A Study on the Re-establishment Method on Building Use Classifications

Hwang,Eun-Kyoung [1, a]

[1] Senior Research Fellow, Korea Institute of Civil Engineering and Building Technology, South Korea

[a]ekhwang@kict.re.kr

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AbstractThe current building escape regulation is specification standard mostly according to the purpose and size of the building. Therefore, for the operation of the regulation, the classifications of building use must be clear and consistent, but the classifications of the architectural field and the fire-fighting field are somewhat different. Moreover, the occupants density, which is the very basic standard for escape performance design, also somewhat differs depending on the individual law. Therefore, through comparative analysis of the classifications of building use and occupants density defined in each individual law including the Building Act, this study aims to use this analysis as the basic material for re-establishing the classifications of building use and occupants density of Korea in the future.

1. Introduction

1.1 Background and purpose of the study

Currently, the escape regulation in Korea is divided into the Building Act and the Law related to fire-fighting. In the past, when the functions and sizes of the buildings were simple, the individual laws on escape facilities and fire extinguish equipment were clear. However, due to the increase in escape safety requirements and the demand on safety evacuation design according to the recent super high-rise, large-scale and sophisticated building trend, similar standards are operated on the architectural and fire-fighting fields, and the representative cases are the classifications of building use and the occupants density.

First, in the Building Act, the purpose of the building is defined by combining the types of buildings according to the similar structure, purpose of use and type, and they are utilized as the main elements of determining the application of the building regulation. On the other hand, in the Installation, Maintenance, and Safety Control of Fire-Fighting Systems Act, fire-fighting objects which fire-fighting systems should be installed are classified as specific fire-fighting objects, defining centrally of the purpose of the building. Also for the occupants density, each standard are specified through the term of “the number of persons to be admitted” in the Building Act, Fire-Fighting System Installation Business Act, Installation, Maintenance, and Safety Control of Fire-Fighting Systems Act, and Special Act on Management of Disasters in Super High-Rise Buildings and Complex Buildings with Underground Connections. The object or method of each classification can vary depending on the legislative intent and purpose of the individual law, but applying different standards on a single building can cause hindrance on securing the building safety. Especially in operating the escape regulation, since the classifications of building use or the occupants density can be a very important standard, securing consistency on these are very urgent matters.

Therefore, the study aims to compare to draw differences from the classifications of building use and occupants density defined in the architectural and fire-fighting fields and seeks to the measures to improve the classifications and occupants density in order to utilize it as the basic material for re-establishing the classifications of building use and occupants density of Korea in the future.

1.2 Method and procedure of the study

This is a basic study for re-establishing the classifications of the building use and occupants density. Therefore, the classifications of building use and occupants density on the Building Act that are the

very basic of the classification of building use were examined. Next, the relevant standard defined in the fire-fighting field was derived to be compared and analyzed with the Building Act to review the differences. Based on these researches, the differences between the two were derived.

The classifications of building use and occupants density were derived through the National Legislation Information Center (http://www.law.go.kr) serviced by the Ministry of Government Legislation.

2. Derivation of relevant act and subordinate statute on the classifications of building use and occupants density standard

2.1 Relevant act and subordinate statute on the classifications of building use

According to the definition in Article 2 in the Building Act, the term "use of buildings" is defined as "classification of buildings according to similarity of structure, purpose of use, or style", and in Article 2, Section 2 and Annex 1 of the enforcement decree of the Building Act, the types of the buildings for each use are defined. Also for the fire-fighting field, Article 2, Section 3 in the Installation, Maintenance, and Safety Control of Fire-Fighting Systems Act (hereinafter referred to as Fire-Fighting Act) and Article 5 and Annex 2 in the enforcement decree of the same Act, the classification of building use for designation of specified fire-fighting object are defined. In the Fire-Fighting Act, the purpose of defining the classification of the building use is to define the specified fire fighting object required with more special maintenance for property protection and national safety on fire.

