

Measures to improve the efficiency of integrated disaster management according to the complexity of disaster types

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Abstract

In modern society, disasters are becoming increasingly complex and large. In particular, it is occurring continuously so that it is safe to have a limited disaster due to climate change at any time. The inundation of Choryang Underpass in Dong-gu, Busan, where three deaths occurred on July 23, 2020, and Osong Gungpyeong Underpass 2 in Cheongju, where 14 people died on July 15, 2023, had a common point of flooding, but it was a complex disaster that occurred because disaster management such as vehicle control was not carried out in time. As such, modern disasters occur as the first cause, but if proper disaster management is not carried out, it tends to expand to secondary and tertiary disasters. Accordingly, various claims have been raised that the existing disaster management system has reached the limit of protecting life and property from disasters, and a new disaster management system should be formed. For effective disaster management, the classification of types of disasters must also change from the existing method before structural changes in the disaster management system. As disasters become more complex and large, the types of disasters must be subdivided accordingly, and the disaster management system must be reorganized according to the subdivided types of disasters. In particular, in order to effectively respond to a wide range of disasters that occur across regional boundaries, the need to establish an integrated disaster management system rather than the current subdivided public service organization is raised. This study examines through literature analysis and case comparison that disaster types are subdivided and management methods require integrated disaster management, and suggests the necessity and improvement of the existing disaster management system.

Key words: Disaster management, disaster type, crisis management, crisis type, integrated disaster management

I. Introduction

In modern society, disasters are becoming increasingly complex and large. In particular, it is occurring continuously so that it is safe to have a limited disaster due to climate change at any time. The flooding of Choryang Underpass in Dong-gu, Busan, where three deaths occurred on July 23, 2020, and Osong Gungpyeong Underpass 2 in Cheongju, where 14 people died on July 15, 2023, have a common point of flooding, but it is a complex disaster that occurred because disaster management such as vehicle control was not carried out in time. As such, modern disasters occur as the first cause, but if proper disaster management is not carried out, it tends to expand to secondary and tertiary disasters. Accordingly, various claims have been raised that the existing disaster management system has reached its limit in protecting life and property from disasters, and a new disaster management system should be formed.

Lee Jae-eun said that the government and local governments have established new organizations and reorganized laws with the determination to end disasters whenever major disasters occur, but despite these efforts, new organizations, organizations, and laws have rather complicated the overlapping of disaster-related tasks and on-site command systems, which have resulted in a contradiction to the efficient response of disaster sites. The problems of the central disaster management organization are reflected in the provinces, exposing the same problems in the local disaster management organization, and operating in a form far from the principles of the disaster management organization. (Lee Jae-eun et al., 2019, Business Management Research: 152).

Prior to structural changes in the disaster management system for effective disaster management, the classification of types of disasters should also change from the existing method. As disasters become more complex and large, the types of disasters should be subdivided accordingly, and the disaster management system should be reorganized according to the subdivided types of disasters. Lee Jang-ho stressed that it shows that it is more efficient for today's society that disaster management agencies in each field to respond organically rather than individually to effectively manage complex and large-scale disasters, and analyzed that it has developed from a management system with a distributed organizational structure according to disaster types to an integrated management system with a consistent organizational structure and system for all disaster types. (Lee Jang-ho, 2011, Nara Economy)

Another important point is that the center of Korea's disaster management system is the organization of public officials of local governments based on the state. These organizations have their own disaster management organizational system and have responded to numerous disasters, but they did not expect organizational changes as the types of disasters change. Numerous objections can be raised here, such as the de-specialization of disaster-related public officials and the rigidity of the organization of public officials. However, since the organizational response of the state and local governments is essential in large disasters, it is more appropriate to present improvement measures rather than unilateral criticism of failures. In particular, it is not possible to have a subdivided public official disaster management organization respond to a wide range of disasters that occur across regional boundaries one by one. At this time, the reason and purpose of integrated disaster management are derived.

Therefore, this study examines the existing classification of disaster types and examines changes in disaster types compared to recent large-scale disaster cases. In particular, it examines the necessity of changing the type of disaster according to the classification of crisis types in terms of crisis management, which is the pre-disaster stage, and presents the necessity of change and improvement of the existing disaster management system. The main research method conducts literature analysis on related papers, books, and media reports.

