AURI-기본-2016-3

건축물 안전강화를 위한 합리적 정책방향 연구

A Study on Reasonable Policy Direction for Strengthening Building Safety

김은희 Kim, Eun Hee
여혜진 Yeo, Hae Jin
이여경 Lee, Yeo Kyung

(aur

SUMMARY

A Study on Reasonable Policy Direction for Strengthening Building Safety

Kim, Eun Hee
Yeo, Hea Jin
Lee, Yeo Kyung

1. Introduction

The purpose of this study is to provide reasonable policy alternatives in response to building safety risks. In other words, it will be vigilant against the policy response that has reinforced the relevant regulations every time a safety accident occurs, and will provide a feasible alternative based on the cause of the actual safety accident and the safety situation of our buildings. To accomplish this, three major tasks were performed in this study. First, the cause and risk factors of universal safety accidents were derived by grasping the current state of safety accidents and architectural safety in Korea. Second, the current status and limitations of the related systems such as the trend of the current building security enhancement policy and related laws and regulations have been reviewed. Third, implications of system of safety management system of foreign buildings and related system are derived. Through these tasks, policy direction for building safety were presented.

2. Analysis of the status of buildings safety accidents and risk factors

First of all, the cause of damage to the building fire caused by the statistics of the National Statistical Office was abrupt burning of combustible materials, fire

delays, delays in reporting, weather, drying and strong winds, remote fire stations, delays in arrivals due to traffic accidents, and delays in arrivals due to illegal parking. In the case of large fires, the expansion is very fast from the beginning of the fire, and 70% of deaths are caused by toxic gas inhalation of flammable materials. In the case of fire fighting equipments, which cause delays in notifying the fire, the failure of the fire detector, the failure of the emergency alarm facility, and the deterioration of the effectiveness of the sprinkler. The main cause of collapse is management failure during the use of facilities.

We examined the causes of 17 primary fire accidents and the causes of secondary damage in Korea, which suffered major casualties from 1960s to 2014. Generally, the main causes of fire accidents are electric leakage, welding fireworks, gas explosion, and fire protection. However, it is the structure of buildings and the appropriateness of fire fighting facilities to determine the scale of damage after the fire. The cause of damage at the construction phase identified in the case of accidents is unsuitable design criteria for safety facilities at the design stage such as evacuation passage, entrance door, etc.

The causes of the accidents at the construction phase can be divided into the carelessness of the contractor and the neglect of the management of the maintenance stage. Especially during the construction phase, short-circuit due to carelessness of the constructor during construction, gas explosion and poor construction that does not meet the design standards are problems. Finally, the causes of the accidents at the maintenance stage is a failure of the safety system due to the neglect of management, the unsuccessful evacuation route, and the uncertainty of the distance between adjacent buildings. In addition, due to the inability to secure the finishing material performance during the illegal alteration of the internal space during use, the damage caused by excessive toxic gas generation is increased.

In the case of a collapse accident, there are problems such as failure of structural design due to insufficient structural expertise of architects and failure of structural safety diagnosis. The causes of safety accidents related to the construction phase include reinforced concrete placement and concrete cladding poor construction, poor foundation construction work, application of unreasonable construction techniques for cost reduction, and carelessness of contractors during construction. The reason for

the safety accident in the maintenance stage is due to the illegal construction of the building or the change of the structure after the completion of the building, and maintenance and management of the building are also neglected.

As confirmed by statistical surveys and case studies, fire and collapse accidents are caused by insufficient maintenance in the process of using existing buildings. As a result, we conducted a survey on the buildings and management exclusions managed through the current building maintenance and inspection system. As a result, we can propose two major results. First, regarding the state of the building, the safety management status of the small-scale 20 years or more, structure A (masonry, concrete, wooden, other structure) is the worst and the priority improvement plan is required.

Second, the facilities for preventing the fire and collapse of buildings including the safety of the earth include structural strength (seismic design), corridors, stairs, doors, fire doors, roof openings, interior and exterior finishing materials, notice of disturbance from adjacent buildings, no earthquake-resistant design, no evacuation passage·stairway, illegally modified stairway, locked evacuation floor door, demolished or deformed fire door, flammable inner partition and interior·exterior sealant. An underground evacuation staircase and eight evacuation routes. These risk factors almost coincide with the cause of accidents based on the above-described safety accident statistics and case analysis.

3. Safety policy and legal system status and problems

The building security enhancement policy is implemented mainly by the Ministry of Land, Infrastructure and Transport and the Ministry of Public Safety and Security. The policy of the Ministry of Land, Infrastructure and Transport focuses on enhancing the physical structure of the buildings, that is, the inner and outer spaces and forms of buildings, and the surrounding environment. The Ministry of Public Safety and Security will seek to systematically and autonomously manage the experts and the public for the prevention of disasters such as fire or collapse after the creation of buildings and for the post-disaster response. These policies can be largely expected in three aspects.

First, the scope of the physical management target is expanded not only from existing multi-use facilities and large-scale facilities but also from small-scale buildings to institutional blind areas. It was provided the basis for securing the safety of buildings. Second, the subject of safety management is divided into stages of construction and the roles of specialists, support agencies and users of each stage (design, construction, maintenance) are classified. Third, the government was able to minimize the negative impacts on the industry and to cope with it by implementing flexible policies to cope with social change and building conditions.

