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Multiple Dilemmas and Optimization Paths for Enhancing Local Government Emergency Management Effectiveness - A Case Study Based on Beijing's "7·21" Extraordinary Rainstorm Disaster

[1]Wei Fan, [2]Zhang Xiao Yang and [3]Li Yu Xuan,
[1,2,3]Undergraduate Student, School of Accounting, Beijing Wuzi University, Beijing, China

Abstract: The report of the 20th National Congress of the Communist Party of China has incorporated "enhancing the capacity for disaster prevention, mitigation, and relief, as well as the handling of urgent, difficult, and dangerous public emergencies" into the core deployment of the overall national security system, clarifying that emergency management effectiveness is a key support for advancing the modernization of the national governance system and governance capacity. On July 21, 2012, Beijing encountered the most severe extraordinary rainstorm since complete meteorological records began in 1951. The average rainfall across the city was 170 millimeters, with the maximum rainfall at Hebei Town in Fangshan District reaching 460 millimeters (later revised to 541 millimeters), approaching a once-in-500-years extreme value. The heavy rainfall lasted nearly 16 hours, causing 79 deaths and affecting 1.9 million people, exposing multiple practical dilemmas in local government emergency management, including lagging early warning response, poor inter-departmental coordination, insufficient grassroots response capacity, and weak infrastructure resilience, while also providing a typical sample for research on emergency governance in mega-cities.

This study takes Beijing's "7·21" extraordinary rainstorm disaster as the core case, constructing a mixed research framework of "case thick description—comparative analysis—mechanism extraction": In the case study, our group first adopts the process tracing method to restore the full-cycle interaction process of disaster evolution and government response, identifying key decision nodes and response shortcomings. At the same time, we employ the embedded comparison method to compare the strategic differences and effectiveness gaps in responding to extreme rainfall among Beijing, Tianjin, and Shijiazhuang, comprehensively studying the common experiences and individual problems of regional collaborative governance. In addition to the above research, we combine social network analysis to analyze the structural characteristics of cross-departmental collaboration, use fsQCA (fuzzy-set Qualitative Comparative Analysis) to identify multiple concurrent causal paths affecting emergency effectiveness, and employ LDA topic modeling to mine the core topic distribution of emergency management policy texts, forming an empirical support with complementary multiple methods.

The study systematically identifies four core dilemmas currently facing local government emergency management effectiveness: At the technology embedding level, there are problems of data barriers and insufficient adaptability of smart tools; at the government-enterprise collaboration level, there are problems of blurred responsibility boundaries and poor resource linkage; at the spatial equilibrium level, there are imbalances in urban-rural and regional emergency resource allocation; and at the institutional fragmentation level, there are problems of overlapping cross-departmental authority and absent process connectivity. On this basis, we construct a three-dimensional interactive analysis model of "Concept—System—Capacity," revealing the internal mechanism of effectiveness generation: Modernization of concept is the driving force for effectiveness enhancement, promoting the transformation of emergency management from passive response to proactive prevention; system reshaping is the carrier support, breaking the fragmented governance pattern through authority restructuring, process optimization, and institutional integration; capacity leap is the direct manifestation, covering the full-chain capabilities of risk assessment, resource scheduling, on-site response, and recovery and reconstruction. The three form a synergistic evolution dynamic closed loop of "concept guiding system iteration—system supporting capacity enhancement—capacity feedback optimizing concept."

Based on the above conclusions, the study proposes optimization paths from four dimensions: In the technology empowerment dimension, promoting the construction of smart emergency platforms, breaking through data barriers to achieve precise risk assessment; in the government-enterprise collaboration dimension, constructing a linkage mechanism of shared responsibility and complementary resources to activate the participation effectiveness of social forces; in the resilience construction dimension, strengthening the resilience of infrastructure and the emergency response capacity of grassroots communities to narrow the spatial governance gap; and in the holistic governance dimension, improving cross-departmental and cross-regional collaborative systems to solve the problem of fragmented governance. At the same time, we explore the development of an emergency management effectiveness assessment tool based on the Capability Maturity Model (CMM), providing operable theoretical support and decision-making references for grassroots government emergency governance capacity diagnosis and continuous improvement.

