# Influencing Paths of Local Government Emergency Management Effectiveness ——A Qualitative Comparative Analysis Based on 25 Typical Production Safety Accidents

Lige Liu[1, a]

[1] China University of Mining and Technology (Beijing), Beijing 100000, China

[a] 2310810110@student.cumtb.edu.cn

**Abstract.** This paper mainly explores the influence paths of local governments' emergency management effectiveness in China. Selecting 25 typical work safety accidents from 2022 to 2025 as samples, it adopts the fuzzy-set Qualitative Comparative Analysis (fsQCA) method and builds an analytical model of six conditions based on the Technology-Organization-Environment (TOE) framework: media coverage, mobile Internet penetration rate, emergency material reserves, leading officials' meeting speeches, fiscal revenue scale, and Baidu Index. The study systematically identifies four configuration paths in order to achieve high effectiveness with characteristics of “hour-level response”. It finds that the “media-fiscal” combination is the backbone supporting path to generate high effectiveness while the marginal effect of material reserves is largely contingent on the synergies of information and fiscal conditions. Additionally, leading officials' speeches and public attention exhibit a certain substitution effect under specific circumstances. This paper further proposes a policy framework of "technology bottom line—condition matching", providing empirical evidence and institutional suggestions for addressing the dilemma of "high investment—low effectiveness" in grassroots emergency management.

**Keywords:** Emergency Management Effectiveness, Local Government, Work Safety Accidents, Configuration Paths.

## 1. Problem Statement

The Report to the 20th National Congress of the Communist Party of China places the prevention and mitigation of major risks at a pivotal position in the modernization of national governance, emphasizing the need to enhance awareness of potential risks and uphold a bottom-line mindset amid the coexistence of strategic opportunities and risk challenges [1]. The *Opinions on Further Improving Grassroots Emergency Management Capabilities* issued in 2024 further elevates the development of grassroots capabilities in organizational command, monitoring and early warning, rescue forces, and material support, explicitly requiring the risk prevention and control as well as emergency response chains to be consolidated down to the governance terminals such as counties, towns, and villages [2]. The *14th Five-Year Plan for National Emergency System* deploys national-level arrangements for hierarchical responsibility, territorial management, rapid response, and system coordination, proposing to continuously improve the efficiency of emergency response to unexpected events and comprehensive disaster prevention, mitigation, and relief capabilities [3]. In this policy context, local governments bear direct responsibility for the initial accident response and directly influence key links such as risk assessment, resource allocation, and public opinion stability.

Accident response needs and pressures have grown in line with reality. Work safety accidents usually have the characteristics of suddenness, dispersion, and high sensitivity to public opinion. If the information reporting is inadequate and inter-departmental coordination is lacking, or if the delivery of resources is slow, local governments might have to deal with overlapping demands for accident rescue, social stability maintenance and accountability in a short period of time. From the perspective of institutionalization of emergency management, previous research on the catastrophic rainstorm disaster in Zhengzhou in July 2021 reveals that there are several tensions between organizational coordination, resources input, and institutional implementation to enhance the effectiveness of emergency management, and resources input does not necessarily improve the

emergency management capabilities of local governments [6]. As can be appreciated, a local government's effectiveness in emergency management is not the result of a single condition, but a complex function of the interactions of a number of conditions.

As for research approaches, the research on local emergency management has gradually moved from the institutional design and organizational integration to the generation of effectiveness and system evolution but there are still two deficiencies in the explanation of effectiveness of emergencies. First, the existing literature is more concerned with macro-institutional setup and overall governance logic, and less about the processes by which local governments achieve rapid decision-making, organizational mobilization, and matching of resources in crisis situations of accidents. Second, the conditions of media coverage, public attention, technical foundations and fiscal guarantees in work safety accidents are often interdependent and a univariate analysis does not give clear insights into the substitution, complementarity and compensation relationships of these conditions in different situations. Previous research has focused on organizational coordination, data empowerment, digital construction, and work safety attention, but has not integrated the understanding of the interplay of these conditions into the response outcomes in accident situations. Thus, local government's emergency management effectiveness is not better understood by simply averagizing the effects of the single factors, but rather as a multiple causality phenomenon that needs to be identified by conditional combinations in the context of the respective emergency management situation.

In this context, taking 25 closed typical work safety accidents as samples from 2022 to 2025, this paper defines the emergency management effectiveness of local governments as the comprehensive result of response speed, organizational scheduling and result control in handling work safety accidents, and tries to answer two questions: What combinations of conditions can bring about high emergency management effectiveness in work safety accidents? How do local governments make efficient responses in different ways in different situations with varying political and public attention, and technical conditions? This paper builds on a literature review, introduces social movement theory and the Technology-Organization-Environment (TOE) framework, applies the fsQCA method to identify multiple generation paths to local governments' emergency management effectiveness and discusses practical implications for local government emergency governance as a result.