Table 1. Status of individual act related to classification of building use

Name of Act	Purpose of classification	Category	sub-category	Current standard
Building Act	-Apply the regulation by combining types of the buildings in similar structure, purpose of use, and style -28 categories, including detached houses, multi-unit houses, Class 1 & 2 neighborhood living facilities, facilities for cultural activities and assembly, etc.	28	132	2014
Installation, Maintenance, and Safety Control of Fire-Fighting Systems Act	-Designation of specified fire-fighting object -Facility requiring special maintenance among the fire-fighting facilities -30 categories, including multi-unit houses, neighborhood living facilities, facilities for cultural activities and assembly, religious facilities, etc.	30	128	2014

2.2 Relevant act on the occupants density

In the Building Act, there is no detailed definition on the occupants density, but when calculating the area of egress safety zones in high-rise buildings according to Article 50-2 in the Building Act, it is the area standard occupied per 1 person for each use according to the purpose of the building. The occupants density is defined in Article 8 and Annex 1-2 in the Regulation of Standard on the escape and fire-prevention structure of the building. In the fire-fighting field, it is defined not only in the Fire-Fighting Act, but also on the Special Act on Management of Disasters in Super High-Rise Buildings and Complex Buildings with Underground Connections, Installation, Maintenance, and Safety Control of Fire-Fighting Systems Act, and in the Fire-Fighting System Installation Business Act. In this study, the Fire-Fighting System Installation Business Act was examined mainly because performance-based design of the fire-fighting facilities is conducted based on this act. In other words, in the performance-based design method and standard of the fire-fighting facility (National Emergency Management Agency Notification No. 2013-10), the standard of calculating occupancy is defined for the preparation of the scenario of fire and escape simulation. In this standard, even though the term "the number of persons to be admitted" is used, it is the same concept as the occupant density in the perspective of the area per 1 person according to the purpose of use.

Table 2. Status of individual act related to occupants density

Name of Act	Term	Main applied regulation
Building Act (Regulation on the standard of escape and fire protection structure of the building)	-Occupants density	-Calculation standard of number of occupants by purpose of building use and area per 1 person when estimating the area of escape safety zone in a high-rise building
Fire-Fighting System Installation Business Act (Performance-based design method and standard of fire-fighting facilities)	-The number of persons to be admitted	-Performance-based fire-fighting design -Calculation standard of occupancy by purpose of building use when preparing the scenario of fire and escape simulation

3. Comparative analysis of standard between individual acts and review of re-establishment direction

3.1 Comparative analysis of classification standard of building use

As a result of the comparative analysis on the classifications of the occupants building use defined in the Building Act and the Fire-Fighting Act, the following differences were derived. First, due to the difference in the classifications of use, the Building Act was composed of 28 categories and 132 sub-categories, but the Fire-Fighting Act was composed of 30 categories and 128 sub-categories. The detailed differences were that for the Building Act, the detached houses, and Class 1 & 2 neighborhood living facilities are defined, but in the Fire-Fighting Act, there is no division of detached houses, and the Class 1 & 2 neighborhood living facilities are integrated to be defined. Also underground town, underground structure, cultural asset and complex building are defined additionally. Second is that different names are used for the same building use. Regarding the facilities related to resource recirculation and multiple living facilities in the Building Act, the Fire-Fighting Act is defining them as facilities for treatment of excreta and wastes and accommodation for examiners. Last is the case of the different standard detailed building type for each building use, and in the Building Act, the office facilities are divided into three types of public service, general service and officetel, but in the Fire-Fighting Act, it includes the community center and the village hall that are defined as Class 1 neighborhood living facility in the Building Act. The area standard by building type is also different. In the Building Act, the restaurant area (rest area) is defined to be less than 300㎡, but in the Fire-Fighting Act, it is defined to be less than 150㎡.

Table 3 . Derivation of main differences between the classifications of building use

Main problem	Building Act	Fire-Fighting Act
Different classification system for use	-28 categories and 132 sub-categories -Detached houses -Class 1&2 neighborhood living facilities	-30 categories and 128 sub-categories -No standard on detached houses, integrated as neighborhood living facility -Addition of underground town, underground structure, cultural asset and complex building
Different name	-Facility related to resource recirculation -Multiple living facility, etc.	-Treatment of excreta and wastes -Accommodation for examiners
Different standard on classification of use and type	-Office facility: Public service, general service, officetel, etc. -Class1 neighborhood living facility (Restaurant (rest area) area less than 300㎡) -Class 2 neighborhood living facility (Karaoke)	-Public service, general service, community center, village hall, substation, etc. -Restaurant area (rest area) less than 150㎡ -Karaoke less than 150㎡

