

Analysis of Status and Problems Associated with Construction Safety Management

Han, Kap-kyu¹ and Kim, Sun-kuk²

¹ Graduate Student, Kyunghee University, Kyunggi-do, KOREA ,
hkk277800@hanmail.net

² Professor, Kyunghee University, Kyunggi-do, KOREA, kimsuk@khu.ac.kr

ABSTRACT

An increasingly large number of recent construction projects are investing substantial resources in safety organization, training, inspection and evaluation to help prevent accidents. Such efforts were backed by the government's December 2004 approval and announcement of the "2nd 5-Year Plan of Industrial Accident Prevention." Despite the administrative support, however, accidents are surging in the construction industry in recent years. Among a host of reasons that could explain such phenomenon, one is particularly noteworthy: the conflicting trend in the current industry practice marked by favoritism toward larger and more complex projects and active entry into the market by less experienced or older workers and female crews. That said, the role of safety managers is becoming crucial in the industry's efforts to ensure zero accident. The purpose of this study was to conduct thorough analysis of the status and problems associated with construction safety management so that the information obtained will be utilized as underpinning materials to help establish accident prevention measures.

Keywords: Accident, Safety Management, Influence Factors.

1. INTRODUCTION

1.1 Length of Paper

The latest trend in construction favors larger and more complex projects. By contrast, the industry is witnessing a greater influx of inexperienced, older, or female workers entering into the market.

In December 2004, the government announced its approval of the "2nd 5-Year Plan of Industrial Accident Prevention (2005 - 2009)" as part of the administrative support to help ease the conflicts. However, the policy has seemed to do little to curb the soaring number of victims reported in

annual construction industry accident data, as evidenced by the Ministry of Labor's statistics where the year 2006's 17,955 victims increased to 19,050 in 2007. The majority of the incidents, according to the data, are attributed to insufficient prior accident prevention measures. And this calls for greater responsibilities to be shouldered by safety managers among other related factors.

Review of literature of some of the latest works in the field includes studies by Jung Jae-wu et al. (2007) and Park Chan-jong et al. (2006), which suggested problems and improvement possibilities identified in

construction project sites. But the majority of the articles reviewed addressed problems from legal or legislative perspectives, leaving little or no insight into the problems from a construction site safety manager's standpoint. The purpose of this study, therefore, was to perform detailed analysis of the status and problems associated with construction safety management so that the information will be used as underpinning materials to help establish accident prevention measures.

1.2 Research Scope and Method

Scope of this study was the site safety management that is normally conducted in the process of constructing new buildings. Method utilized for this study is illustrated in Figure 1 below.

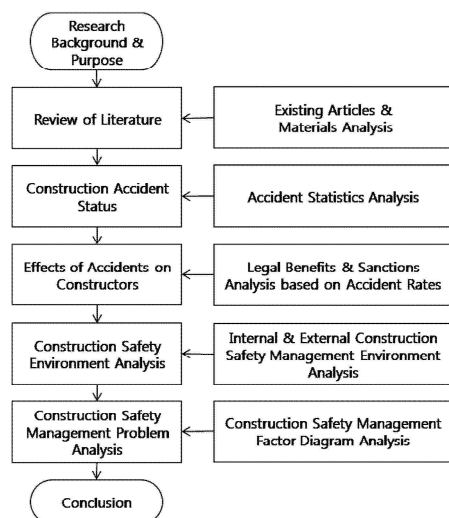


Figure 1: Research Process Flowchart.

First, existing research and literature are reviewed to identify the trend in the subject matter. Second, construction accident statistics are analyzed to help understand the status of incidence details. Third, effects of accidents on constructors are examined by looking into the legal/legislative benefits and sanctions based on accident rates. Last, construction safety management factor diagrams are analyzed to provide detailed review of problems associated with safety management.

2. THEORETICAL CONSIDERATION

2.1 Analysis of Research Literature

The present authors reviewed a number of previous studies that were conducted on the current research topic. The literature reviewed included studies by Jung Jae-wu et al. (2007) and Park Chan-jong et al. (2006), which respectively examined problems and improvement possibilities related to Korean construction safety management, as well as research by Park Gyeong-hun et al. (2007) and Ko Seong-seok (2005), where major causal factors of accidents and safety improvement options were discussed respectively.

Some of the literature examined for this study addressed safety management problems found in construction sites, which concurs with the present study topic. Jung Jae-wu et al. (2007), for instance, analyzed laws and regulations for construction safety management and problems associated with legal systems, safety management operation, safety activities and implementation methods, and suggested possibilities for improvement. But the study showed limitation in that it presented a brief examination of the safety issues based mostly on literature review. Applying the findings to actual site conditions, therefore, appears infeasible.

