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A Study on Efficient Methods for the Execution of Safety Management Expenses under the Occupational Safety and Health Act and the Construction Technology Promotion Act

Min-Chul KOO¹, Seung-Hyun LEE²

1. First Author Doctor's Course, Department of Industrial Engineering, Sunmoon University, Korea.

Email: motorora777@naver.com

2. Corresponding Author Professor, Department of Fire and Disaster Prevention, Sunmoon University, Korea.

Email: shlee02@sunmoon.ac.kr

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Abstract

Research purpose: This study aims to explore efficient methods for the execution of safety management expenses under the Occupational Safety and Health Act and the Construction Technology Promotion Act. **Research method:** The study analyzes the requirements of the Occupational Safety and Health Act and the Construction Technology Promotion Act, proposing various methodologies, including detailed planning of safety management expenses, IT-based management systems, expert collaboration, enhanced training and education, subcontractor management, and regular audits and evaluations. **Research results:** Efficient execution of safety management expenses requires establishing detailed plans tailored to each site's characteristics and clearly allocating budgets for each category. **Conclusions:** The study confirms that strategies such as prior planning, IT technology utilization, expert collaboration, enhanced education and training, subcontractor management, and regular audits can simultaneously achieve accident prevention and cost reduction.

Keywords : Safety Management Expenses, Occupational Safety and Health Act, Construction Technology Promotion Act, Cost Efficiency, Accident Prevention.

JEL Classification Code : K23, K32, L52, L70, L74

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1. Introduction

1.1. Background and Necessity of the Study

The importance of safety management at construction sites is being increasingly emphasized alongside industrial development, and the legal systems supporting it are continuously being strengthened. The Occupational Safety and Health Act provides a legal framework to protect the physical and mental health of workers and to prevent various hazards that may occur in the workplace. Its purpose is to prioritize the protection of workers' lives and health while minimizing the social costs and corporate losses caused by industrial accidents. In addition, the Construction Technology Promotion Act focuses on managing technical safety and quality at construction sites, particularly emphasizing the establishment of systematic and scientific safety management systems for large-scale construction projects. Both laws define safety management expenses as a key means to ensure site safety and prevent accidents, and proper execution of these expenses is recognized as a legal obligation as well as a fundamental basis for practical accident prevention.

However, in reality, the intended purposes of these laws are often not fully realized, and safety management expenses are frequently not executed properly or are utilized inefficiently. At some construction sites, safety management expenses are allocated only in a formal manner without achieving substantial improvements in safety. In certain cases, excessive spending or misuse of funds results in unnecessary budget waste. This not only creates difficulties in meeting legal requirements but also leads to the failure to adequately protect workers' safety on-site.

Particularly at small- to medium-sized construction sites, where there is a lack of professional safety personnel and systems, and where investment capacity for safety measures is limited, these problems are even more pronounced. In workplaces where safety management systems are poorly established or where management lacks sufficient awareness of safety, safety management expenses tend to be perceived merely as a financial burden. As a result, there is a tendency to meet only the minimum legal requirements, making it difficult to achieve substantial accident prevention outcomes.

1.2. Purpose of the Study

The necessity of the study is emphasized for the following reasons:

1) Enhancing workplace safety: The efficient execution of safety management expenses is essential to

prevent accidents in industrial and construction sites and to ensure the safety of workers. However, many companies fail to establish clear execution plans, resulting in noncompliance with legal requirements or the incurrence of unnecessary costs.

2) Enhancing cost efficiency: Safety management expenses are not just simple costs but investments that contribute to long-term accident prevention and improved productivity. Without proper planning and management, unnecessary expenditures may occur, which can become a financial burden for the company. It is necessary to manage this efficiently in order to strike a balance between safety and cost.

3) Reducing legal risks: Improper use of safety management expenses can lead to legal sanctions, which may negatively affect the company's image and finances. A strategy is needed to ensure that the execution of safety management expenses under the two laws is carried out effectively in accordance with legal requirements.