3.2 Comparative analysis of the occupants density standard

As a result of the comparative analysis on the classification system of occupants building use that is defined in the Building Act and the Fire-Fighting Act, the following differences were derived. First, there was difference in the classification system of purpose of space use, and in the Building Act, it is divided into 11 purposes and 23 detailed purposes, but in the Fire-Fighting System Installation Business Act, it is divided into 9 purposes and 31 detailed purposes. Second, some names of the purpose of use are different. In the Building Act, the purpose of culture, assembly, sales and industry are defined as assembly, commerce, industry and warehouse in the Fire-Fighting System Installation Business Act. Also, the specific classifications by purpose are somewhat different. In the Building Act, the purpose of use is divided into underground floor, first floor, other floors, and transportation space, while in the Fire-Fighting System Installation Business Act, it is divided as escape floor, sales zone, sales zone above second floor, and underground sales zone for the commercial purpose. Lastly, the occupants density is different as well. In the Building Act, the space not using fixed seat for the purpose of culture and assembly is defined to be 0.45㎡/person, but in the Fire-Fighting System Installation Business Act, if it is for the purpose of assembly, the space not using fixed seat is defined to be .65㎡/person for high-density zone, and 1.4㎡/person for low-density zone.

Table 4 . Derivation of main differences between the occupants density

Main problem	Building Act	Fight-Fighting System Installation Business Act
Difference in classifications for the purpose of space use	-11 purposes and 23 detailed purposes for each type of use	-9 purposes and 31 detailed purposes for each type of use
Difference in name	-Culture, assembly, sales industry	-Assembly, commerce, industry, warehouse
Difference in occupants density	-Space not using fixed seat (0.45㎡/person) -Sports facility (4.6㎡/person)	-Space not using fixed seat (High-density 0.65 ㎡/person, low-density 1.4㎡/person) -Fitness center (4.6㎡/person), Exercise room (1.4㎡/person)

3.3 Derivation of problems on the classifications of building use and occupants density

Through comparative analysis on the classification of building use and occupants standard between the Building Act and Fire-Fighting Act, the following problems were derived.

First, in the classification system of building use, the biggest problem between the current acts is the lack of linkage with the Fire-Fighting Act according to the revision in the Building Act. In other words, the Building Act is a law that is the very basic of the construction work, so the connectivity with other acts is essential. However, the classifications of building use in the Building Act revised since December, 2013 were not reflected to the Fire-Fighting Act properly, so it resulted in confusion. Also, the classification of building use is a base standard to be applied on various architectural regulations; therefore, it must have consistency. However, the classifications or standard for the detailed type differ according to each individual acts, so there are great difficulties in applying the acts.

Second, the biggest problem between the occupants density is that the occupants density for the same purpose is different each other. In other words, if the occupants density applied on single building differs according to the regulatory contents such as the area calculation of escape safety zone or the fire performance design, it is difficult to secure the reliability on the act. Also, if the classifications of space by each purpose applied occupants density differ as same problem as the classification system of building use, great confusion will be caused in the operation of the act.

3.4 Direction setting for re-establishing the classifications for building use and occupants density

All acts must reflect the distinct characteristics according to the unique purpose of legislation of

each act. However, since the classifications of building use or the occupants density are the very basic in application of each relevant act, securing consistency and reliability between each individual act are very important. Therefore, in this study, the following re-establishment direction was set based on the problems examined above.

First, it is to secure consistency on the category. Generally, the classification of building use is largely composed of 3 stages for both the Building Act and the Fire-Fighting Act. Therefore, it is appropriate to have the Building Act as the base of construction and for the classifications on the category; the Fire-Fighting Act must be followed. Instead, for the sub-category, the distinct characteristics of each Fire-Fighting Act must be reflected. However, it is appropriate not to deviate from the overall classifications of the Building Act and to be revised within those classifications. Lastly, in the sub-sub category, the detailed types of the building should not be specified, but only the purpose of building use must be specified. Regarding the detailed type, it is necessary to follow the individual act.

Second, for the occupants density, it is very important to secure the consistency on the space classification of purpose of use like the classifications on building use. Based on consistency, it is critical to prepare an integrated plan for the occupants density. Especially, if the classifications differ on the same space for purpose of use, since different standard is applied to the single building according to the act, the occupants density must be unified mutually. However if there is a space classification for purpose of use required additional occupants density due to the characteristics of the individual act, it must be discussed mutually to provide a standard.

4. Conclusion

All acts reflect distinct characteristics or expertise according to the purpose of legislation on the individual act. However since several acts are applied on a single building, the consistency between acts is required. Therefore, in this study, comparative analysis was conducted on the different parts of the classification of building use and occupants density included in each individual act to derive the parts that require revision between the acts. In the future, further study will be conducted to establish the classifications of building use and occupants density by finding measures to secure consistency and maintain characteristics of individual acts and to analyze the relevant standard of main foreign countries such as the IBC and NFPA in USA.

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