II. A theoretical discussion

1. The definition of disaster

"In the Framework Act on the Management of Disasters and Safety, a disaster is defined as one that may damage or damage the lives, bodies, property, and the state of the people. This Act largely classifies the types of disasters into natural disasters, social disasters, and overseas disasters.

First of all, natural disasters refer to disasters caused by typhoons, floods, heavy rains (豪雨), strong winds, wind waves, tsunamis, heavy snow, cold waves, lightning, drought, heat waves, earthquakes, yellow dust (黃砂), large tides (潮), 藻類, volcanic activity, falls and collisions of natural space objects such as asteroids and meteorites, and other natural phenomena.

Social disasters refer to damages larger than those prescribed by Presidential Decree due to fires, collapses, explosions, traffic accidents (including aviation accidents and maritime accidents), chemical and environmental pollution accidents, paralysis of the national core base, the spread of infectious diseases under the Infectious Disease Prevention Act or livestock infectious diseases under the Livestock Infectious Disease Prevention Act, and fine dust under the Special Act on the Reduction and Management of Fine Dust.

In addition, "overseas disaster" refers to a disaster that needs to be dealt with at the government level as a disaster that can damage or damage the lives, bodies, and property of the Korean people outside the realm of the Republic of Korea.

The term "disaster management" means all activities performed to prevent, prepare for, respond to, and restore disasters. In addition, the term "safety management" means all activities performed to ensure the safety of human life, body, and property from disasters or other various accidents.

2. Disaster Type Classification

1) Classification by type of disaster and safety

The classification of disaster types in Korea is introduced in detail in the disaster safety information portal of the Korea Institute of Science and Technology Opportunity Evaluation as a major classification (3)> a middle classification (17)> a sub-classification (68). The major classification is classified into natural disasters, social disasters, and safety accidents.

First of all, natural disasters include typhoons, heavy rains, floods, strong winds, heavy snow, and hail. Then, weather disasters include cold waves, yellow dust, and ozone, while geological disasters include landslides, steep slope collapses, earthquakes, ground subsidence (sink holes), soil erosion, and volcanic eruptions. Then, marine disasters included red tides, tides, tsunamis, blue, storm surges, wind waves, and coastal erosion. In addition, space and other disasters were classified as major algae outbreaks and space disasters (planetary and meteoroid).

Subsequently, social disasters were classified into infectious diseases and infectious diseases, livestock and aquatic life infectious diseases. Subsequently, traffic accidents are divided into road traffic disasters and accidents, marine traffic disasters and accidents, railroad traffic disasters and accidents, and air traffic disasters and accidents. Subsequently, fires and explosions are divided into wildfires, fires, gas accidents, and explosions. Subsequently, chemical accidents are classified into radioactive accidents and hazardous chemical accidents. Fine dust, which has recently emerged rapidly, is divided into power generation, industrial, litigation, and living areas. Environmental pollution is divided into water quality, marine, and soil pollution. Facility accidents are divided into building and facility accidents, energy infrastructure accidents, waste treatment facility accidents, and water infrastructure accidents, information and computer accidents are divided into financial computer accidents, cyber terrorism accidents, and communication facility accidents are divided into wired communication facility accidents and wireless communication facility accidents.

In addition, safety accidents are divided into life and leisure accidents, electricity and gas accidents, mountain climbing and leisure accidents, water play accidents, household product accidents, and coastal accidents. Industrial accidents are divided into agricultural and fishery accidents, workplace industrial accidents, food accidents, pharmaceutical accidents, and medical device accidents. The security sector is then divided into crime, safety-vulnerable class accidents, suicide, and wartime disaster terrorism.

2) Classification by stages of disaster and management

Classification according to disaster and management stages is divided into major classification (5)> middle classification (13)> sub-classification (41). It was subdivided according to the four stages of disaster management.

The fields of prediction/prevention are divided into risk prediction, damage prediction, risk monitoring, and life safety. Risk prediction is divided into risk factor identification and management, risk prediction modeling simulation, scenario development and analysis evaluation technology. Damage prediction is divided into disaster and safety vulnerability evaluation technology

and damage scale and spread prediction technology, while risk monitoring is divided into risk factor detection and detection technology, risk factor analysis and judgment technology, risk factor mitigation and removal technology, and life safety includes life safety information management technology, life safety public service technology, social vulnerability management technology, and life safety public education and contents technology.

