

A Comparative Study on the Construction of Public Emergency Management Systems: Focus on the German Model and Its Practical Implications

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Abstract—This paper conducts an in-depth theoretical analysis and literature review of Germany's public emergency management system, exploring its construction logic, operational mechanisms, and practical implications. By integrating classic theoretical frameworks such as federalism, collaborative governance, and multi-center governance, this study clarifies the core concepts of emergency management system construction, including "decentralized responsibility," "inter-departmental collaboration," and "social participation." The research finds that Germany's emergency management system, characterized by federal-state-local decentralization, state and local dominance, federal coordination support, and extensive social participation, provides a valuable reference for other countries. Its experience in risk assessment and early warning, disaster response coordination, and cross-departmental linkage mechanisms offers important insights for optimizing emergency management systems. This study aims to contribute to the theoretical development of public emergency management and provide practical guidance for policy-makers.

Index Terms—Public Emergency Management System, German Model, Federalism, Collaborative Governance, Decentralized Responsibility, Social Participation.

I. INTRODUCTION

In an era of increasing global uncertainties, the construction of public emergency management systems has become a crucial issue for national governance. Emergencies such as natural disasters, public health crises, and man-made accidents pose great threats to people's lives and property, social stability, and economic development. Different countries have established diverse emergency management systems based on their political, economic, and social contexts.

Germany, as a developed country with a long-standing tradition of good governance, has a relatively mature and efficient emergency management system. Its system is shaped by its unique political structure (federalism), social culture (extensive social participation), and historical experience in dealing with various emergencies. Studying the German model can not only enrich the theoretical research on public emergency management but also provide practical references for other countries to improve their emergency management capabilities.

The core research questions of this paper are: What are the characteristics and operating mechanisms of Germany's public emergency management system? How do these characteristics and mechanisms contribute to effective emergency management? And what practical implications can be drawn from the German model for other countries' emergency management system construction?

II. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

A. Literature Review

1) Research on Foreign Emergency Management Systems

Scholars at home and abroad have conducted extensive research on foreign emergency management systems. For

example, some studies focus on the emergency management systems of the United States, analyzing its "whole-of-society" approach and the role of federal and state governments [13]. Regarding Germany's emergency management system, existing research mainly focuses on its federal-state-local hierarchical management structure, the dominant role of state and local governments, and the coordination mechanism between different levels of government (Bundesamt für Bevölkerungsschutz und Katastrophenhilfe, 2018). However, most of these studies are descriptive, lacking in-depth theoretical analysis and systematic comparison.

2) Research on the Theoretical Basis of Emergency Management

The theoretical basis of emergency management mainly includes public administration theory, risk management theory, and collaborative governance theory. Public administration theory emphasizes the efficiency and effectiveness of government functions in emergency management. Risk management theory focuses on identifying, assessing, and mitigating risks. Collaborative governance theory highlights the importance of multi-stakeholder cooperation in dealing with complex emergencies [7]. However, few studies integrate these theories to analyze a specific country's emergency management system comprehensively.

B. Theoretical Framework

1) Federalism Theory

Federalism is a political system in which power is divided between a central authority and constituent political units (states, provinces, etc.). In the context of emergency management, federalism determines the division of responsibilities and powers among different levels of government. In Germany, the federal government, states (Länder), and local governments have clear-cut

responsibilities in emergency management, which is conducive to improving the efficiency of emergency response.

2) Collaborative Governance Theory

Collaborative governance refers to the process of bringing together multiple stakeholders (government agencies, non-governmental organizations, businesses, and citizens) to solve complex public problems. In Germany's emergency management, cross-departmental collaboration and social participation are important manifestations of collaborative governance. This theory helps to explain how different actors cooperate to achieve common emergency management goals.

3) Multi-center Governance Theory

Multi-center governance emphasizes the existence of multiple independent but interrelated centers of decision-making and action. In Germany's emergency management system, the federal government, states, local governments, social organizations, and volunteer groups form a multi-center governance network, which can better respond to diverse and complex emergencies.

III. CONCEPT DEFINITION AND CORE ISSUES

A. Concept Definition

1) Public Emergency Management System

A public emergency management system is a comprehensive system composed of organizational structure, operational mechanisms, legal systems, and resource allocation methods, aiming to prevent, respond to, and recover from various public emergencies. It includes pre-emergency prevention and preparation, during-emergency response and coordination, and post-emergency recovery and reconstruction.