Park Chan-jong et al. (2006), on the other hand, focused on steel frame work in their search for causal factors of accidents and safety measures thereof. But their research only addressed major incidences, excluding minor ones, thus failing to execute a wide range of problem analysis.

Based on the findings from their review of literature, the present authors concluded that it would be fair to say that there was only a limited number of studies offering detailed analysis of construction safety management. The purpose of this study, therefore, was to conduct thorough analysis of safety management problems found in construction sites so that the information

will be used as underpinning materials to help establish preventive safety planning.

2.2 Status of Construction Accidents

Accident occurrence status of the most recent five-year term is presented in Table 1 below, which shows the "dipping" pattern in the number of the injured and the deceased and in the average accident rate, with the year 2005 serving as the reference point. Despite the government's approval and announcement of the "2nd 5-Year Plan of Industrial Accident Prevention" in December 2004, accident rate has been defiantly soaring ever since. A number of reasons could be produced, including lack of efficacy of the administrative effort as it was applied in actual construction sites.

Table 1: Construction Accident Occurrence Status for Past 5 Years.

Year	No. of the Injured(M)	No. of the Deceased(M)	Average Accident Rate(%)
2007	19,050	630	To be released in July 2006
006	17,955	631	0.45
2005	15,918	609	0.40
2004	18,896	779	0.51
2003	22,680	762	0.57

2.3 Effects of Accidents on Constructors

Relevant government authorities calculate Korean builders' accident rates and provide the companies with differentiated management service by identifying accident occurrence status of nation-wide construction sites operated by construction companies that have made it into top 1,000 builders whose construction capabilities are deemed superior, by calculating accident rate for each of the 1,000 constructors, and by categorizing the companies into four groups subject to the size of company. Table 2 illustrates benefits that high safety-performing builders get to enjoy. That is, companies in top 10 percent of each group

are spared from all sorts of inspection, supervision and control including site quality inspection for the following year.

The high-performing builders are also given extra benefits (maximum two points) while receiving prior inspection for tender participant eligibility (hereunder "the PQ").

Table 2: Benefits for High Safety-Performing Constructors.

Subject	Benefits
All sites operated by constructors that rank within top 10% of each group	·Exempt for all supervision and control (site inspection, etc.) for the following year ·Extra points for the P-Q (maximum 2 points)

Builders that constitute the bottom 10 percent of the 1,000 companies, with relatively poorer performance in safety ratings, suffer from a host of sanctions as shown in Table 3 below, such as warning delivered to the owner of the company and a special inspection performed for the entire sites run by the firm.

Table 3: Benefits for High Safety-Performing Constructors.

Subject	·All sites operated by constructors that rank within bottom 10% of each group
Sanctions	·Designated as special inspection firms during susceptible seasons over the following year, with exclusive inspection performed during July and August ·Deduction of constructability evaluation amount (maximum 5%) ·No extra points given to the PQ ·Limited eligibility for governmental selection of award/decoration candidates (including company management and employees)

Poor performing-contractors also face a wide range of disadvantages, such as deduction (maximum 5%) of construction amount during constructability evaluation as per Article 23 of the Framework Act on the Construction Industry, no extra points given to the PQ, and denial or restriction of eligibility during application for governmental selection of decoration/award candidates. The constructors' corporate image, too, may suffer beyond repair.

3. ENVIRONMENTAL ANALYSIS FOR CONSTRUCTION SAFETY

To ensure problems in construction safety are properly analyzed, constructors themselves are expected to launch internal safety activities and to identify operation details that are related to relevant authorities/organizations. In other words, builders should first have their internal and external safety environment examined and then render the identified problems to thorough analysis.

3.1 Internal Environment of Construction Safety

Figure 2 shows the internal safety activities that are normally conducted by the safety management team at project sites. Construction process was applied to present the activities.

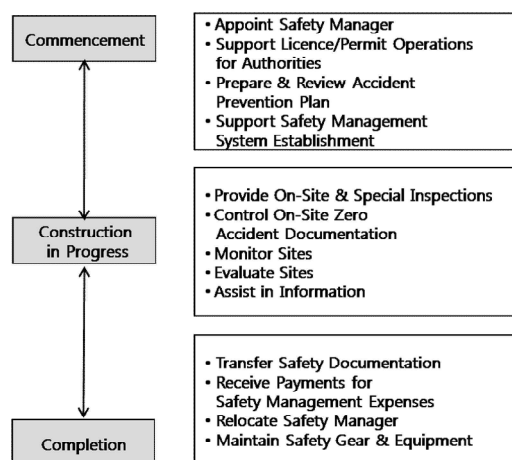


Figure 2: Internal Environment of Construction Safety.