The preparation field is divided into disaster preparation capability diagnosis and analysis technology, manual utilization and management technology, public service function maintenance and management technology, international cooperation and sharing system, and disaster preparation education and training system in the preparation system. The information management field included disaster information big data, disaster and security communication infrastructure, disaster forecasting and warning infrastructure, and civil defense warning infrastructure. Subsequently, resource management was divided into disaster resource management facilities, equipment, and product development, disaster resource management and mobilization technology.

Response areas are classified into disaster security situation information delivery system, integrated decision-making support system, disaster site command and control system, and emergency situation propagation to the public in situation management.

Recovery technology is divided into recovery activity equipment and product development and hazardous environment treatment and removal technology, and relief technology is divided into damage support and management service technology, life safety support technology for victims, and psychological recovery support technology for disasters and safety accidents.

In addition, accident investigation and evaluation are divided into technologies for deriving and evaluating the causes of disasters and safety accidents, field investigation equipment and systems, and disaster and safety standard platforms, and other technologies that do not fall under the above classification are classified.

3. Disaster Management Phase 4

Korea's disaster management system is divided into the prevention and preparation stage, which is the stage before the disaster, and the response and recovery stage, which is the stage after the disaster occurs. Abolition classified the disaster management stage into ① prevention and mitigation of disasters ② preparation and planning of disasters ③ response to disasters ④ recovery of disasters, and emphasized the need for continuous and integrated management by returning the four steps rather than being carried out by each process. (National Crisis Management Society, Disaster Management Theory, 2020: 55-56)

As the main activities in each stage, the prevention stage includes risk analysis and risk map preparation, building law enactment and maintenance, disaster insurance, land use management, safety-related laws enactment and maintenance, and tax support. In the preparatory stage, disaster response plans are established, emergency warning systems are established, emergency communication networks are established, cooperation systems of related organizations are maintained, and emergency resources are secured. In the event of a disaster, it enters the response stage, implementing a disaster response plan, emergency response and treatment of a disaster, developing lifesaving and rescue activities, operating an emergency medical system, accepting and evacuating patients, providing medicines and daily necessities. Subsequently, in the recovery stage, debris removal, epidemic prevention and quarantine activities, support for victims, provisional residence, facility restoration, and damage compensation are carried out.

4. Disaster management and crisis management

1) Definition of Crisis Management

Crisis management is a more comprehensive concept than disaster management. Lee Jae-eun defined crisis management as a

process of efforts to guarantee the basic human right, the right to safety. (Lee Jae-eun, Crisis Management 2018: 22) In addition, crisis management is also linked to factors considered at the organization's overall level, that is, organizational culture and organizational structure, and refers to long-term and consistent organizational activities. In addition, crisis management also has a management system in accordance with the four stages of disaster management, such as prevention, preparation, response, and recovery. Accordingly, it is worth classifying the types of crisis management and comparing them with the types of disaster management.

2) Classification of crisis areas

Types of national crises can be divided into national living safety crises and disaster crises, traditional military security crises, and national core-based crises. (Lee Jae-eun, 2018: 166-203)

The national life safety crisis spans the entire lives of the people. It is divided into a safety crisis for the vulnerable, a living economy crisis, and a life-but-safety crisis in individuals and narrow areas, while it is divided into a transportation life safety crisis, a professional life safety crisis, and a school life safety crisis in individuals and in medium and wide areas. Following that, society and narrow areas are divided into a food safety crisis, a household goods safety crisis, and a life health safety crisis, while society and medium and wide areas are divided into a living facility safety crisis, a living environment safety crisis, and a living-based safety crisis.

A disaster crisis is largely divided into natural disasters and human disasters, and natural disasters refer to situations in which typhoons, storms, heavy rains, floods, tsunamis, and earthquakes threaten the lives, health, and property of the people. Subsequently, a human disaster crisis refers to a situation in which fire, explosion, collapse, environmental pollution, and traffic accident disasters threaten the lives, health, and property of the people.

A traditional military security crisis is one that threatens the security of a country's territory and sovereignty in the fields of unification, diplomacy, and military. A war crisis can be said to be the biggest type of security crisis that threatens the security of a country. This is followed by a local armed conflict crisis, terrorism, and civil defense crisis. (Kim Yong-seok, 2005: 5-8, Jae-yong)

The national core-based crisis then refers to a state in which financial, transportation, transportation, electricity, information and communication, major industrial complexes, energy nuclear power, dams, public order, public health care, food and water, major government facilities, major national assets, and national symbols are paralyzed or damaged, posing a serious risk to ensuring the survival of the country and maintaining its operations.