4) Improving the level of safety management: By efficiently executing safety management expenses, it is possible to reduce accidents and enhance workers' safety awareness. In addition, it is necessary to present practical methodologies to enhance the overall level of safety management through the use of IT technologies and collaboration with experts.

Therefore, the purpose of this study is to explore efficient execution strategies for safety management expenses under the Industrial Safety and Health Act and the Construction Technology Promotion Act, and to propose effective approaches that achieve a balance between safety and cost management.

2. Main Body

2.1. Definition and Purpose of Safety Management Expenses

Safety management expenses are not merely a budgetary item—they represent a strategic investment made by companies to protect workers on-site, maintain construction quality, and enhance both corporate and societal sustainability.

First, the primary purpose of executing safety management expenses is accident prevention. A single accident in the industrial field can result in severe consequences—not only endangering workers' lives and health but also causing significant financial loss and damaging the company's social credibility. In this sense, safety management expenses are not for responding to accidents after they occur but for proactively preventing them. Funds used for providing protective equipment,

eliminating hazards, and conducting safety training directly contribute to worker protection and, ultimately, reduce the financial burden on the company by preventing incidents.

Second, these expenses are essential for building a safety culture within the workplace. Installing safety systems and investing in training and education help workers recognize the importance of safety and encourage voluntary compliance with safety rules. When such a culture is firmly established, it can eliminate the root causes of accidents and elevate the company's overall safety management standards.

Third, the execution of safety management expenses is also tied to legal responsibilities. The Industrial Safety and Health Act and the Construction Technology Promotion Act mandate the use of safety management

expenses on-site. Failure to comply may result in administrative penalties, fines, or even civil and criminal liability. Properly executing these expenses is more than just a legal duty—it serves as a critical indicator that the company is fulfilling its social responsibilities.

Lastly, the appropriate execution of safety management expenses is a vital strategy for ensuring a company's sustainability. With the growing emphasis on ESG (Environmental, Social, and Governance) management, companies are expected to focus not only on financial performance but also on responsible investment in non-financial areas. In the "Social" component, companies that prioritize worker safety and well-being earn long-term trust from the market and secure sustainable competitiveness.

Table 1: Key items and application cases for safety management expenses

Category	Item	Main Usage	Application Example
Industrial Safety and Health Act	Purchase of Safety Equipment	Personal protective equipment, detection sensors, emergency exit signs, etc.	Installation of insulating gloves and warning lights to prevent electric shock during electrical equipment construction
	Hazard Elimination	Installation of falling object prevention nets, soundproof walls, etc.	Installation of fall prevention nets during exterior wall work on high-rise buildings
	Safety Training	Mandatory pre-work training, new employee orientation training	Implementation of "Work at Heights Safety Training" before steel structure work
Construction Technology Promotion Act	Process-Specific Safety Measures	Proactive elimination of risk factors during the process design stage	Installation of gas detectors and implementation of automatic ventilation systems during tunnel excavation.
	Expert Consultation	Risk assessment, management consulting	Risk analysis through external industrial safety consultants
	System Implementation	Introduction of a cloud-based budget execution system	Management of expenditure history through the implementation of an integrated management system for large-scale sites.

2.2. Thorough Planning for the Usage of Safety Management Expenses

Although both the Industrial Safety and Health Act and the Construction Technology Promotion Act legally regulate the use of safety management expenses, these funds can only be truly effective on-site when supported by specific and thorough advance planning.

Each law has a slightly different focus in terms of how safety management expenses are applied. Under the Industrial Safety and Health Act, the focus is on directly protecting workers. Expenses are allocated to items such as the purchase and maintenance of personal protective equipment (e.g., helmets, safety shoes, gloves), installation of devices and facilities to eliminate or

minimize hazards, and operation of safety training programs for workers.

In contrast, the Construction Technology Promotion Act emphasizes system-level and organizational investments for managing overall site safety. This includes costs for safety reviews at the design stage to preemptively address risks in each construction phase, safety inspections and supervision, and the establishment and maintenance of integrated safety management systems on-site.