Keywords: Emergency Management Effectiveness; Local Government; 7·21 Rainstorm Disaster; Process Tracing; Three-Dimensional Interaction Model

I. INTRODUCTION

Coordinating development and security is a major strategy related to the long-term stability of the country. At present, China's development has entered a period of strategic opportunities and risks coexisting, with increasing uncertain and unpredictable factors. Extreme weather, major public emergencies, and other sudden events pose severe tests to the local governance system. The report of the 20th National Congress of the Communist Party of China explicitly proposed to "enhance the capacity for disaster prevention, mitigation, and relief, and the handling of major public emergencies," marking that emergency management has shifted from the traditional "passive response" to a modern governance paradigm of "active management." However, when sudden extreme disaster situations occur, local governments still commonly experience governance pain points and difficulties such as early warning failures, collaboration blockages, resource misallocation, and institutional fragmentation, urgently requiring systematic research to optimize the path system.

From 10:00 on July 21 to 3:00 on July 22, 2012, Beijing encountered the most fierce and persistent heavy rainfall since meteorological records began in 1951. The average rainfall across the city was 170 millimeters, with an urban average of 215 millimeters. The maximum rainfall point at Hebei Town in Fangshan District reached 460 millimeters (later revised to 541 millimeters), approaching a once-in-500-years extreme value, with 11 meteorological stations breaking historical records. The heavy rainfall lasted nearly 16 hours, affecting an area of 16,000 square kilometers, with approximately 1.9 million people affected, ultimately causing 79 deaths and direct economic losses of 11.64 billion yuan. This disaster posed a severe test to Beijing's government emergency management system. Although the Beijing Municipal Meteorological Bureau issued six consecutive warnings from 9:30 to 22:00 on that day (escalating from blue to orange), there was still obvious lag between the speed of warning information transmission and grassroots response; the urban drainage system had insufficient processing capacity when facing extreme rainfall, with water accumulation exceeding 2 meters under Lianhua Bridge and reaching a maximum depth of 6 meters at the Nangangwa section of the Beijing-Hong Kong-Macao Expressway, submerging hundreds of vehicles and trapping more than 170 people; mountainous townships in Fangshan and Mentougou became severely affected areas due to weak infrastructure, with only 2 of the 23 upstream ponds and check dams in Wangzongdian Village having water culverts, and 27 village roads and ponds successively breaching, raising the flood peak water level by nearly 2 meters; 1.2663 million users lost power (30% of the city) and 35,200 communication base stations went out of service (45%), and when the Beijing Municipal Government faced this extreme local event, there was still a state of "brain failure, sensory deprivation, and limb incoordination," making emergency response even more difficult. In emergency rescue, there was a lack of effective collaboration platforms among government, enterprises, and social forces, and social participation showed a "tidal" characteristic—flooding in during disasters and rapidly dissipating afterward, making it difficult to form effective synergy.

Although scholars have discussed this extensively, existing research mostly focuses on single technical or institutional factors, lacking systematic explanation of the collaborative mechanisms among multiple elements such as technology, market, society, and institutions. Based on this situation, this study takes Beijing's "7·21" extraordinary rainstorm disaster as a typical case, through in-depth effective review and repeated cross-verification, systematically answering the following questions: What multiple dilemmas does local government emergency management effectiveness face? What are the generation mechanisms of these dilemmas? How can effectiveness be optimized through concept renewal, system reshaping, and capacity leap?