3) Linkage between Crisis Management and Disaster Management

Crisis management is both national and national, as discussed in the crisis management type. In short, it is necessary to manage crises in all fields that can be experienced in the entire process of people's lives. On the other hand, disaster management is a management system to minimize damage from disasters that have occurred on the premise of a disaster. Therefore, it can be said that crisis management and disaster management have individual characteristics, and at the same time are linked to each other under the premise of public safety.

Just as disaster management is organized into four stages: prevention, preparation, response, and recovery, crisis management is also divided into four stages: prevention, preparation, response, and recovery. (Lee Jae-eun, 2018:245-314) Therefore, if the crisis management stage is well followed, it can be basically recognized that damage can be minimized in the event of a disaster.

In addition, compared to the recent frequent occurrence of severe disasters, the need for an integrated disaster management

system has emerged, Lee Jae-eun emphasized the need for an integrated crisis management system as various types of crises such as war, terrorism, natural disasters, nuclear power plants, riots, corporate crises, and infectious diseases are occurring amid rapid environmental changes. (Lee Jae-eun, 2018:223) Therefore, disaster management and crisis management can be more effective than when operating as an interconnected system.

In particular, the Ministry of Public Administration and Security prepares and operates crisis management manuals according to a total of 9,180 disaster types to efficiently manage disasters. (Administrative Security, Crisis Management Manual, December 31, 2022) This can be seen as a mixture of similar concepts between disaster and crisis, and has a symbolic meaning of having a close relationship.

III. Comparison of Disaster Management Systems

1. A disaster management system

1) History of the Disaster Management System

In the current disaster management system, the "Central Safety Management Committee", headed by the Prime Minister, is in charge of deliberation, generalization, and coordination of important policies related to disaster and safety management. In the event of a large-scale disaster, the "Central Disaster and Safety Countermeasures Headquarters" is established in the Ministry of Public Administration and Security to oversee prevention, preparation, response, and recovery, and take necessary measures to enable integrated disaster management at the government level. The relevant ministries have a "Central Accident Management Headquarters" to oversee accident management, and the "Disaster Safety Countermeasures Headquarters" in cities, counties, and districts are required to manage disasters in the area. In particular, the "Central Emergency Rescue and Control Team", headed by the head of the National Emergency Management Agency, oversees matters related to emergency rescue and supports efficient accident management through rapid command and control. In July 2008, the National Crisis Situation Center (currently the National Crisis Management Office) was established, and the Office of Safety and Environment Policy Officer of the Social Integration Policy Office was also operated in the Prime Minister's Office, which established a consistent disaster management system leading to the Presidential Office, the Central Safety Management Committee, the Prime Minister's Office, the Central Disaster and Safety Countermeasures Headquarters (Ministry of Public Administration and Security). (Lee Jang-ho, Nara Economy May 2011)

2) Disaster Management Organization and Method

Disaster management organizations must also be organized accordingly, as disasters occur complex, diverse, and unpredictable. The administrative environment in the disaster management field has the characteristics of uncertainty, interaction, and complexity. Due to these characteristics, perfect disaster management is a very difficult task even in advanced countries such as the United States and Japan, as shown in the examples of the September 11, 2001, Hurricane Katrina in August 2005, and the Great Japanese Earthquake. What is important is the continuous effort to find problems and implications in dealing with disasters at home and abroad and to reflect them in improving systems or systems.

The more uncertain the administrative environment is, the more the disaster management organization should become an organization that learns preemptively. Although the government is striving to establish an efficient and integrated disaster management system, due to the nature of disasters, perfect management is impossible, and it cannot be said that the level of

disaster management in Korea, such as manpower, equipment, and organization, is higher than that of other advanced countries. (Jang-ho Lee, 2011.05.) In the traditional disaster management method, plans for each type of disaster were prepared according to the type of disaster, and response responsibility agencies were assigned differently. In this management method, there were difficulties in coordination and control, such as causing problems of overlapping and over-response between related agencies in the event of a disaster. (Yang Ki-geun, 2006, Gyeongnam Development Institute)

2. Basic Plan for National Safety Management

The basic framework of disaster management in Korea is in accordance with the National Safety Management Basic Plan. The National Safety Management Basic Plan is a top-level plan that establishes the basic direction of national disaster and safety management in order to protect the lives and physical property of the people from various disasters and accidents in accordance with the Constitution and the Framework Act on Disaster and Safety Management. In the 4th National Safety Management Basic Plan (2020-2024), the Korea Research Institute established '40% reduction in deaths in disasters and safety accidents' as a key indicator in August 2019. This plan presented four strategies and 17 key implementation tasks. (Central Safety Management Committee, 2018)