2) Decentralized Responsibility

Decentralized responsibility in emergency management refers to the division of emergency management responsibilities among different levels of government (federal, state, local) and different social actors according to their respective functions and capabilities. Each actor has clear responsibilities and rights, which can improve the flexibility and efficiency of emergency response.

3) Inter-departmental Collaboration

Inter-departmental collaboration means that different government departments (such as police, health, transportation, and public works) cooperate closely in emergency management, sharing information, resources, and responsibilities to achieve seamless emergency response.

4) Social Participation

Social participation in emergency management refers to the active involvement of social organizations, volunteer groups, and citizens in emergency prevention, response, and recovery. Their participation can supplement the resources and capabilities of the government and improve the overall emergency management level.

B. Core Research Issues

Based on the above concept definitions, this paper focuses on the following core research issues:

- 1) How does the decentralized responsibility system in Germany's emergency management system work, and what are its advantages and challenges?
- 2) What are the specific mechanisms of inter-departmental collaboration in Germany's emergency management, and how do they ensure the efficiency of emergency response?
- 3) How does social participation play a role in Germany's emergency management, and what measures can be taken to further promote social participation?
- 4) What practical implications can be drawn from the German model for other countries to optimize their emergency management systems?

IV. CHARACTERISTICS OF GERMANY'S PUBLIC EMERGENCY MANAGEMENT SYSTEM

A. Federal-state-local Decentralization

Germany is a federal country, and its emergency management system reflects the characteristics of federal-state-local decentralization. The federal government, states, and local governments have clear-cut responsibilities in emergency management. The federal government is mainly responsible for formulating overall emergency management strategies, providing legal and financial support, and coordinating major cross-state emergencies. States are responsible for implementing federal policies in their respective regions, organizing and coordinating emergency response within the state, and providing necessary support to local governments. Local governments, such as municipalities, are at the forefront of emergency response, responsible for daily emergency prevention and preparation, on-site emergency response, and post-emergency recovery in their jurisdictions.

This decentralized management structure is conducive to giving full play to the initiative and enthusiasm of different levels of government. Local governments are more familiar with local conditions, so they can respond more quickly and accurately to local emergencies. At the same, the federal government can play a coordinating and supporting role in major emergencies that exceed the capacity of a single state or local government.

B. Dominant Role of State and Local Governments

In Germany's emergency management, state and local governments bear the main responsibility for emergency management. They have relatively independent emergency management agencies and sufficient autonomy in emergency response. For example, each state has its own disaster control department, which is responsible for formulating state-level emergency plans, organizing emergency drills, and coordinating emergency resources within the state. Local governments also have their own emergency management teams and are responsible for implementing specific emergency response tasks, such as evacuating residents, providing emergency supplies, and maintaining social order.

The dominant role of state and local governments is determined by Germany's political system and historical tradition. It can ensure that emergency management is more

close to the actual needs of the local area and improve the pertinence and effectiveness of emergency response.

C. Federal Coordination Support

Although state and local governments bear the main responsibility for emergency management, the federal government plays an important coordinating and supporting role. The federal government provides legal support by formulating and perfecting emergency management laws and regulations, which clarify the rights and obligations of different levels of government and social actors in emergency management. In terms of financial support, the federal government allocates special funds for emergency management, especially for major cross-state emergencies or emergencies that cause serious losses to local governments. In addition, the federal government also provides technical support, such as sharing emergency monitoring and early warning technology, providing emergency management training and guidance, and helping state and local governments improve their emergency management capabilities.

The federal coordination support mechanism ensures that the decentralized emergency management system can operate effectively. It can avoid the problem of fragmented emergency management caused by excessive decentralization and ensure the unity and coordination of emergency management at the national level.

D. Extensive Social Participation

Germany encourages extensive social participation in emergency management, including social organizations, volunteer groups, and citizens. Social organizations, such as the German Red Cross, play an important role in emergency rescue, medical care, and material distribution. Volunteer groups, such as volunteer fire brigades, are widely distributed in communities and can respond quickly to local emergencies. Citizens are also actively involved in emergency management through participating in emergency drills, learning emergency knowledge and skills, and reporting potential safety hazards.

The extensive social participation in Germany's emergency management is due to its long-standing social culture of volunteering and the government's active guidance and support. Social participation can effectively supplement the resources and capabilities of the government, improve the speed and quality of emergency response, and enhance the resilience of society to emergencies.