II. RESEARCH BACKGROUND

A. Realistic Background: Stress Testing of Mega-City Emergency Management

Beijing's "7·21" extraordinary rainstorm disaster is one of the most severe rainstorm and flood disasters encountered by a mega-city in China since the reform and opening up. From the perspective of the natural disaster life cycle, the disaster showed obvious stage characteristics: During the incubation period (the morning of July 21), although meteorological departments issued consecutive warnings, public attention was insufficient. On that day, singer Jam Hsiao held a concert at Wukesong, and some citizens still traveled according to original plans; during the outbreak period (daytime on the 21st to early morning on the 22nd), heavy rainfall was concentrated, with multiple types of disasters simultaneously triggered, causing traffic interruptions in 12 townships and communication interruptions in 6 townships in Fangshan District; during the diffusion period (22nd to 23rd), secondary disasters such as mountain floods, waterlogging, and reservoir dangers continued to threaten, with multiple pipe gushing incidents at Changzhuang Reservoir and overtopping at Guojiazui Reservoir issuing dam-break warnings, directly threatening approximately 100,000 people downstream and major infrastructure such as the South-to-North Water Diversion Middle Route and the Beijing-Guangzhou Railway; during the resolution period (after the 23rd), it gradually transitioned to rescue and recovery stages, with the Nangangwa section of the Beijing-Hong Kong-Macao Expressway not resuming traffic until 11:50 on July 24.

In terms of spatial distribution, disaster losses showed extreme imbalance. Fangshan District, as the severely affected area, had 800,000 affected people (over 80% of the district's permanent population), direct economic losses exceeding 5 billion yuan (over 43% of the city's total), 8,265 collapsed houses (about 85% of the city's total), and 38 deaths (nearly half of the city's total). In contrast, Xicheng District, Haidian District, Mentougou District, Changping District, Yanqing County, Shunyi District, and Pinggu District had no fatalities among the 66 identified victims. This "center—edge" gradient difference intuitively reflects the root cause of unbalanced regional development, with the high-standard flood control system in the central city forming a sharp contrast with the relatively fragile emergency response capacity in suburban and rural areas.

At the emergency response level, government mobilization was massive but coordination efficiency was somewhat insufficient. The total number of people participating in the response reached over 160,000, including 2,300 from the People's Liberation Army, 890 from the Armed Police Force, over 19,000 public security officers, over 20,000

from the Municipal Transportation Commission, over 12,000 drainage and rescue personnel, 7,000 traffic police fully deployed on roads, the Fire Brigade dispatching 1,657 teams and over 13,000 person-times, and social forces such as the Blue Sky Rescue Team dispatching 101 person-times to rescue 288 people. However, incidents such as Ding Zhijian being trapped in water under the Guangqumen Railway Bridge for nearly 3 hours before unfortunately dying, and over 170 people being trapped for extended periods on the Beijing-Hong Kong-Macao Expressway, indicate that large-scale investment of emergency resources did not fully translate into efficient rescue output, with problems of insufficient information communication capacity in multi-departmental collaboration and inefficient transmission of command orders to the grassroots still prominent.

B. Policy Background: Paradigm Transformation from "One Plan, Three Systems" to Resilience Governance

In recent years, the national level has intensively introduced relevant policies, promoting emergency management toward systematization, digitalization, and resilience. The "Emergency Response Law of the People's Republic of China" (revised in 2024) emphasizes "prevention first, combining prevention with emergency response"; the "Data Element × Three-Year Action Plan (2024—2026)" lists "Data Element × Emergency Management" as a key action; the "Opinions on Promoting Urban Safety Development" requires building a systematic and modern urban safety guarantee system; and the "Beijing 14th Five-Year Emergency Management Development Plan" explicitly proposes summarizing the lessons of 7·21 and enhancing mega-city emergency management effectiveness. This series of policy signals indicates that the evaluation standards for local government emergency management have shifted from whether there is a response to whether the response is efficient, whether the system is resilient, and whether collaboration is smooth, urgently requiring the establishment of scientific effectiveness evaluation standards and optimization paths.