Safety management teams at construction sites normally carry out a host of operations, such as appointing safety manager at the time of commencement, assisting in license/permit capabilities with relevant authorities, preparing and reviewing hazard/accident prevention plan, and providing support for safety management system construction.

While construction is underway, safety managers are engaged in official on-site and special inspections, on-site zero accident documentation management, site monitoring, and site evaluation and support.

Upon completion, safety managers deal with transferring safety documents and records, calculating safety management expenses and receiving payments, relocating safety managers, and maintaining safety gear and equipment.

3.2 External Environment of Construction Safety

Site safety management teams are expected to perform safety management activities as well as communication with relevant authorities or organizations. Their external operations are shown in Figure 3 below.



Figure 3: Internal Environment of Construction Safety.

First, safety management teams are responsible for collecting information from relevant authorities, such as the Ministry of Labor and its arms, on amendment and other changes made to the Industrial Safety and Health Act. Safety managers are also

responsible for reporting accidents, preparing for on-site inspections, and handling questions and responses.

Second, safety management operators can make policy suggestions to the industry organization Construction Safety Commission, can share information with other industry agencies, and can network and construct a professional cooperation organization through Construction Safety Professionals Commission.

Third, safety managers may apply for safety training and/or joint inspection by the specializing organization Korea Occupational Safety and Health Agency (KOSHA), and may collect safety information from Korea Industrial Safety Association (KISA).

Fourth, safety teams are authorized to have their partners or sub-contractors establish accident prevention commission to help support the constructor's safety activities and to carry out safety management operations on the partners or sub-contractors. In addition, safety teams are entitled to conduct zero accident document control, punishment, reward, and safety training support.

4. ANALYSIS OF CONSTRUCTION SAFETY MANAGEMENT PROBLEMS

The present authors carried out literature review and sought professional consulting prior to their investigation of Site S, to help analyze problems associated with construction safety management. During the site investigation, efforts were made to identify any and all factors that might influence safety management activities on-site.

Figure 4 below illustrates the findings by categorizing the aforementioned factors into seven groups, which were further categorized into 37 influence factors.

Problems associated with the influence factors that were analyzed are summarized below.

First, it was found that there was insufficient support for sub-contractors' safety management activities and for safety facility operations. Consulting support for specialized safety technology was found lacking as well.

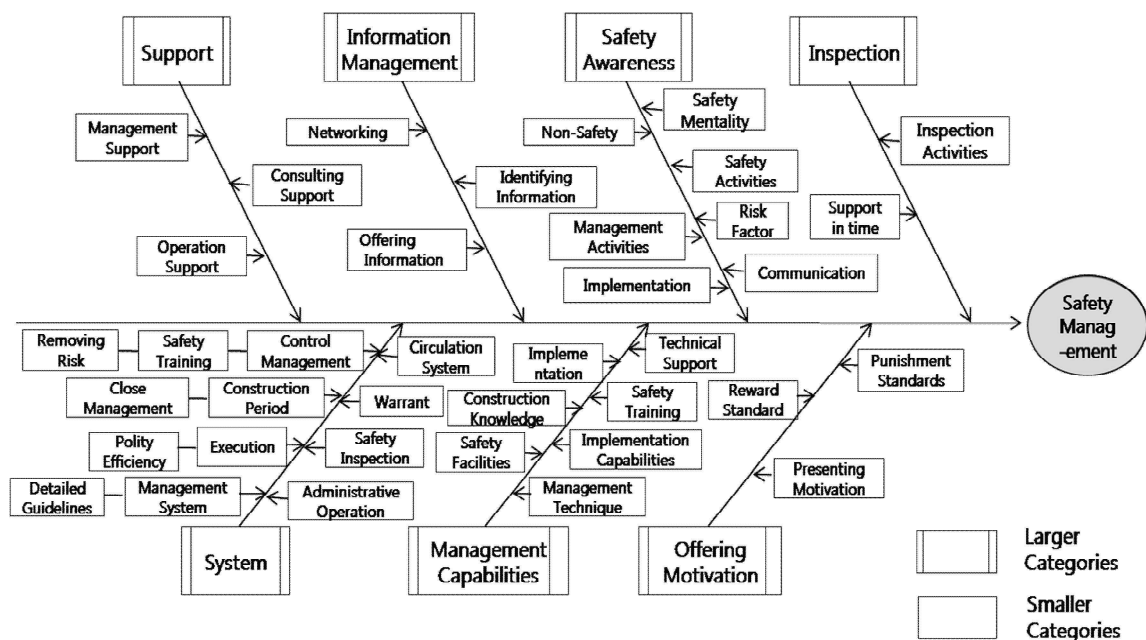


Figure 4. Safety-Management influence factor diagram

Second, information sharing for safety management know-how was found insufficient as safety managers engaged in information management activities. In addition, offering safety information was found not as active as it should have been. More efforts should also have made to secure and utilize local and international safety information updates.