Due to these differences, it is important to clearly distinguish and plan the specific budget items according to the purpose and characteristics of each law, as illustrated in Fig. 1. For the Industrial Safety and Health Act, ensuring individual worker safety requires a detailed

analysis of the types and quantities of equipment and protective gear needed for each work process. Customized training programs that reflect the risks of specific tasks should also be developed, and sufficient budgets allocated accordingly.

Under the Construction Technology Promotion Act, risk evaluation and management across the entire construction process are key. For example, in tunnel excavation, installing gas detectors, or during large structure construction, conducting structural safety assessments is essential. As project scale increases, a more detailed and organized management system is needed, and budgets must be sufficiently allocated to support this infrastructure.

Recently, the adoption of IT-based budget management systems has increased under both laws to improve execution efficiency. Cloud-based systems allow real-time tracking and transparent sharing of how safety funds are used, enabling swift adjustments if discrepancies arise between the planned and actual usage.

Finally, both laws emphasize the importance of education and training to ensure that individuals responsible for on-site safety are fully competent. In the long term, such investment helps reduce accidents and encourages workers to voluntarily comply with safety protocols. Therefore, budgeting must go beyond basic legal training and include sufficient funding for in-depth, repetitive, and practical safety programs tailored to real on-site conditions.

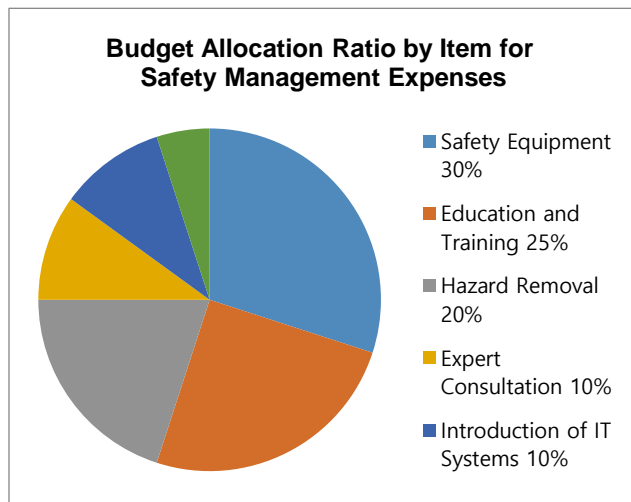


Figure 1: ratio of budget allocation by item of safety management expenses

2.3. Safety Management Expense Management Using IT Technologies

Both the Industrial Safety and Health Act and the Construction Technology Promotion Act emphasize the planned use and transparent execution of safety management expenses to ensure on-site safety. To realize this, cloud-based digital management systems, mobile applications, and IoT (Internet of Things) devices are now widely being utilized.

Cloud-based systems allow real-time recording and monitoring of how and where safety expenses are being used. These systems enable both on-site personnel and head office management to simultaneously track the execution of expenses. For instance, if spending on protective equipment or safety gear at a specific site deviates from the planned budget, real-time monitoring allows for immediate corrective actions. In addition, historical data from past projects can serve as a valuable reference for accurately and reasonably planning future safety budgets.

Under the Construction Technology Promotion Act, especially in public construction projects, integrated management systems are being introduced in more advanced forms. These platforms allow for comprehensive safety management across entire projects by digitizing risk factors and cost execution by construction phase. This enables the early identification of potential hazards and the immediate implementation of necessary safety measures, thereby improving overall project quality and safety.

Meanwhile, mobile apps and IoT-based sensors and devices enable the instant collection and monitoring of data on-site. Workers can report hazardous situations or the status of safety equipment through mobile applications, and IoT sensors can detect threats such as gas leaks or fire risks in real time, supporting immediate response actions. The collection and processing of such real-time data directly lead to more efficient and purpose-driven execution of safety management expenses.

The ultimate benefit of using IT for managing safety budgets lies in enhancing transparency and accountability. With all expenditure processes digitized and openly shared, misuse and waste can be fundamentally prevented. Moreover, workers can directly verify that safety management expenses are being used on essential items like protective equipment and training, thereby strengthening trust within the site.

