

FIRE PREVENTION EFFORTS IN KOREA

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INTRODUCTION

Due to the rapid economic development from 1960s, Korea has become an industrialized nation. Statistics in 1996 of Korea shows that its GNP is 480.5 billion US dollars and per capita GNP is 10,500 US \$. Nearly 47 million people live in the area of 9.93 square kilometers. The average population density is above 450 persons/square kilometers that is among the highest in the world. During the period of the industrialization of the country, people migrated from the rural areas to cities, and now 85% of the population live in the cities. About 45% of the population are concentrated in the metropolitan area of Seoul (Table 1). Thus cities are heavily inhabited and congested. High-rise buildings and living complexes are increasing continuously, and the distribution of fuel gas for domestic use is widened nowadays. In Korea many industrial operations which store and handle large amounts of hazardous materials are located in the industrial parks away from the inhabited area, but many small and medium sized companies which use hazardous materials are scattered in the cities. Fire prevention and effective fire fighting should be the utmost concern for everybody living in such a situation to save lives and the material wealth we so endeavored to build up. After tragic disasters we have suffered recently, awareness of people on fire safety is heightened and government's efforts for the fire prevention and fire fighting are strengthened.

FIRE PROTECTION ADMINISTRATION OF THE GOVERNMENT

The first fire protection administration of the government was recorded in 1397 AD in Korean history. In 1418, fire protection was administrated by the defense ministry. In 1908, royal fire brigade was organized by selecting 60 fire fighters from the royal palace guards to protect the palace from the fire. In 1909 it was placed under the administration of police, and its duty was enlarged to protect the fire in Seoul, in addition to the palace. With the background of this fire protection administration, modern fire protection administration in Korea has developed.

At present, Fire Administration Bureau is placed under the Civil Defense Headquarters of the

Ministry of Home Affairs. Under the Bureau there are 16 local Fire Office Headquarters. National Central Fire Academy that was established in 1978 and National Central 119 Rescue Team that was established in 1995 are attached directly to the Fire Administration Bureau. There are 126 local Fire Departments and 675 local Fire Stations in Korea. 5 local Fire Schools and 9 Aviation Corps equipped with 13 fire helicopters are under local Fire Headquarters. There are 119 local 119 Rescue Companies and 857 local EMS (Emergency Medical Service) Units under local Fire Stations. The total number of personnel in the fire service of the government is 23,145 as shown in Fig. 2.

There are also 2,691 volunteer fire brigades organized with 81,816 volunteer fire fighters. Volunteers, having their own jobs in their residential, assist fire and rescue service. They patrol vulnerable areas in their own region especially at the beginning and the end of the year when the danger of fire is high and also when the weather condition is abnormal.

FIRE SAFETY TECHNICAL MAN-POWER

The Ministry of Labor has the authority to issue the certification and license of professional fire protection engineers and technicians. To become a certified professional fire protection engineer, one must pass the national examinations on theories of fire prevention, building fire safety, fire facilities and practices of fire services, etc. To become a candidate of the professional fire protection engineer, one must have at least seven years of practical experience in the fire safety after the graduation of the university or five years after qualified as Grade 1 licensed fire protection engineer. Professional fire protection engineers are entitled to conduct the design of the fire safety of large buildings and the supervision of the construction of fire safety facilities under their responsibility. At present there are 111 professional fire protection engineers in Korea. University graduates and Grade 2 licensed engineer are qualified to take Grade 1 license in fields of mechanical and electrical fire facilities. At present there are over 40,000 Grade 1 licensed fire protection engineers. Grade 2 license is issued to technical college graduates or equivalents after passing examinations. Korea Fire Safety Association (KFSA) is offering courses for training fire safety managers and technicians dealing with hazardous materials and fire facilities.

EDUCATION FOR FIRE SCIENCE AND TECHNOLOGY

Fire safety courses have been included in the curriculums of technical colleges and engineering departments of electrical, architectural and chemical engineering in the universities. However, it was only in recent years that departments of fire safety and engineering were established in technical colleges and universities to teach fire science and fire safety related subjects in depth. Since 1987 the total of 9 departments of fire safety management have been established (Table 2). At present 7

universities have established departments teaching fire science and engineering (Table 3).