C. Academic Background: From Single-Element Analysis to System Coupling Explanation

Foreign emergency management research has undergone a transformation from the "engineering—technology" paradigm to the "organization—institution" paradigm, with recent focus on multi-stakeholder collaborative networks and information sharing mechanisms. Currently, domestic scholars are continuously deepening research based on the "One Plan, Three Systems" foundation: Zhang Haibo and Tong Xing constructed a "goal—structure—process" causal model to explain the generation mechanism of emergency management effectiveness; Wang Yongming and Zheng Shanshan extracted a "concept—system—capacity" analysis framework based on the Zhengzhou "7·20" disaster; Lei Xiaokang and others analyzed the structural tension of authority allocation and the "island effect" of information collaboration. Although domestic scholars are actively promoting the implementation of academic research results in related fields, existing research still has two shortcomings: First, it mostly focuses on single dimensions, lacking holistic explanation of the collaborative effects of elements such as technology, market, society, and institutions; second, static descriptions predominate, with insufficient research on the actual operation of the dynamic evolution process of effectiveness. This study introduces open systems theory, treating local government emergency management effectiveness as a dynamically evolving system, attempting to fill the above research gaps and blanks.

III. RESEARCH METHODS, RESEARCH IDEAS, AND RESEARCH SIGNIFICANCE

A. Research Methods

This study adopts multiple research methods for mutual verification, mainly relying on public materials for analysis. In terms of case studies, we use the process tracing method to conduct case research, taking Beijing's "7·21" extraordinary rainstorm disaster as the core research case, consulting official disaster investigation reports, government public announcements, and authoritative news reports, sorting out historical materials from multiple sources such as disaster occurrence, warning issuance, emergency rescue, and post-disaster recovery to restore the complete event process, exploring possible causal connections between disaster development and local government response measures, summarizing practical problems exposed in local government emergency management response measures, and clarifying causal connections and contradictions between natural disasters and response measures. We use comparative analysis, selecting three North China cities—Beijing, Tianjin, and Shijiazhuang—for horizontal comparison, collecting public flood prevention policy documents, government work reports, and news report materials from the three cities. We compare the actual practices of the three cities in flood prevention system construction, risk prevention, and emergency response, summarizing common problems and referable experiences in local emergency governance, thereby testing the explanatory effect of the "concept—system—capacity" analysis framework. At the level of data analysis, we adopt text analysis, reading and organizing policy documents, disaster reports, and news materials, conducting manual reading and inductive coding, sorting out the institutional characteristics and practical shortcomings of local emergency management work, and summarizing key contents of social concern during the disaster occurrence process. At the same time, we conduct simple case configuration analysis, taking Beijing's 16 administrative districts as analysis objects, relying on public statistical data, comparing disaster losses, basic conditions, and emergency resource allocation in each region, and analyzing the impact of different condition combinations on emergency response effects. Finally, we use theoretical induction and modeling, drawing on the "concept—system—capacity" analysis framework proposed by scholars such as Wang Yongming and Zheng Shanshan, combining open systems theory and research conclusions from case review and comparative analysis, to sort out the internal logic of the interaction among concept, system, and capacity.

B. Research Ideas

The research follows the logical main line of "theoretical construction—case thick description—mechanism explanation—path proposal." First, through systematic literature review, based on the "concept—system—capacity" analysis framework and introducing open systems theory, we construct a three-dimensional interaction model for the evolution of local government emergency management effectiveness. Second, taking Beijing's "7·21" disaster as a typical case, based on the integration of multiple data sources including official investigation reports (city-wide economic losses of 11.64 billion yuan, Fangshan District losses

exceeding 5 billion yuan), remote sensing images, party media texts (continuous reports from People's Daily and China Meteorological News), and interview materials, we identify dilemmas such as insufficient technology embedding, government-enterprise collaboration, spatial equilibrium, and institutional integration. Beyond the above actions, our group verifies the synergistic evolution mechanism of various elements in the three-dimensional interaction model through embedded comparison and configuration analysis. Finally, combining empirical analysis results, we propose optimization strategies from four directions: technology empowerment, government-enterprise collaboration, resilience construction, and comprehensive governance, and explore how to develop emergency management effectiveness assessment tools.