The first is inclusive safety management. As national and social responsibility for safety is emphasized, it is to lay the institutional foundation and implement various support policies so that all citizens can live safely. To this end, laws and systems will be reorganized and infrastructure will be expanded to support and protect the vulnerable groups such as children and labor. In particular, the Framework Act on Safety Management (tentative name) has been enacted to lay the institutional foundation for guaranteeing the right to safety of the people. In addition, the system will be strengthened so that the state can guarantee the right to safety of the people, while providing public participatory disaster safety education and training, and directly reporting and inspecting risk factors around life.

The second is preventive life safety. Preventive life safety is a strategy to improve the safety level of the people, to increase the reliability of air and water quality, and to strengthen the safety system of various facilities. In particular, in order to reduce traffic, industrial accidents, and suicide accidents, which are the three areas with a higher death toll than the OECD, the government plans to achieve three major projects to protect people's lives. In addition, it is important to reduce fine dust by establishing a comprehensive plan, strengthening forecasting capabilities, and information delivery systems, and to solve problems with the quality of life of the people through water quality management of drinking water. It also includes creating a safe environment around daily life through safety management of multi-use facilities such as railroads, aviation, and elevators, and strengthening safety management of various consumer goods such as food and medical products to spread a safety culture in daily life.

Third, strengthen on-site disaster response. On-site disaster response is a strategy to enhance the speed and effectiveness of disaster response by clarifying the role of each operating entity, including the government, emergency rescue agencies, and the public, in the event of a sudden disaster. Accordingly, in order to respond quickly in emergency situations, the role of the central and heavy copies will be clarified, and a situation management support system will be established, and disaster management personnel will be nurtured. Training for on-site personnel will be strengthened on land and at sea to enable early response on the site. Education and consulting will be supported so that disaster management capabilities can be expanded not only in the government but also in local governments and the private sector, and communication capabilities to the public will be strengthened by improving the disaster broadcasting system, using the disaster safety communication network, and social media.

Fourth, strengthen disaster management based on science and technology. Science and technology-based disaster management is a strategy to become more complex and to develop safety-related technologies necessary to respond to unpredictable disasters and to strengthen response capabilities. To this end, we intend to foster the disaster safety and firefighting industries, and develop various technologies through disaster safety R&D. Disaster safety R&D includes land disasters, marine disasters, and food safety accidents. Meanwhile, it aims to secure resilience by preparing long-term plans for the occurrence of large-scale complex disasters, using advanced ICT, strengthening practical education and training, and establishing a foundation for cooperation between the central and local regions. In addition, in response to climate change, we intend to establish a system for preventing storm and flood damage, provide weather information using big data, and advance a damage prediction system. In addition, it plans to strengthen management capabilities through the establishment of prediction technologies and forecasting and warning systems for large-scale disasters whose occurrence frequency gradually increases, such as fires, earthquakes, infectious diseases, and chemicals, and promote international cooperation in relation to various disasters.

3. The disaster management system of the central government

Disaster management by the central government is accompanied by the organizational transformation of the Ministry of Public Administration and Security. Starting from the Ministry of Home Affairs in November 1948, the National Police Agency was established in November 1991, and the National Emergency Management Agency was established in June 2004. Then, the name was changed to the Ministry of Public Administration and Security in February 2008, then to the Ministry of Security and Public Administration in March 2013 and the Ministry of Government Administration and Home Affairs in November 2014. At this time, the Ministry of Public Safety and Security was separated. Then, in July 2017, the Ministry of Public Administration and Security integrated the Ministry of Public Safety and has reached today.

1) Disaster and Safety Management Headquarters of the Ministry of Public Administration and Security

Through the "National Disaster Safety Portal," the Ministry of the Interior and Safety is guiding the public on how to act in the event of a disaster (natural disaster, social disaster, life safety, and emergency preparedness measures). It is also guiding the public on safety facilities. It is subdivided into civil defense evacuation facilities, earthquake evacuation sites, temporary housing facilities for victims, heat shelters, landslide shelters, civil defense water supply facilities, temporary housing facilities for both earthquakes, chemical accident evacuation sites, and fine dust shelters. It also includes information on civil defense training and educational schedules. It is also in charge of safety insurance for storm and flood, civil safety insurance, and psychological counseling for disasters.