In this way, leveraging the latest IT technologies has become a necessity—not an option—for managing safety expenses in accordance with the goals of the Industrial Safety and Health Act and the Construction Technology Promotion Act. Going forward, the extent to which companies and site managers actively adopt and utilize IT technologies will significantly impact both the safety level of the worksite and the long-term sustainability of

the organization.

2.4. Execution of Safety Management Expenses through Collaboration with Experts

To efficiently execute safety management expenses as outlined in the Industrial Safety and Health Act and the Construction Technology Promotion Act, collaboration with experts is essential. This is because safety management is not merely a matter of budgeting—it is a specialized field that deals with complex and multifaceted risk factors.

Under the Industrial Safety and Health Act, the primary focus is the protection of individual workers' lives and health. The selection of various protective equipment and safety devices used at worksites—regarding type, quality, and specifications—requires expert judgment. For instance, protective gear used for high-altitude work or in confined spaces must be chosen based on a precise understanding of the site's conditions and associated risks. Without expert involvement, selecting equipment and systems may become a mere formality, providing little real help in preventing accidents.

In contrast, the Construction Technology Promotion Act emphasizes comprehensive risk management across the entire construction project. Expert collaboration plays a vital role in risk assessments by construction phase, safety planning, early hazard mitigation, and oversight activities. For example, in large-scale projects such as tunnel or bridge construction, structural engineers, safety specialists, and supervisory experts must work together throughout the entire process—from design and construction to completion—to systematically evaluate risks and establish management strategies.

Risk assessment conducted with expert input is one of the most crucial aspects of allocating safety management expenses. Hazards vary significantly across sites and are often complex. Without professional expertise, it is nearly impossible to accurately assess these risks or develop appropriate countermeasures. Experts help determine the priority of budget allocation and ensure that funds are directed toward items that effectively prevent real-world risks, thereby maximizing cost efficiency.

Moreover, expert collaboration helps minimize legal risks. Both the Industrial Safety and Health Act and the Construction Technology Promotion Act impose strict legal standards for the use and documentation of safety management expenses. Failure to comply may result in legal penalties or administrative sanctions. Working with experts ensures that companies fully understand and comply with legal requirements, thereby reducing legal

liabilities and maintaining social trust.

This collaboration also contributes to fostering a strong safety culture on-site. The involvement of external professionals enhances awareness among workers and site managers, facilitates open communication about safety, and encourages employees to internalize safety as a top priority. Ultimately, sustained and practical collaboration with experts is key to improving the effectiveness of safety spending and transforming workplace safety into a core value.

2.5. Investment in Education and Training

One of the most powerful means of ensuring safety in industrial and construction sites is the systematic education and training of the workers on-site. The Industrial Safety and Health Act and the Construction Technology Promotion Act not only require the installation of protective equipment and facilities, but also mandate continuous and effective training to enhance workers' accident prevention capabilities and safety awareness.

From the perspective of the Industrial Safety and Health Act, safety education is a fundamental method for protecting workers' lives and health. Training should be tailored to actual working environments so that workers can properly wear protective gear and respond effectively to potential hazards. However, in reality, safety training often ends up being a formality under the name of "legal compliance." Therefore, it is essential to go beyond legal requirements and implement practical and effective training programs. For example, hands-on training based on site characteristics and VR-based accident response simulations can greatly improve workers' real-world response abilities.

In contrast, the Construction Technology Promotion Act focuses on organizational-level education and training to ensure the overall quality and safety of construction projects. It emphasizes not just the safety of individual workers, but also the training of site managers, supervisors, and technical personnel, enabling them to recognize and manage potential risks throughout the construction process. Large-scale construction projects involve multiple work types and complex environments, making customized training for each process essential. Especially for supervisory personnel, it is effective to implement structured programs where they can regularly learn the latest safety knowledge and management techniques from external experts and apply them to the site.