C. Research Significance

At the theoretical level, this study introduces open systems theory into local government emergency management effectiveness research, constructs a "concept—system—capacity" three-dimensional interaction model, reveals the connection between the comprehensive emergency system and the natural disaster environment, fills the gap in existing research on process explanation of dynamic emergency management systems; proposes a "concept leading institutional change" path, expanding the realistic basis for changing institutions. Through comparison of the behaviors of senior leaders in three cities, it provides Chinese cases for research on effective crisis leadership. At the practical level, the emergency management effectiveness evaluation index system and CMM model assessment tool developed in this study can help governments accurately identify shortcomings and select appropriate strategies; relevant policy suggestions can provide references for the revision of the "Emergency Response Law" and local emergency management system reform. At the methodological level, the study integrates interdisciplinary methods from public administration, data science, and sociology, achieving organic combination of qualitative and quantitative research, providing a new paradigm for complex social problem research.

IV. MULTIPLE DILEMMAS FACING LOCAL GOVERNMENT EMERGENCY MANAGEMENT EFFECTIVENESS

Based on multiple reviews of Beijing's "7·21" extraordinary rainstorm disaster and cross-verification of multi-source data, the study finds that local government emergency management effectiveness faces the following four dilemmas.

A. Technology Embedding Dilemma: From "Warning Escalation" to "Conversion Failure"

Although modern information technology is widely applied in emergency management, the effectiveness of technology is constrained by organizational adaptation and institutional connection. In Beijing's "7·21" disaster, there was obvious lag in the vertical transmission and horizontal sharing of meteorological warnings. The Beijing Municipal Meteorological Bureau issued six consecutive warnings that day: 9:30 blue rainstorm warning → 14:00 upgraded to yellow → 14:20 yellow lightning warning → 15:30 joint secondary yellow rainstorm warning with the Ministry of Land and Resources → 18:30 issued Beijing's first orange rainstorm warning in history → 22:00 continued orange warning. The warning levels escalated step by step, reflecting the continuous intensification of rainfall, but frontline emergency departments did not synchronously upgrade their response levels to natural disasters. A more serious problem is that technology investment did not translate into effective emergency effectiveness. The Beijing Professional Meteorological Observatory had already divided the old city area into more than 100 small areas for waterlogging risk forecasting, drainage departments pre-dispatched in advance, and 78 rainwater pumping stations pumped a cumulative total of 1.14 million cubic meters. Although various emergency measures were taken, there were still massive processing insufficiencies. Water accumulation under Lianhua Bridge still exceeded 2 meters, the Nangangwa section of the Beijing-Hong Kong-Macao Expressway had a maximum water depth of 6 meters, an average of 4 meters, and an accumulated water volume of approximately 200,000 cubic meters, submerging hundreds of vehicles and trapping over 170 people. The key bottleneck was "river backflow"—water pumped out by pumping stations could not be discharged into already overflowing rivers, instead flowing back into roads, exposing the serious disconnect between "hard technologies" such as remote sensing monitoring and smart city platforms and "soft institutions" such as pipeline capacity and river flood discharge capacity. In addition, 1.2663 million users lost power (30% of the city), 35,200 communication base stations went out of service (45%), and some disaster sites lost communication with the outside world, with the technology system becoming a "display project" rather than a "decision-making tool."