The Disaster and Safety Management Headquarters operates the Safety and Prevention Policy Office, the Natural Disaster Office, and the Social Disaster Office, with the head of the Central Disaster and Safety Situation Office and the safety inspection officer at the center of the vice minister-level headquarters. It also operates the Disaster Recovery Support Bureau, the Emergency Preparedness Policy Bureau, and the Civil Defense Review Board.

2) The National Fire Agency

Starting with Gyeongseong Fire Station (currently Jongno Fire Station) in 1925, the National Fire Service was operated as the Central Fire Service Commission and the Provincial Fire Service Commission in 1946, and as the Fire Service Department of the Security Bureau of the Ministry of Home Affairs (province is the Fire Service Department) after the establishment of the government in 1948. Since then, the Fire Service Bureau was established in the Ministry of Home Affairs in August 1975, and the Fire Officials Act was enacted in March 1978. The provincial and provincial fire departments were established in April 1992.

The Fire Prevention Agency was then established in June 2004, and it was changed to the Central Fire Headquarters of the Ministry of Public Safety and Security in November 2014 following the reorganization of the Government Organization Act, but the agency was launched in July 2017.

The National Fire Agency has 19 provincial and provincial fire departments nationwide, and has the Central Fire School, the Central 119 Rescue Headquarters, and the National Fire Research Institute. The main duties of the National Fire Agency are to establish and coordinate fire policies, operate fire prevention and fire-related systems, develop fire suppression and fire investigation technology, strengthen emergency rescue capabilities and plan and adjust rescue and assistance, promote the fire industry and strengthen the foundation for people's living safety, supply fire fighting equipment, and develop policies for aviation rescue assistance.

4. The disaster management system of local governments

The local government's disaster management system looked at the organizational structure of Seoul Metropolitan Government, Chungcheong Buk-do in the metropolitan area, and Cheongju City, a basic local government.

1) Disaster Management System in Seoul

The Seoul Metropolitan Government has a disaster safety management office under the mayor, the first and second deputy mayors of administration, and the deputy mayor of political affairs. The disaster safety management office has a safety officer under the head of the department, and is operated by the disaster safety policy department, the disaster situation management department, the disaster safety prevention department, and the critical disaster prevention department. It also includes the construction innovation department, the road planning department, the road management department, the road facilities department, and the bridge safety department.

2) Disaster Safety Management System of Chungcheongbuk-do

Chungbuk-do, a metropolitan government, has a disaster safety office under the provincial governor, economic deputy governor, and administrative deputy governor. The disaster safety office operates the safety policy department, the social disaster department, and the natural disaster department, while the safety policy department operates the safety policy department, serious disasters, safety health, and emergency civil defense teams. The social disaster department operates social disasters, safety inspections, disaster situations, and people's livelihood judicial police teams, and the natural disaster department operates natural disasters, natural disaster recovery, river planning, and river maintenance teams.

3) Disaster Safety Management System of Cheongju City

Cheongju City, a basic local government, is in charge of disaster management in the safety policy department under the mayor and deputy mayor. In the safety policy department, the disaster management team leader oversees social disasters, including daytime work and operation of the disaster safety situation room. Subsequently, the regional safety management team manages facilities, outdoor events, and elevators, the civil defense team oversees civil defense, and the natural disaster preparation team oversees natural disasters. Subsequently, the chemical safety team is responding to chemical leakage disasters, and the integrated control team oversees CCTV control. In particular, a critical disaster team is also in operation to oversee critical disaster work.

5.Small conclusion

As such, the central, local governments, and the National Fire Agency have their own administrative organizations for disaster

management. However, due to the complexity, enlargement, and instability of disaster types, disaster management centered on some regions has reached the limit of their ability to cope with them. Accordingly, the integrated disaster management system was implemented in earnest, but the effect of integration is insignificant due to the lack of sustainable connectivity such as selfishness among ministries and agencies. Accordingly, the need for efficient and improvement measures for integrated disaster management emerges.

