohibits extension of the construction period and reduction of construction costs, there is no way to confirm the validity of an appropriate construction period and an appropriate construction amount.

The hazardous risk prevention plan preparation system is a pre-safety review system that establishes preventive measures for hazardous risk factors prior to the start of construction. The key content of the hazardous risk prevention plan is to establish a safety work plan for each detailed work type, and for temporary structures, safety calculations and design drawings are to be attached. The Hazard Prevention Plan is a system that reviews all plans directly by the Korea Occupational Safety & Health Agency (KOSHA) and checks whether the site is implemented once within six months, and is strictly applied to large construction sites.

The purchaser of a construction site that establishes a construction project business plan with a total construction cost of about $14,000 or more shall include the occupational safety and health management cost, which is an expense used to prevent industrial accidents at the construction site, in the contract amount or project cost. Occupational safety and health management costs are set as indirect costs in the construction cost composition and are strictly limited to use only for the safety and health

of workers. Representative items that can be used for occupational safety and health management costs include labor costs for safety managers, safety facility costs, and personal protective equipment and safety equipment purchase costs.

4. Opinions of Stakeholders on the Construction Safety and Health System

As a result of analyzing the opinions of stakeholders on the S&H ledger, it was mainly implemented for public order construction, and for privately ordered construction, the operation was insufficient due to lack of understanding of the system, and it was analyzed that the effect was weak so far because there are few matters reflected in the field. The advantage of the S&H ledger system is that it is possible to preemptively respond to predictable risk factors prior to construction by attracting the contractor's attention from the planning stage. On the other hand, what was presented as a disadvantage and limitation is that there is a limitation due to the professionalism of the contractor and the absence of a safety manager. In particular, the stakeholders argued that in the case of the design S&H ledger, the designer writes it, and the designer's lack of related knowledge and concept of risk assessment can lead to formal implementation of the system. Therefore, the stakeholders argued that when writing the basic S&H ledger and the design S&H ledger, a safety manager was input and it was necessary to write the S&H ledger together with the client or designer, or to improve the competency of designers and contractors through education. The construction in the case of S&H ledger, the creation and management of ledgers are smoothly performed at large-scale sites, but there are cases where small and medium-sized sites are not created. Considering that it is still in the early stages of implementation, it was analyzed that judgment on the operability of the system should be made later.

As a result of analyzing the field operability for the proper construction cost and period, it was analyzed that the operability of the regulations of the Occupational Safety and Health Act was somewhat insufficient. As an advantage of the system for calculating the appropriate construction period, there was an opinion that safety could be fundamentally secured by shortening the construction period. However, the stakeholders argued that, in the case of publicly-ordered construction, operability is poor because in many cases it is impossible to secure an appropriate construction cost and construction period due to the prohibition of the lowest bid and construction period adjustment. Therefore, in order to improve the system, the constructor argued that a solution to the limiting factors of the appropriate construction cost and the construction period was necessary, the safety manager said that It is necessary to check whether the construction cost and period are appropriate In the case of on-site supervision of the government or public institutions.

In the case of the hazard prevention plan preparation and implementation confirmation system, as the constructor had to prepare a hazard prevention plan and undergo examination and confirmation by the Occupational Safety and Health Agency, it was clearly recognized at the site and analyzed to have very good operability. The advantage of the system is that it is a prior safety review system. In particular, the hazard prevention plan was evaluated as having a large preventive effect and preparing the minimum standards for on-site safety management because it is possible to predict the risk in advance for hazardous hazardous work types. In particular, it was analyzed that the system was established as the implementation was confirmed through professional reviews and periodic on-site inspections by the Occupational Safety and Health Agency. The disadvantages of the system are that there are cases where the site and the plan are different due to the creation of an external organization, the amount is large, it is difficult to understand the details, and the transmission to the workers may not be good. As for the blind spots, the problem of non-fulfillment of work at small and medium-sized sites, the difficulty of coping with design changes and changes in construction types, and the fact that there are cases in which planning and construction occur separately were derived. As an improvement plan, on-site implementation confirmation and reinforcement of inspection were suggested for the hazard prevention plan.

The operability of the construction industry appropriation of the occupational safety and health expenses and use was found to be good as the occupational safety and health expenses were included as overhead costs in the construction amount. Although there is a positive aspect of safety and health management expenses to ensure that the costs invested in worker safety measures are smoothly executed at construction sites, it was found that some small-scale sites use them for other purposes.

5. Conclusion

This study analyzed the construction safety and health system according to the life cycle of a construction project, and suggested improvement plans for the construction safety and health system by analyzing the opinions on major construction safety and health systems targeting construction stakeholders. As a result of analyzing the construction safety and health system by construction project life cycle, the main system of the Occupational Safety and Health Act is focused on construction implementation, and there are basic S&H ledge and design S&H ledge preparation systems in the business plan and design stage. It was analyzed that the system to secure construction safety during the construction phase and construction completion phase was insufficient.As a result of analyzing the field operability of the construction safety and health system,

the S&H ledge system is in the early stage of its introduction, and unlike other systems, the roles of various stakeholders such as orderers and designers are important, but it was analyzed that field operability was relatively low due to their lack of expertise in safety and health. The estimation of the proper construction cost and period system was analyzed to have some low operability as it calculates the lowest bid and non-adjustable construction period when contracting at some sites. The system for preparing and confirming the implementation of the Hazard Risk Prevention Plan is relatively well implemented as it includes procedures for examination and confirmation by public institutions, and it was found that the appropriation of the occupational safety and health expenses is also well implemented. Therefore, in order to improve the field operability of the system, the verification system of the S&H ledge needs to be institutionally supplemented for the activation of the S&H ledge. In addition, it is necessary to prepare a small-scale hazard prevention plan that simplifies the contents to prepare and implement a hazard prevention plan at small and medium-sized sites with relatively insufficient manpower and capital. In addition, in the case of estimation of the proper construction cost and period, appropriation of the occupational safety and health expenses, and the use system, it is necessary to check whether the system is being implemented through direct on-site inspection by the government.

6. References

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