## 2. Literature Review

### 2.1. Origin and Connotation of Emergency Management Research

Regarding the starting point and core connotation of emergency management research, domestic academia has conducted systematic discussions from two dimensions: governance tasks and system capabilities. On the one hand, relevant studies regard emergency management effectiveness as a comprehensive result of multi-link linkage including risk identification, organizational coordination, resource delivery, information release, and social order restoration, emphasizing that it is not merely an indicator of rescue speed but a concentrated reflection of institutional execution capacity, organizational mobilization capacity, and contextual adaptability [4]. On the other hand, discussions on the evolution of China's emergency management system point out that China's emergency governance has gradually shifted from a disaster-specific, departmental, and phased response model to an integrated, whole-process, and multi-agent collaborative system structure, meaning that the scope of responsibilities and governance tasks assumed by local governments in accident response continue to expand [5]. Therefore, understanding local governments' emergency management effectiveness first requires situating it within the overall structure of the national governance system and local implementation chain.

At the institutional construction level, existing research no longer views emergency management as a simple addition of institutions or superposition of functions but emphasizes the reconfiguration process among institutional rules, organizational tools, and local adaptability. Taking Shenzhen's institutional innovation practice as an example, researchers point out that the improvement of local emergency governance capabilities relies on the simultaneous adjustment of institutional

arrangements, organizational operations, and action tools; institutional innovation translates into sustainable governance capacity only when institutional requirements can be embedded into specific implementation scenarios [9]. Correspondingly, discussions on the optimization path of China's characteristic emergency management system further propose that emergency governance should evolve from "sectoral integration" to "organic integration" and enhance system resilience through mechanism coordination, functional linkage, and resource coordination. These studies provide an important reference for defining the organizational foundation and institutional logic of local governments' emergency management.

### 2.2. Models and Influencing Factors of Emergency Management

Regarding the operation model of local governments' emergency management, existing research has generally formed three explanatory threads: "attention-driven", "technology-empowered", and "institution-collaborative". Among them, work safety attention research emphasizes that local governments' sustained attention to risk issues, rapid assessment of accident information, and high-level promotion by leading officials directly affect risk identification and accident governance outcomes. Such research reminds us that local emergency management is not merely an extension of routine administrative operations but a governance activity that rapidly aggregates political and organizational resources under high-pressure time constraints.

The technology empowerment perspective pays more attention to the impact of information infrastructure, data elements, and platform collaboration on emergency performance. Existing fsQCA studies find significant configuration effects among data conditions, organizational resources, and external environments, and different regions can achieve high governance performance through differentiated paths such as "data-environmental" or "organizational-environmental" [7]. Research on digital construction performance further points out that digital platforms, data openness, and strategic resources do not have a linear relationship but require matching in specific contexts to effectively improve emergency management efficiency [8]. This indicates that the explanatory power of technical variables lies not in their independent effect but in whether they can form stable coupling with organizational and environmental conditions.

In terms of the overall summary of influencing factors, local governments' emergency management effectiveness is constrained by at least three categories of conditions. Institutional and organizational conditions are mainly reflected in material reserves, fiscal guarantees, inter-departmental coordination, and accountability implementation; system optimization research has pointed out that such organizational adaptation directly affects the resilience of local emergency governance [11]. Technical and informational conditions are reflected in data connectivity, network coverage, and platform support. Environmental and pressure conditions involve media coverage, public attention, and the spread of accident public opinion; work safety attention research reveals the significant impact of external attention and political promotion on accident response outcomes [10]. Existing research provides a basis for identifying explanatory variables in this paper but also reflects a common limitation: most discussions remain at the level of single-factor effects or general attribution, lacking detailed path explanations of how different conditions interact in specific accident scenarios.

### 2.3. Literature Summary

Overall, existing research has identified key influencing factors of local governments' emergency management effectiveness from the perspectives of institutional coordination, attention mobilization, and digital empowerment, but still lacks systematic explanations of how multiple conditions form concurrent causalities in high-pressure accident scenarios. In recent years, case-oriented research has emphasized that the analysis of complex governance issues needs to simultaneously explain contextual boundaries, key processes, and comparative paths, avoiding simplifying outcomes to a single factor [12]. Discussions on causal inference in social sciences further point out that only by situating conditions within specific action sequences can researchers accurately distinguish necessary

support, key triggers, and compensation mechanisms [13]. This means that the explanation of work safety accidents cannot merely compare outcome differences but also clarify how local governments complete information aggregation, resource mobilization, and organizational response under accident pressure.