IV. Current Status and Improvement of Integrated Disaster Management System

1. Integrated Disaster Management Status

Integrated disaster management began in 2013 when the Park Geun Hye government revised the Government Organization Act to promote major policies in the public safety sector, giving the Ministry of Security and Public Administration the function of establishing, overseeing, and controlling policies on safety and disaster. (Ahn Young-hoon, June 24, 2013) At this time, disaster safety departments were established in the central and local governments to "protect the people from crisis situations," and the Framework Act on Disaster and Safety Management was adjusted to an integrated disaster response system centered on the Central Disaster and Safety Countermeasures Headquarters. An Young-hoon also proposed the transition to a comprehensive disaster safety management and response system that prevents possible risk factors from natural disasters due to climate change at the community and national level or prepares in advance through prior risk assessment as one of the most important safety policies in the local community.

Lee Jang-ho (Director of Disaster Support at the Prime Minister's Office) saw that integrated disaster management began after the Daegu subway disaster in 2003 in his paper titled "Comprehensive Disaster and Integrated Response System" in the May 2011 issue of the country's economy. The Daegu subway disaster in February 2003 raised the need for integrated disaster management, and the "Framework Act on Disaster and Safety Management" was enacted in March 2004. This laid the groundwork for integrating individual disaster-related laws and establishing interconnection and integrating disaster management organizations that were distributed by various types of disasters. At the same time, the opening of the National Emergency Management Agency in June 2004 served as an opportunity for Korea's disaster management system to shift from the traditional distributed management to integrated management. Lee Jang-ho analyzed that it has developed from a management system with a distributed organizational structure according to disaster types to an integrated management system with a consistent organizational structure and system for all disaster types. He argued that it is more efficient for disaster management responsible agencies in each field to respond in an integrated manner by organizing themselves rather than individually.

2. Limitations and Problems of Integrated Disaster Management

The synthesis of disaster management is that the activities of local governments in charge of primary responsibility and role in responding should be integrated with the activities of local governments, and at the same time, close cooperation between local governments and central governments or agencies in charge should be demonstrated. The emphasis in this integrated management method is on the integrated management of disaster information, which is the source of decision-making in coordinating and controlling overall response activities. (Kim Ki-chang, 2006.12)

- 1) Basic principles for the establishment of an integrated disaster management system

Ahn Young-hoon emphasized that after the government establishes plans and strategies to establish an integrated disaster management system, each department should prepare an execution plan and support system for each field, and local governments and fire departments should establish an execution and response system according to emergency preparedness work. In addition, an integrated system based on a step-by-step work manual such as prevention, preparation, response, and restoration, which is the fourth stage of disaster management, should be established. (Ahn Young-hoon, 2012. 6)

2) Need to supplement the legal system for integrated disaster management

Currently, the nation's disaster management legal system is largely divided into natural disasters, human disasters, social disasters, and fire-related laws, and laws in each field have been enacted. As the laws vary, there are many difficulties in integrated management as some laws overlap, as well as various ministries in charge.

3) A disaster management organization problem

Kim Ki-chang suggested that there are many difficulties in establishing a comprehensive management system, and opposition between ministries' selfishness and existing organizations, resulting in excessive work and responsibility can be concentrated in organizations. As a result, it is a difficulty in integrating material management between the government and local governments, and between local governments and firefighting and police officials' organizations. In fact, in the case of the flooding of the Osong Gungpyeong 2 Underpass in Cheongju, which occurred in July 2023, the flood warning of the Geumgang Flood Control Center was issued hours ago, but it was not delivered to Chungbuk-do, Cheongju-si, and the Happiness Office in time. Such a lack of communication between organizations can be seen as a representative problem of integrated management. The Sisa Journal said, "The Osong accident, which would have been recorded as a flooding disaster even in the worst underground road, could have been avoided if traffic had been controlled in advance. However, the traffic control was not implemented in a timely manner. There were three main reasons. The relevant administrative agencies did not move properly in a timely manner, and ② old manuals were not sufficient to prevent ordinary extreme rain. ③ The control tower of disaster management did not play its role and the president's leadership was not shown. This means that all three pillars supporting the nation were collapsed." (Kim Jong-il, 2023.7.21, Sisa Journal) also stressed the need for a single general organization such as FEMA and DHS in the U.S. for effective integrated disaster management. (Lee Cha-min, 2014.12), however, the U.S. suffered great damage due to the lack of integrated management between state and local governments when Typhoon Katrina hit. Therefore, efforts should be made to organize and operate an integrated disaster management organization.