RESEARCH AND DEVELOPMENT

In the past researches of fire safety and related technologies have not been active in Korea. Some researches were carried out mostly at such institute as Fire Insurers Laboratory (FILK) of Korea Fire Protection Association (KFPA) and Korea Fire Equipment Inspection Corporation (KFEIC) in the course of conducting their own businesses. However, major national institutes and universities have not paid much attention on it. After many disasters we have had in recent years such as gas explosions in the center of Seoul and Taegu, and the collapse of Sampoong department store in Seoul, the government have started to pay more attention to the fire safety researches. In 1995 the Ministry of Science and Technology launched a national research program on fire safety. At present, researches are carried out at national research institutes and universities. Major research institutes where fire researches are carried out are shown in Table 4.

FIRE SAFETY INDUSTRY

Compared to other major industry sectors in Korea, the size of fire safety industry is rather small. The industry is composed of mostly small- and medium-sized companies, the total number of companies being about 164. Korea Fire Fighting Equipment Industry Cooperative (KFFIC) to which most of the major companies are members is established in 1968 in order to promote the sales of their products, to support financing by loan and to provide technical assistance and quality control methods to member companies. Major fire safety products of Korea include fire extinguishers, fire hose and fittings, fire detection apparatus, sprinkler heads, and life safety equipment. The annual turnover of the fire safety products is estimated to be 300 billion Korean Won in 1996. The growth of the industry was rapid, being around 20% annually, until 1993, and afterwards it is rather slowed. However, the demand of improved products with high technologies will grow continuously with the growing economy and also with the enlightening awareness of the fire safety of the people in Korea (Fig. 3).

PUBLIC CORPORATIONS AND INSTITUTIONS FOR THE FIRE INDUSTRY

Several newspapers and journals are published for the fire industry and business in Korea as shown in Table 5. Public corporations and institutions established for the fire industry are assisting the progress of the fire industry. Their main activities and services are summarized in Table 6.

PUBLICITY ACTIVITIES FOR FIRE SAFETY

Publicity activity of fire safety in Korea is very active. It starts at primary schools and extends every sectors of the society. In primary schools of 5,782 in Korea, children fire brigades are formed with 3,800,000 children. Through safety classes, camp activities, and public services, they are awakened for the fire safety at the early ages. The government and corporations and institutions shown in Table are active in publicity activities of fire safety by publishing pamphlets and by holding seminars on fire safety. Newspapers and journals for the fire industry shown in Table are also play important roles in promoting the awareness of the fire safety and in introducing new technologies to the industry. The serial of TV dramas of Korea Broadcasting System (KBS) that are based on real activities and services of fighters of 119 Rescue companies is one of the most popular programs in Korea. It is contributing to the awakening of the fire safety, and people appreciate the service of fire fighters. The month of November is fire safety month, and November 9 is Fire Safety Day in Korea. In November various publicity activities and events for fire safety are held across the whole country, and civilian and official fire fighters of merit are appreciated.

CONCLUSIONS

Modernization of the fire protection in Korea was accelerated in the preparation of 1988 Summer Olympic Game in Seoul as evidenced by the fact that most of corporations and institutions for fire safety were established around 1987 and afterwards in Korea. Along with the rapid development of the industry and also with the rising standard of living, the fire industry in Korea has also developed rapidly. Recent tragic disasters in Korea have accelerated the awakening of the fire safety of the people. This also prompted the Government to fund R&D for fire safety. Demand of the fire safety will increase in Korea as high-rise commercial buildings, high-density living complexes, large industrial facilities and mass transportation systems are continuously constructed. It is required that the government enlarges and strengthens the support to R&D of the fire safety to safeguard the lives and property of the nation. It is also required that the fire industry improves the quality of the product and service to meet the more sophisticated demand of the society. Fire prevention effort of the government has been strengthened and fire service has been enlarged as seen in the service of 119 rescue companies. However, measures should be taken in advance to combat large disasters that can occur in heavily inhabited cities and in large industrial complexes. It is hoped that the fire fighting capability is reinforced with modern fire fighting equipment and with increased manpower and that the quality of the service is improved. It is also hoped that in due time the Fire Prevention Bureau develops into an independent Administration of the government.