Third, the level of safety awareness was found not as satisfying as expected. That is, sub-standard performance was observed in workers' safety-blind behaviors, sub-contractors' insufficient safety management activities, supervisors' insufficient safety management implementation, site representative's and/or safety managers' compromised safety mentality, insufficient removal of risk factors and early-stage risk elements, clash in opinions between supervisors and safety managers, etc.

Fourth, safety inspection activities were found lacking. In other words, site support and inspection were unclear, causing difficulties providing timely support for safety risk intervention.

Fifth, safety management systems were found incomplete, i.e., line of communication and instruction for safety inspection items and post-inspection management systems should be more thorough and more organically-structured. Other safety-compromising problems were found to include lack of internal site safety inspection activities, inefficient safety management due to excessive administrative work, difficulties managing and maintaining workers, and challenges of ensuring safety owing to current construction practices where the overriding priority is "beat the deadline." In addition, other related problems were identified, such as gap between the site office and the headquarters in implementation and decision-making, lack of solid establishment of on-site internal safety management systems, absence of sufficient effort to help promote sub-contractors' internal safety training programs, shortage in close management of

site workers, and lukewarm attitude towards confirming efficacy of all related laws, regulations and policies and towards increasing efficiency. What were also identified include nonexistent detailed guidelines that are crucial in implementing work and insufficient pre-construction removal of hazardous or risk-causing factors.

Sixth, the present authors assessed that there could be some lack in management capabilities. That is, safety managers may lack in work implementation abilities, construction knowledge, timely installation of safety facilities, and/or safety-related technical prowess. The lack of the capabilities may also imply the presence of insufficient on-site technical support activities, inadequate safety training based on worker characteristics and work types in progress, and inexperience in overseas project safety management implementation.

Last, lack in offering clear motivation as with safety policy implementation as well as reward and punishment standards for safety activities was identified as other possibilities.

5. CONCLUSION

Accidents in construction sites not only damage constructors' corporate image but also render the companies to assortments of government benefits or sanctions depending on accident rates. In order to protect workers from accidents and to ensure builders' position from administrative policies, safety activities, particularly those carried out by safety managers at construction sites, play a pivotal role.

This study analyzed safety management-related problems associated with construction sites so that the information obtained will be used as underpinning materials to help implement safety managers' activities and establish protective measures against accidents. The problems identified were grouped into seven categories including safety support, safety awareness, safety inspection, safety

management system, safety management capability, and motivation based on safety management implementation. The categories were further divided into 37 influence factors, each of which was reviewed for problem identification.

The data compiled in this study are believed to serve as solid basis on which safety planning and management will be established and executed to ensure safe working environment and accident prevention at construction sites.

Further research projects in the future are recommended to include ones that are designed to help identify improvement possibilities for construction safety issues, based on investigation of actual case studies involving construction sites.

REFERENCES

- [1] Lee Gyu-jin. 2008. Analysis of the Appropriateness of Safety Manager Appointment System based on Comparison of Accident Prevention Cost-Effectiveness by Size of Construction Site. Anthology of AIK Articles. Vol. 24, Issue 3. pp. 161 - 168. Korea.
- [2] Choi, Seung-mo, Lee Dong-eun, Sohn Chang-baek. 2007. Analysis and Comparison of Major Accident Occurrence Status by Project Type. Anthology of KICEM Conference Articles. pp. 714 - 717. Korea
- [3] Jung Jae-wu, Kim Tae-yang, Kim Hang-su, Cho Yeong-jun. 2007. A Study on Improvement Possibilities of Construction Project Safety Management." Anthology of KICEM Conference Articles. pp. 691 - 694. Korea.
- [4] Park Gyeong-hun, Kim Jun-hwa, Choi Seung-mo, Sohn Chang-baek. 2007. Analysis of the Characteristics of Major Construction Accident Occurrences. Anthology of National College Students' Research Conference. pp. 297 - 300. Korea.
- [5] Park Chan-jong, Song Ji-won, Yu Jeong-ho, Kim Chang-deok. 2006. An FMEA Application to Establish Major Safety Management Items, with Emphasis on Steel Frame Work Cases. Anthology of KICEM Conference Articles. pp. 502 - 506. Korea.
- [6] Ko Seong-seok, Song Hyeok, Lee Han-min. 2005. Development of Construction Project Safety Information System by Using Selected Cases and Risk Indexes. Anthology of AIK Articles. pp. 113 - 120. Korea.
- [7] Ahn Hong-seob. 2005. Improvement Measures for Construction Project Safety Management System. Anthology of AIK Articles. Vol. 21, Issue 9. pp. 137 - 144. Korea.