However, despite these policy achievements, it is not possible to obtain information on the safety status of buildings and there is no correlation analysis between safety issues and countermeasures by sector (architecture, structure, fire, construction, maintenance).As a result, there is still a limit to accept the validity of the existing policy application methods and methods.

Major laws and regulations related to fire safety are divided into fire, building, electricity and gas. The laws and regulations related to building structure safety can be classified into laws that provide building structure standards and laws related to building structure safety management. We looked at them and found out the problems by the stages of building construction.

First, since regulations on the use of flammable materials in relation to fire safety are scattered among the Building Law and the Fire Service Act, consistency is reduced when the law is adopted. Regarding fire fighting facility installation plans, there are no regulations on sprinkler installation or installation of evacuation equipment for buildings below a certain size.

The problem with the building structure safety regulation is that it is difficult to guarantee the safety of the structural strength because there is no separate provision for the submission of the confirmation documents in the declaration of construction or the obligatory regulations for securing the structural expertise in the design of the buildings of a certain size or less.In the construction phase, there is a penalty clause for the case where the constructor does not proceed according to the structural design drawing, and there is no separate regulation when applying the technology for the special facility, which may lead to the problem of the poor

construction. In the maintenance stage, when a building user illegally enlarges or changes the structure, it imposes a compulsory performance deposit. However, it is difficult to grasp such situation unless a report is received.

4. Implications of Security Enhancement Policy and Legal System for Overseas Buildings

We reviewed the architectural safety policies and legislation in the United States, Germany and Japan, and made suggestions. First, in the United States, laws on the structural safety and fire safety of buildings are operated in a binary code system, which enhances consistency with a clear hierarchy.Also, in the process of enactment and amendment of the legal system, issues related to construction materials, construction technology, and disaster prevention performance are accepted by the technical standards of the private sector association. In addition, it introduces a proven level of technical standards that can be applied in the market and operates the legal system to ensure the stability of the system operation.

Germany defines safety of general buildings through a building law model, but has a separate safety enhancement model law for 10 types of special buildings. Through this, the legal system is divided into general regulation and special regulation.In the model law, specific criteria for the objects specified in the parent law are presented according to the conditions of each federal state, and the guidelines serve as a supplementary means for specifying the regulations for specific buildings. Accordingly, there is a good correlation between the high-level method, the low-level method and the guideline for the same safety factor. Germany also uses standard proposals of the Industrial Standardization Committee so that technical standards and engineering standards based on accumulated expertise and experience in the private sector and construction industry area can be legislated similarly to the United States.

Japan has the most similar legal system to Korea. The law related to building safety includes building, housing, earthquake-related, and architectural law, and it introduces various execution systems based on these laws. Especially, according to the Building Standard Law, the architectural confirmation level is strengthened by introducing the building confirmation system which strengthens the confirmation of the

experts three times at the planning stage, construction stage, and completion stage of the building. The Fire Service Act provides a procedure for fire fighters to confirm procedures in the process of verifying various standards under the Building Standards Act.It is also characteristic to operate a system that can strengthen the supervision of building safety management through the architectural justice law.

There are four main implications for the Korean case through overseas case analysis. First, legal systems should be able to enhance mutual coherence in the system where the legal system related to building safety is dualized. Especially, it is necessary to improve the regulations on the physical facilities and to make the regulations related to the fire fighting act as the fire fighting law so that the users of the legal system can operate efficiently. The second is to introduce safety guideline guidelines for details of safety standards for each type of building. For building types that are vulnerable to building safety, there is a limit to deal with specific technical standards in both the Building Law and the Fire Services Act.

Therefore, it is necessary to review the introduction of measures to regulate basic requirements in the Building and Fire Service Act. Third, building a system for building safety management using private sector and nonprofit organization. In the process of institutionalizing regulation, it is necessary to use the government-led top-down method, the legislation to cope with individual accidents, utilize the consultative body among related parties, and utilize the accumulated expertise and experience of the private sector. Fourth, it is to find ways to advance the safety standards of buildings through standardization of technological upgrading.

5. Rational Policy Direction for Strengthening Building Safety

In this study, three rational policy directions were suggested.This is the 'building safety standardization and basic information construction', 'safety related legal system improvement and standard upgrading', and 'flexible management of safety management system through role diversification'.These results were derived from statistical data on building safety accidents, case analysis, actual situation of building safety management, safety management policy, and legal system.From this perspective, the rational policy presented in this study is defined as a sustainable policy through clear recognition of the problem in question and diagnosis of the cause.

First, 'standardization of building safety and construction of basic information' is the basis for establishing mid- and long-term systematic building safety policy.As a detailed implementation task, 'building safety index and safety grade model' and 'building safety information system' were suggested.Second, 'Improvement of safety related legal system and improvement of standards' can be explained as stable and continuous management of building safety and security of users at the construction site.The detailed tasks for this were proposed as 'improvement of safety related legal system centering on building law' and 'improvement of building safety standard and reliability'. Lastly, 'Flexibility of Safety Management System through Diversification of Role Subject' was suggested.This is to reinforce the 'role of the person concerned' which is a direct cause of the building safety accident.The detailed tasks for this are 'strengthening the roles of experts and administrative bodies in the design and construction phase', 'strengthening the management responsibilities of users in the maintenance and management phase', and 'building an autonomous safety management system in the construction market'.

Key Words: Fire Accident, Collapse, Safty Risk Factors, Safety Management Status, Safety Enhancement Policy