Table 1. Statistics of Korea (1996)

Population	44,851 million
Area	9.9272 km ²
Population density	451.8 person/km ²
GNP	480.4 billion US\$
Per capita GNP	10,500 US\$
Economic Growth Rate	+6 % / yr
Population city metropolitan area	45%

Table 2. Technical Colleges Offering Courses of Fire Safety Management

College	Department
Jeonju Technical College	Department of Fire Safety Management
Jinju College	Department of Fire Safety Management
Jungkyong Industrial College	Department of Fire Safety Management
Kimchon College	Department of Fire Safety Management
Kyung-Min Junior College	Department of Fire Safety Management
Kyungwon College	Department of Fire Safety Management
Seokang College	Department of Fire and Security Management
Seoul Health Junior College	Department of Industrial Safety
Taeku Health Junior College	Department of Fire Safety Management

Table 3. Universities Offering Courses of Fire Science and Engineering

University	Department
Seoul National Polytechnic University	Department of Safety Engineering
Pukyong National University	Department of Safety Engineering
Chungbuk National University	Department of Safety Engineering
Dongguk University (Kyongju)	Department of Industrial Safety
Hoseo University	Department of Industrial Safety
University of Incheon	Department of Industrial Safety
Inje University	Department of Health and Safety Engineering

Table 4. Research Institutes in Korea

Institute	Activity
Korea Institute of Science and Technology (KIST)	- Development of Halon Replacement
The Korea Institute of Machinery & Materials (KIMM)	- Smoke research - Water Mist
Fire Insurers Laboratory of Korea (FILK)	- Fire Prevention for Cultural Treasure, Power facility, factory, and high storage building
Industrial Safety Research Institute (ISRI)	- Functional test of safety device - Safety Certificate Mark - Center for Chemical Plant Safety
National Fire Service Academy	- Research and Development of the Fire service system, Administration technology and Training system. - Research for setting the standard of fire fighting power and development of fire fighting equipment. - Research for prevention and Suppression of Specialized fires

Table 5. News Media for Fire & safety in Korea

<p>The Self-Governing Fire Service The Fire & Prevention Newspaper The Fire 2000 years Monthly Magazine The Safety News The Fire Safety News The So Bang Si Sa</p>

Table 6. Organizations for Fire Prevention

Organization	Main Activities
Korean Fire Protection Association (KFPA) Est: 1973	<ul style="list-style-type: none"> - Safety Inspection of Specific Buildings - Safety Inspection of Non-specific Buildings - Risk Management Service Center - Fire Insurers Laboratory of Korea (FILK)
Korea Fire Equipment Inspection Corporation (KFEIC) Est: 1977	<ul style="list-style-type: none"> - Inspection for the fire fighting machinery and equipment - Flame retardant performance test for carpets and curtains - Safety performance test and periodical inspection of storage tank containing hazardous materials - Guidance to manufacturers to upgrade the product - Cooperative Tie with Factory Mutual Research Corp. (FMRC)
Korea Fire Safety Association (KFSA) Est: 1983	<ul style="list-style-type: none"> - Education for fire safety management - Retraining of fire safety managers, technicians for dealing dangerous materials, and fire safety facilities - Public activities for fire safety
Korea Fire Fighting Equipment Industry Corporation (KFFEIC) Est: 1968	<ul style="list-style-type: none"> - Exclusive contract for the product of member company - Standardization of specification and inspection - Support financing by loan - Consulting the management technique - Providing technical assistance and quality control method
Korea Society of Fire Protection Professional Engineers (KSFPE) Est: 1983	<ul style="list-style-type: none"> - Consultation and recommendation to fire safety - Introduction of new technologies - Promotion of the cooperation of members
Fire Safety Members Association (FSMA) Est: 1995	<ul style="list-style-type: none"> - Technical education for fire facilities - Recommendation for the improvement of the fire safety system - Authentication of experienced fire safety technicians and engineers
Korean Institute of Fire Science and Engineering (KIFSE) Est: 1987	<ul style="list-style-type: none"> - Pronotion of R&D in fire science and technology - Publication of research results on fire science and technology - Introduction of new technology