Investing in education and training leads to a long-term reduction in on-site accidents. A single accident can threaten the life and health of a worker and cause

significant financial and social losses for the company. The cost of proactive training is far less than the cost of dealing with an accident after it occurs, making education and training one of the most effective investments in safety management. Furthermore, workers who receive consistent and systematic training develop a stronger safety mindset and voluntarily follow safety protocols, naturally improving the overall safety level of the site.

From this perspective, investment in education and training should be seen not just as a legal obligation, but as a strategic investment in securing a company's long-term competitiveness. It not only protects the lives and well-being of workers, but also improves productivity and project quality. In the future, the level of safety management on-site will be determined not by how many advanced safety devices are available, but by how effectively and practically training programs are implemented.

2.6. Management of Partners and Subcontractors

Safety management at industrial and construction sites cannot be ensured solely by the responsibility of primary contractors or project owners. True safety is achieved only when subcontractors and partner companies actively understand and strictly comply with safety management standards. In this regard, both the Industrial Safety and Health Act and the Construction Technology Promotion Act clearly mandate the use and management of safety management expenses by subcontractors and partner companies.

The Industrial Safety and Health Act requires that primary contractors also take responsibility for the safety of subcontracted workers. This means that subcontracted workers must receive the same level of safety protection and management as directly employed workers. Primary contractors must regularly assess the safety capabilities and on-site performance of partner companies and continuously monitor whether subcontracted workers are receiving proper protective equipment and effective safety training. If subcontractors are not provided with adequate safety gear or are sent to the field with only formal or insufficient training, not only does the risk of accidents increase, but the primary contractor may also face serious legal liabilities.

Meanwhile, the Construction Technology Promotion Act requires a more systematic and organized approach to managing subcontractors and partner firms. Construction sites often involve complex networks of trades and companies, and effective accident prevention requires clear role division and collaboration among all parties. Accordingly, primary contractors and project

owners must establish specific safety guidelines and requirements for each subcontractor based on their assigned tasks, communicate them clearly on-site, and ensure continuous supervision and compliance. If an accident occurs within a subcontracted unit, it can severely disrupt the project timeline and quality, meaning that the safety level of subcontractors is directly tied to the safety of the entire site.

To manage safety expenses effectively, primary contractors and project owners must provide clear safety management guidelines and include detailed provisions for safety expense execution within subcontract agreements. To prevent these expenses from being treated as a formality or used in an opaque manner, concrete standards must be established, along with a regular internal audit and evaluation system. Site managers should also utilize integrated IT management systems to monitor subcontractor safety status and budget execution in real time, ensuring continual oversight.

When this kind of structured subcontractor management is in place, partner companies can use safety budgets more meaningfully to maximize accident prevention, while primary contractors can mitigate legal risks arising from poor subcontractor oversight. A well-managed subcontractor network enhances the overall safety competence of all parties and fosters a shared sense of responsibility, ultimately leading to a stronger on-site safety culture.

2.7. Regular Audits and Evaluations

The execution of safety management expenses does not end with simply allocating and spending a budget. A regular process of audits and evaluations is essential to verify whether the expenses are being properly utilized on-site and effectively serving their intended purpose. In particular, both the Industrial Safety and Health Act and the Construction Technology Promotion Act emphasize ongoing and systematic assessments and audits to ensure transparency and effective management of safety expenditures.

From the perspective of the Industrial Safety and Health Act, audits and evaluations of safety expense execution are crucial to protecting workers. In practice, funds for essential items such as protective equipment and safety training are often misused or handled in a merely formal manner. Regular audits are one of the most effective ways to prevent such inefficient or symbolic usage. The audit process must thoroughly check for consistency between planned and actual spending, cost-effectiveness, and compliance with legal standards. If shortcomings are found, immediate corrective actions should be taken, such as reallocating the budget or

conducting additional training to improve on-site safety.