V. OPERATING MECHANISMS OF GERMANY'S EMERGENCY MANAGEMENT

A. Risk Assessment and Early warning

Germany has established a sound risk assessment system, which regularly assesses various potential emergency risks, such as natural disasters (floods, earthquakes, etc.), public health risks, and man-made accident risks. The risk assessment process includes identifying risk sources, analyzing the probability and consequences of risks, and evaluating the vulnerability of society to risks. Through comprehensive risk assessment, the government can understand the distribution

and severity of risks, and then formulate targeted emergency prevention and preparation measures.

In addition, Germany has also established a perfect monitoring network and early warning system. For example, in flood prevention, a large number of hydrological monitoring stations are set up to monitor water levels, flow rates, and other indicators in real-time. Once the monitoring indicators reach the early warning threshold, the early warning information will be released to the relevant government departments, social organizations, and the public in a timely manner, so as to give them enough time to prepare for emergency response.

B. Disaster Response Coordination

Germany has established an efficient disaster response coordination mechanism. When an emergency occurs, the relevant government departments, social organizations, and volunteer groups will be mobilized quickly to participate in emergency response. The disaster response coordination mechanism includes the establishment of emergency command centers, the formulation of emergency response plans, and the allocation of emergency resources.

The emergency command center is the core of disaster response coordination. It is responsible for overall command and coordination of emergency response, including collecting and analyzing emergency information, formulating emergency response strategies, and dispatching emergency resources. Emergency response plans are formulated in advance, which clearly define the responsibilities and tasks of different actors in emergency response, as well as the procedures and methods of emergency response. Emergency resource allocation is carried out according to the needs of emergency response, including personnel, materials, and equipment. The government will allocate emergency resources reasonably to ensure that the most needed areas can get sufficient support.

C. Firefighting and Technical Rescue

In Germany, firefighting and technical rescue are mainly carried out by professional fire departments. Fire departments have advanced firefighting equipment and technical rescue equipment, such as fire engines, aerial work platforms, and life-saving equipment. Firefighters are professionally trained and have rich experience in firefighting and technical rescue.

In addition to dealing with fire emergencies, fire departments also play an important role in other emergencies, such as traffic accidents, natural disasters, and public health emergencies. For example, in the event of a traffic accident, firefighters can carry out rescue work, such as extricating the injured, and providing on-site medical care. In natural disasters, they can help evacuate residents, provide emergency shelter, and restore infrastructure.

D. Cross-departmental Collaboration

Germany attaches great importance to cross-departmental collaboration in emergency management. Different government departments, such as police, health, transportation, and public works, cooperate closely in emergency response. They share information, resources, and responsibilities to achieve seamless emergency response.

For example, in the event of a public health emergency, the health department is responsible for diagnosing and treating patients, the police department is responsible for maintaining social order, the transportation department is responsible for ensuring the transportation of medical supplies and personnel, and the public works department is responsible for ensuring the normal operation of water, electricity, and gas supply. The cross-departmental collaboration mechanism is realized through regular joint drills, information sharing platforms, and joint command systems. These mechanisms can improve the coordination and cooperation ability of different departments and ensure the efficiency of emergency response.

VI. TYPICAL PRACTICES OF GERMANY'S EMERGENCY MANAGEMENT

A. Flood Prevention

Germany has strengthened flood prevention through strengthening basin management and flood control engineering construction. It has formulated scientific flood control plans for river basins, including measures such as dredging rivers, building dikes and reservoirs, and restoring wetlands. These measures can effectively regulate the flow of rivers, reduce the risk of floods, and protect the safety of people's lives and property in the basin.

In addition, Germany has also improved the flood early warning and emergency response system. The flood early warning system can monitor the water level of rivers in real-time and release early warning information in a timely manner. The emergency response system includes the formulation of flood emergency plans, the organization of flood emergency drills, and the allocation of flood emergency resources. In the event of a flood, the government will quickly organize the evacuation of residents, provide emergency supplies, and carry out flood rescue and relief work.

B. Extreme Weather Response

Germany has established a meteorological early warning system to deal with extreme weather, such as high temperatures, snowstorms, etc. The meteorological early warning system can monitor meteorological elements in real-time, such as temperature, precipitation, wind speed, and wind direction, and predict the occurrence and development of extreme weather. Once extreme weather is predicted, the early warning information will be released to the relevant government departments, social organizations, and the public in a timely manner.

In addition, Germany has also formulated corresponding countermeasures for different types of extreme weather. For example, in the face of high temperatures, the government will take measures to ensure the supply of water and electricity, open up cooling centers, and strengthen the inspection of outdoor construction sites. In the face of snowstorms, the government will organize the cleaning of snow and ice, ensure the normal operation of transportation, and provide emergency shelter for the homeless.