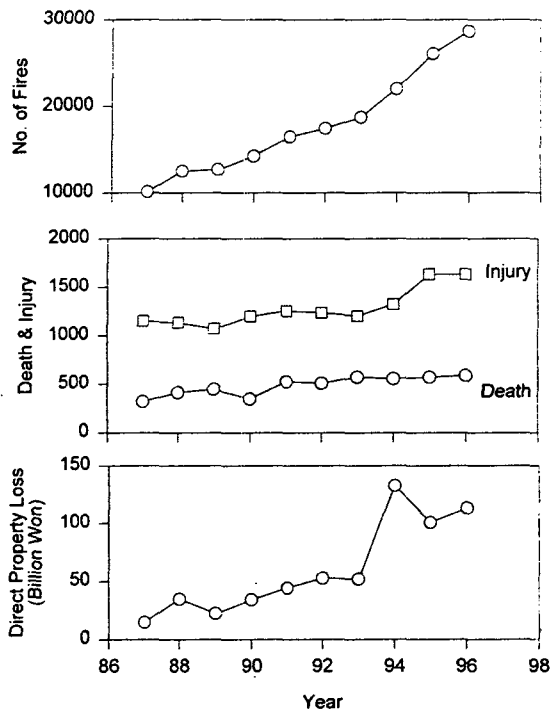
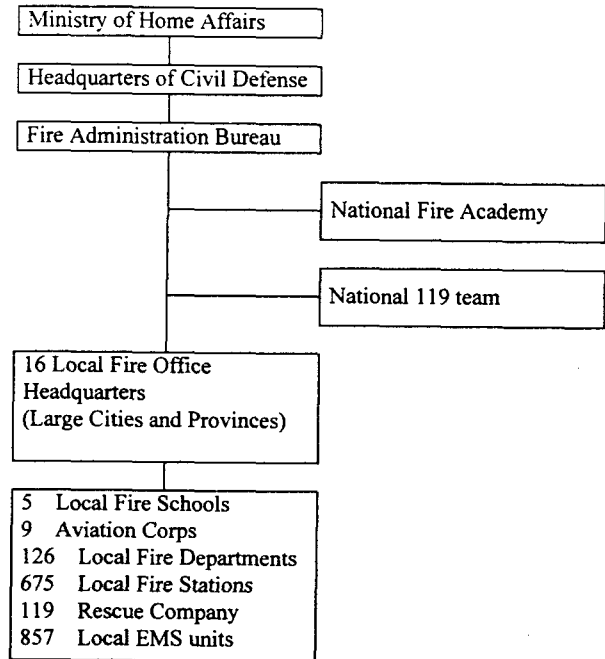


Figure 1. Fire Statistics in Korea (1987-1996)



Personnel	23,145 Officials
	157 National
	22,988 Local
	60% Fire fighters
	25% Rescue & EMT
	10% Fire Inspectors
	10% Administrative Officials
	5% Others

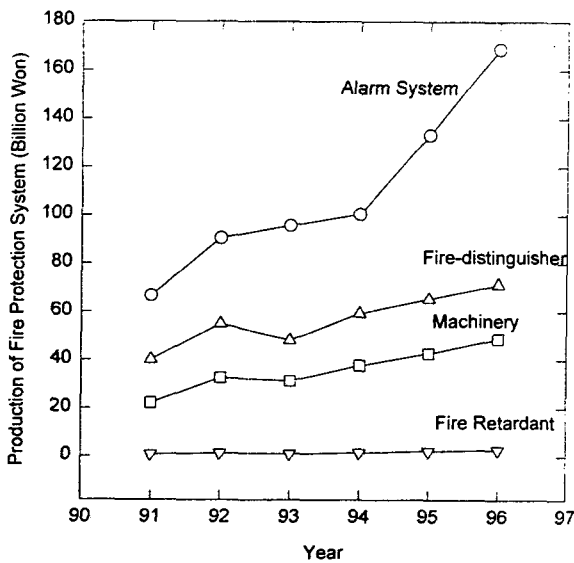


Figure 3. Production of Fire Protection System

Figure 2. Organization of Fire Administration Bureau