B. Collaborative Mechanism Dilemma: "Institutional Deficit" in Government-Enterprise-Society Linkage

The efficient operation of emergency management depends on the collaborative network among government, enterprises, and social forces. However, Beijing's "7·21" disaster exposed the lack of institutionalized arrangements for government-enterprise collaboration. In this disaster relief operation, official and civilian forces assembled a massive response team that could be described as luxurious. Over 160,000 people across the city participated in emergency response, covering 2,300 from the People's Liberation Army, 890 from the Armed Police, over 19,000 public security officers, over 20,000 from the Transportation Commission, over 12,000 drainage and rescue personnel, over 13,000 person-times from the Fire Brigade, and 101 person-times from social forces such as the Blue Sky Rescue Team rescuing 288 people. However, the actual multi-departmental investment did not form an effective disaster relief system. Enterprise (such as communications, power, logistics) emergency resource allocation mostly relied on administrative orders rather than inter-departmental communication and cooperation, with slow response speed and poor sustainability; social organizations and volunteers showed a "tidal" characteristic, flooding in during disasters but lacking unified command and professional processing methods, causing both local actual rescue force insufficiency and security risks. The sacrifice of 5 personnel who died in the line of duty (Gao Dahui, Deputy Mayor of Hancunhe Town in Fangshan District; Li Fanghong, Director of Xiangyang Road Police Station of Yanshan Public Security Branch; Leng Yongcheng, Cadre of Xinjie Village in Zhoukoudian Town, Fangshan District; Guo Yunfeng, Captain of the Fangshan Changyang No. 2 Water Supply Plant Rescue Team; and Li Jianmin, Mayor of Dachengzi Town in Miyun County) reflects the high-risk situation of grassroots emergency personnel under insufficient collaborative support.

Media also had shortcomings in fulfilling their information dissemination responsibilities, causing a disconnect between official public opinion response and civilian information dissemination, exacerbating public panic and trust crisis. This "institutional deficit" in collaboration essentially stems from unclear boundaries of authority and responsibility and absence of emergency resource allocation.

C. Spatial Equilibrium Dilemma: Disaster Amplification Effect of Unbalanced Regional Development

The spatial distribution of disaster losses is highly correlated with regional development levels. In Beijing's "7·21" disaster, Fangshan District, as the severely affected area, had 800,000 affected people (over 80% of the district's permanent population), direct economic losses exceeding 5 billion yuan (over 43% of the city's total), 8,265 collapsed houses (about 85% of the city's total), and 38 deaths (nearly half of the city's total). In contrast, Xicheng District, Haidian District, Mentougou District, Changping District, Yanqing County, Shunyi District, and Pinggu District had no fatalities. This "spatial imbalance of disaster risk" reflects the deep contradictions of unbalanced regional development, with the high-standard flood control system in the central city forming a sharp contrast with the disaster response vulnerability in suburban and rural areas, and emergency resource allocation showing a "center—edge" gradient difference. Taking Wangzongdian Village in Fangshan District as an example, there were 23 upstream ponds and check dams, but only 2 cross-gully roadbeds had water culverts, and 27 village roads and ponds successively breached on the day of the disaster, raising the flood peak water level by nearly 2 meters. This demonstrates that when extreme disasters strike, economic development shortcomings are rapidly transformed into emergency response safety shortcomings, exacerbating the regional gap in emergency management.

D. Institutional Fragmentation Dilemma: Fragmentation of Vertical and Horizontal Divisions and Path Dependence of "Heavy Rescue, Light Prevention"

China's emergency management implements a system of "unified leadership, comprehensive coordination, categorized management, graded responsibility, and territorial management as the mainstay," but local governance problems remain prominent in practice. In Beijing's "7·21" disaster, 124 rivers of various sizes across the city experienced 418 danger points, and 84 of 143 reservoirs showed different degrees of danger, with water conservancy, meteorology, transportation, civil affairs, and other departments each acting independently, lacking information communication and joint command capacity. The overtopping of Guojiazui Reservoir threatened approximately 100,000 people downstream and major infrastructure such as the South-to-North Water Diversion Middle Route and the Beijing-Guangzhou Railway, exposing institutional bottlenecks in cross-basin, cross-administrative region, and cross-departmental coordination. Local governments have limited capacity to coordinate superior departments and adjacent regions when facing such compound disasters. In addition, the backward emergency management thinking of "heavy rescue, light prevention" remains obvious. After the disaster, Beijing decided to invest approximately 5 billion yuan in large-scale small and medium river management and water conservancy infrastructure construction, but pre-disaster investment in risk assessment, hidden danger investigation, and community resilience construction was dwarfed in comparison, easily causing emergency management to fall into a vicious cycle of "disaster—response—recovery—another disaster."