4) Understanding the nature of widespread disasters

Lee Cha-min argued that the characteristics of the disaster should be considered first when designing an integrated disaster management plan. In addition, the design process of the disaster management system must be able to accommodate various disaster theory paradigms. This is where specialized responses to specific disasters and integrated disaster management responses conflict with each other. However, as it has become difficult to respond to all disasters individually, integrated disaster management should consider understanding and classifying the characteristics of each disaster and preparing response methods.

From July 13 to 16, 2023, North Chungcheong Province received a cumulative average of 340.6 millimeters of rain. Fourteen people were killed in a flooding accident at the Osong Gungpyeong 2 underground road in Cheongju, and the Goesan Dam overflowed, forcing nearby residents to evacuate. At that time, the precipitation by region compiled by North Chungcheong Province recorded 455.2 millimeters in Cheongju, 404.5 millimeters in Goesan, and 346.2 millimeters in Boeun. (Chungbuk-do Disaster and Safety Countermeasures Headquarters, July 16, 2023.) The reason for looking at the three regions is that the

presumptive pass of Nangseong-myeon, Sangdang-gu, Cheongju-si is the Hannam Geumbuk jeongmaek. Around this pass, the direction of Nangseong-myeon is the Geumgang water system, where the upstream of Musicheon Stream begins, and the direction of Miwon-myeon is the Han River water system. The disaster of the Osong underground road was affected by the Geumgang water system, and the overflow of the Goesan Dam was affected by the Han River water system. As the degree of damage to torrential rain is determined depending on the water system, it is difficult to respond with a disaster management system divided into simple administrative districts.

3. Improvement Measures for Efficiency of Integrated Disaster Management

As a way to improve, Kim Ki-chang suggested unifying the disaster management system of the government and local governments and supplementing the system and operation. In addition, periodic education and training and strong leadership of the chief executive were also required to strengthen the organic cooperation system of disaster response organizations divided into administrative positions, fire fighting, and police.

Subsequently, the efficiency of integrated disaster management is the establishment of a command system. To this end, strong leadership of the head of the integrated organization is urgently needed, and organic cooperation between administrative and private organizations is required. In general, it is said that public-private governance is organized and operated, but it is still difficult to find the horizontal organizational operation of voting rights, the essence of governance. For this, it is necessary to establish horizontal governance.

In addition, for effective disaster management, raising public safety awareness is an important part. Disaster-related education and training suitable for kindergarten, elementary, middle, and high school students, to the general public, and office workers are constantly required.

V. Conclusion

The importance of the country's disaster management and crisis management system seems to be gradually emerging, but rather than trying to prevent a recurrence with a systematic response and long-term post-recovery, it is showing an immature response and insufficient post-recovery form that avoids the crisis with only one-time recovery support or punishment for accident managers. (Kang Young-hoon, 2008, Korean Administration Essay) This means that the existing disaster management organizations are not properly managing disasters for the enlargement and complexation of various disasters, including the climate crisis.

As a result, the need for an integrated disaster management system has emerged for efficient disaster response, and efforts are being made to have a system for it, but we have faced a fundamental reason to solve the various problems of integrated organizations.

To suggest the improvement of the integrated disaster management system to efficiently respond to diversified disasters through this study, first, more effective disaster management can be achieved by utilizing the link between disaster management and crisis management and applying it to the integrated disaster management system. Second, it is necessary to unify the central and local governments and strengthen the organic cooperation system of disaster response organizations such as administrative positions, fire fighting, and police. In addition, strong leadership of the head of the integrated disaster management organization is necessary to establish an effective command system for the integrated disaster management organization. Powers and

obligations should be defined for the leadership of the chief executive at the disaster site. Reinforcing the capacity of public officials is an important part that does not require reconsideration. Third, it is necessary to construct practical governance between administrative organizations and private organizations. Practical governance that can fully participate in decision-making should be constructed, not as a formal cooperation body. Fourth, a certain amount of education and training must be conducted to raise public safety awareness.

In particular, since Korea has an administrative organization that is subdivided into provinces, cities, counties, towns, villages, dongs, and ri, integrated disaster management is considered beneficial in order to effectively manage disasters that occur widely. In addition, disaster types should be subdivided like the classification of crisis management types to minimize damage through rapid and effective response in the event of a disaster. In other words, it can be seen that it is appropriate for Korea to subdivide disaster types and integrate disaster management organizations.

In addition, regular evaluations of these systems should be conducted to continuously create and implement improvements. Through this, disaster management should be carried out through a proper composition of an integrated disaster management system.

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