C. Civil Defense and Evacuation

Germany has improved the civil defense system and built evacuation facilities to deal with emergencies. The civil

defense system includes the establishment of civil defense organizations, the formulation of civil defense plans, and the training of civil defense personnel. Civil defense organizations are responsible for organizing and coordinating civil defense work, such as emergency evacuation, emergency shelter construction, and emergency supplies storage.

Evacuation facilities include emergency shelters, evacuation routes, and evacuation signs. The government will mark evacuation routes and signs clearly, so that residents can evacuate quickly and safely in case of emergency. In addition, the government will also conduct regular emergency evacuation drills to improve the emergency evacuation ability of residents.

D. Volunteer Fire Brigade System

Germany's volunteer fire brigade system is very developed. Volunteer fire brigades are widely distributed in communities, and their members are volunteers from the community. Volunteer fire brigades have professional firefighting equipment and training, and they can respond quickly to local emergencies, such as fires, traffic accidents, and natural disasters.

The volunteer fire brigade system can effectively supplement the forces of professional fire departments, improve the speed and quality of emergency response, and enhance the resilience of communities to emergencies. The government also provides support and guidance to volunteer fire brigades, such as providing training, equipment, and funds.

VII. PRACTICAL IMPLICATIONS

A. Strengthening Hierarchical Responsibility

Other countries can learn from Germany's experience of strengthening hierarchical responsibility in emergency management. Clear division of responsibilities among different levels of government can improve the efficiency of emergency response. Each level of government should have clear responsibilities and rights, and establish effective communication and coordination mechanisms. At the same time, the responsibilities and rights of different levels of government should be adjusted according to the actual situation, so as to ensure that emergency management can be carried out smoothly.

B. Improving Cross-departmental Collaboration

Cross-departmental collaboration is the key to effective emergency management. Other countries should establish and improve cross-departmental collaboration mechanisms, such as regular joint drills, information sharing platforms, and joint command systems. Different government departments should strengthen communication and cooperation, share information and resources, and jointly formulate emergency response plans. In addition, the government should also establish a performance evaluation mechanism for cross-departmental collaboration, so as to encourage different departments to actively participate in emergency management.

C. Perfecting the Early warning Release System

A perfect early warning release system is the premise of effective emergency prevention and preparation. Other countries should learn from Germany's experience of establishing a sound monitoring and early warning system, and optimize the information release process. The early warning release system should be able to monitor potential emergency risks in real-time, and release early warning information to the relevant government departments, social organizations, and the public in a timely and accurate manner. At the same time, the government should also strengthen the publicity and education of emergency knowledge, so as to improve the public's awareness and self-rescue ability.

D. Attaching Importance to Social Participation

Social participation can effectively supplement the resources and capabilities of the government and improve the overall emergency management level. Other countries should encourage and support social organizations, volunteer groups, and citizens to participate in emergency management. The government should provide policy support and guidance to social participation, such as giving tax incentives to social organizations, providing training and equipment to volunteer groups, and encouraging citizens to participate in emergency drills and learn emergency knowledge and skills. In addition, the government should also establish a mechanism for social participation in emergency management, such as a social participation fund, so as to ensure the long-term and stable participation of social forces in emergency management.

VIII. CONCLUSION

This paper conducts a comprehensive and in-depth study on Germany's public emergency management system from the perspectives of theoretical analysis, literature review, and practical exploration. Through the analysis, it is found that Germany's emergency management system has the characteristics of federal-state-local decentralization, dominant role of state and local governments, federal coordination support, and extensive social participation. Its operating mechanisms, including risk assessment and early warning, disaster response coordination, firefighting and technical rescue, and cross-departmental collaboration, are relatively perfect. The typical practices in flood prevention, extreme weather response, civil defense and evacuation, and volunteer fire brigade system provide valuable experiences for other countries.

The practical implications of the German model, such as strengthening hierarchical responsibility, improving cross-departmental collaboration, perfecting the early warning release system, and attaching importance to social participation, are of great significance for other countries to optimize their emergency management systems. However, it should be noted that each country has its own unique political, economic, and social context, so when learning from the German model, other countries should combine their own actual situations and make appropriate adjustments and innovations.

In the future, with the increasing complexity and uncertainty of emergencies, the construction of public emergency management systems needs to be continuously

improved and innovated. More in-depth research on different countries' emergency management systems, especially the integration of theoretical research and practical exploration, will help to promote the development of global public emergency management theory and practice.

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