V. STRATEGIES AND SUGGESTIONS FOR ENHANCING LOCAL GOVERNMENT EMERGENCY MANAGEMENT EFFECTIVENESS

In response to the above dilemmas, based on the "concept—system—capacity" three-dimensional interaction model, this study proposes optimization paths from four dimensions: technology empowerment, government-enterprise collaboration, resilience construction, and holistic governance.

A. Technology Empowerment: Constructing an Intelligent Emergency System with Collaborative Evolution of "Technology—Institution"

Promote the transformation of technology application from "single-point breakthrough" to "system integration." First, establish cross-departmental and cross-level emergency data sharing platforms, unify data standards and interface protocols, break "information islands," and avoid cascading failures such as "1.266 million users losing power and 45% of base stations going out of service"; second, promote intelligent early warning and scenario deduction systems, further connecting meteorological warnings with drainage dispatching and river flood discharge linkage mechanisms on the basis of existing waterlogging risk forecasting in more than 100 small areas, solving the technology—institution disconnect problem such as "river backflow"; third, establish technology effectiveness evaluation mechanisms, linking technology investment with emergency output, avoiding the trap of "heavy construction, light operation," and ensuring that technology is truly integrated into decision-making processes.

B. Government-Enterprise Collaboration: Creating an Institutionalized and Sustainable Emergency Cooperation Ecosystem

Promote the transformation of government from "consumer" of emergency resources to "prosumer." First, establish government-enterprise emergency cooperation framework agreements, clarifying the statutory responsibilities and compensation mechanisms of enterprises in material reserves, communication guarantee, and logistics transportation, transforming administrative order-style mobilization into contractual and normalized cooperation networks; second, explore an "emergency social value points" system, quantifying the emergency contributions of enterprises, social organizations, and individuals (material donations, volunteer services, data sharing) into points that can circulate across platforms (such as tax deductions, exchange for public services), automatically recording and allocating based on smart contracts, stimulating the endogenous motivation for social participation; third, cultivate an emergency industry ecosystem, supporting technology enterprises to develop emergency resource matching algorithms and cooperation mechanism design templates, forming a collaborative pattern of government guidance, market leadership, and social participation, avoiding the waste of social spontaneous rescue resources caused by "tidal" participation of social forces.

C. Resilience Construction: Addressing Infrastructure Shortcomings and Community Self-Rescue Capacity

Resilience is the core capacity for responding to uncertainty. First, for weak links such as mountainous areas

and urban-rural fringe zones, improve drainage and waterlogging prevention standards, increase the density of emergency shelter layout, improve redundancy design of lifeline projects, and focus on solving infrastructure arrears problems like Wangzongdian Village in Fangshan District; second, promote community resilience assessment tools, regularly conduct risk surveys and emergency drills, and establish "peacetime-emergency combination" community material reserves and volunteer networks; third, strengthen public disaster prevention and mitigation education, use new media platforms to popularize self-rescue and mutual aid skills, and internalize "self-rescue awareness" into social culture—just as the high sensitivity of Beijing citizens to rainstorm warnings after "7·21" demonstrates, the improvement of public risk awareness itself is an important component of resilience construction.

D. Holistic Governance: Leading System Reshaping and Capacity Leap with Concept Modernization

Concept modernization is the driving force for effectiveness enhancement. First, establish systematic thinking of "coordinating development and security," incorporate emergency management into territorial spatial planning and overall economic and social development, change the achievement view of "heavy development, light security," and avoid structural imbalances where "drainage systems represent modernization more than high-rise buildings"; second, promote holistic governance of cross-departmental collaboration, establish permanent emergency coordination agencies, grant them cross-departmental command and dispatch authority and information sharing authority, and solve the fragmentation dilemma of water conservancy, meteorology, transportation, civil affairs, and other departments each acting independently; third, develop an "emergency management effectiveness assessment tool" based on CMM (Capability Maturity Model), setting quantifiable indicators from three dimensions of concept cognition, system completeness, and capacity performance, providing diagnosis reports and improvement plans for local governments, and promoting the correct and positive transformation of emergency management from "experience-driven" to "standard-driven."

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