Under the Construction Technology Promotion Act, more structured and comprehensive audits and evaluations are required to ensure the quality and safety of construction projects. Given the complexity of construction sites—with multiple contractors and processes involved—gaps in oversight can easily lead to increased risks without regular monitoring. Therefore, project owners must implement a system to periodically verify and assess the use of safety expenses across all work phases. In large-scale projects, it is especially important to evaluate items such as risk management for each process, the safety management capabilities of subcontractors, collaboration with experts, and the application of safety technologies.

Regular audits and evaluations also send a strong message to workers. When these processes are consistently conducted, both workers and managers become more aware and responsible in how safety budgets are used. This helps foster a strong safety culture on-site. Moreover, audit results can be used to identify and share best practices and areas for improvement, providing a foundation for enhancing training and raising the overall safety level.

The outcomes of these evaluations become valuable data for budgeting and planning in future projects. By analyzing which parts of past safety expense execution were effective and which had shortcomings, companies can plan more efficient and targeted budgets. This helps prevent unnecessary spending and ultimately leads to more effective accident prevention.

2.8. Compliance with Legal Requirements and Review of Latest Legal Amendments

The Industrial Safety and Health Act and the Construction Technology Promotion Act are fundamental legal frameworks designed to protect workers' lives and safety, as well as to ensure the quality of construction projects. These two laws are continuously revised and updated to reflect societal changes and emerging demands. As such, companies and site managers have a practical responsibility not only to be aware of these laws but also to regularly review the latest legal requirements and ensure full compliance.

First and foremost, legal compliance is more than just a formal obligation—it is a critical aspect of corporate risk management. Failure to properly implement the requirements of the Industrial Safety and Health Act and the Construction Technology Promotion Act can lead to severe legal consequences in the event of a workplace accident. These may include administrative penalties, fines, and even civil and criminal liability, in addition to

significant damage to a company's reputation and public trust.

Despite the importance of legal compliance, companies often fail to keep up with revisions or overlook recent amendments. These laws are continuously updated to reflect real-world site conditions, and recent developments such as the enforcement of the Serious Accidents Punishment Act have further increased the legal responsibilities of employers. Therefore, companies and site managers must routinely review legislative updates and apply them promptly on-site. Doing so not only reduces legal risks but also contributes to improving the actual safety of workers.

Collaboration with experts is essential when reviewing and applying the latest legal requirements. In many cases, in-house personnel may lack the expertise to fully understand and interpret the complexities of new legislation. Regular consultation with external legal professionals or occupational safety experts can help companies verify compliance and establish systems that allow for swift on-site implementation. It is also important to develop processes for real-time communication and education regarding legal updates so that site managers and workers are continuously informed and able to comply with current standards.

In particular, recent legal amendments go beyond strengthening formal requirements and place greater responsibility on companies. For example, with the implementation of the Serious Accidents Punishment Act, employers are now legally obligated to take more concrete and effective safety measures to prevent accidents. Site managers must fully understand the intent of such laws and establish practical safety management systems and procedures that align with them.

3. Conclusion

This study examined how safety management expenses, which are mandated under the Industrial Safety and Health Act (ISHA) and the Construction Technology Promotion Act (CTPA), should be practically utilized. The execution of safety management expenses is not merely a matter of cost control; it is a crucial process for ensuring worker safety and the long-term sustainability of businesses. To go beyond simply fulfilling legal requirements and actually enhance safety for workers and construction sites, a comprehensive approach is required—one that integrates advance planning, transparent cost management using IT technologies, collaboration with experts, systematic education and training, management of subcontractors and partner companies, regular audits and evaluations, and

compliance with the latest legal standards.

By effectively applying these strategies, it is possible to improve safety conditions at workplaces and construction sites while securing long-term cost efficiency.

The following outcomes can be expected from such an approach:

First, by systematically eliminating or reducing risk factors, the frequency of accidents can be decreased.

Second, through strengthened safety training and expert involvement, workers' safety awareness is enhanced, enabling quicker responses in the event of an accident.

Third, transparency in budget execution is ensured, maximizing safety outcomes relative to cost.

Finally, faithful compliance with legal requirements enhances the external credibility of companies and institutions while preventing potential legal disputes.

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