In terms of research objects, work safety accident response involves not only emergency decision-making and on-site scheduling but also continuous processes such as inter-departmental coordination, information dissemination, and accountability implementation, making it impossible for a single variable to present its true operation mechanism. Process tracing research points out that the explanation of complex governance actions needs to focus on key nodes and examine how actors at different stages drive outcome evolution [14]. Consistency analysis research emphasizes that governance effectiveness generation logic can be better identified only when action processes, conditional combinations, and outcome judgments are integrated into the same analytical framework [15]. Based on this gap, this paper incorporates technical, organizational, and environmental factors into a unified framework in subsequent research design and further compares the impact paths of different conditional combinations on high-effectiveness response.

A comprehensive review of existing research reveals that the generation of local governments' emergency management effectiveness does not simply follow the linear logic of "more resources mean higher effectiveness" or "stronger technology means higher efficiency" but is related to accident nature, information dissemination speed, inter-departmental coordination foundation, and fiscal pressure-bearing capacity. Especially in work safety accident scenarios, local governments face compound tasks including both on-site rescue time requirements and public opinion diffusion, accountability transmission, and cross-regional resource scheduling, which determines that a single explanatory framework cannot fully reveal the formation mechanism of efficient emergency response. Research on conditional combination comparison around this issue can not only retain the differences in accident scenarios but also help explain why different regions present different governance outcomes under similar pressure.

## 3. Theoretical Foundation

Introducing social movement theory into emergency management research does not equate local governments with actors in social movements [22] but leverages the analytical perspectives of resource mobilization and opportunity structure to understand the external constraints and internal responses faced by local governments in high-pressure accident scenarios. For this paper, this theory serves two main functions: first, it provides an explanatory framework for conditional variables such as media coverage, Baidu Index, and leading officials' meeting speeches; second, it helps explain that local governments' emergency management effectiveness is not only determined by material resources but also influenced by external pressure perception, political mobilization methods, and action window grasping.

The Technology-Organization-Environment (TOE) framework emphasizes that organizational performance and innovation are determined not by a single dimension but by the combined effects of technical conditions, organizational capabilities, and external environments [23]. For local governments' emergency management, information infrastructure, command systems, resource guarantees, and public opinion environments in accident response inherently exhibit cross-dimensional coupling characteristics. Adopting the TOE framework enables the integration of originally scattered conditional variables into a unified analytical logic: mobile internet penetration rate corresponds to technical conditions; emergency material reserves, leading officials' meeting speeches, and fiscal revenue scale correspond to organizational conditions; media coverage and Baidu Index correspond to environmental conditions. Through this classification, this paper can clearly identify the synergy, substitution, and compensation relationships among different dimensions.

More importantly, the TOE framework and fsQCA method have a high degree of alignment in explanatory logic. TOE provides a theoretical basis for variable selection and dimensional division,

while fsQCA further answers how conditions in these dimensions jointly generate outcomes through different combinations. In other words, TOE defines "which conditions to examine", and fsQCA identifies "how these conditions interact". On this basis, this paper combines the pressure-action logic provided by social movement theory with the multi-dimensional classification logic of the TOE framework to form an analytical framework suitable for work safety accident scenarios.

For this research, the combination of the two theories is not a simple superposition. Social movement theory emphasizes how external attention shapes local governments' action pressure and political opportunities, while the TOE framework further points out that such pressure can only be transformed into stable efficient responses when technical foundations, organizational capabilities, and environmental conditions form coupling relationships. Therefore, the generation of local governments' emergency management effectiveness depends not only on perceiving external pressure but also on having the institutional foundation and resource conditions to transform pressure into organizational action. The integration of the two helps explain both "why action is driven" and "why action translates into performance".

## 4. Research Design

### 4.1. Case Selection

Case selection follows four principles: first, cases must have significant public impact and governance pressure, truly reflecting the organizational mobilization context of local governments in accident handling; second, case types and spatial distribution must be diverse to avoid single regional or industrial characteristics dominating configuration results; third, cases must have clear accident start and end times, handling processes, and closed information to ensure stable judgment of outcome variables; fourth, supporting materials for cases must cover accident investigation reports, mainstream media coverage, government public information, and relevant public opinion texts to provide sufficient evidence for variable calibration and outcome explanation. Based on these principles, 25 work safety accident cases are finally formed as the formal case database. New case studies also emphasize that under a moderate number of cases, establishing a verifiable evidence chain through multi-source texts helps improve explanation stability while maintaining contextual sensitivity [16].

In terms of method adaptability, work safety accidents are characterized by relatively complete event chains and traceable handling processes, as well as large contextual differences and obvious concurrent conditions. Research on ecological environment governance shows that restoring multi-source materials into comparable process nodes helps explain why similar governance objects produce different outcomes [17]. Research on grassroots policy implementation indicates that ignoring negotiation, feedback, and accountability transmission in the process makes it difficult to grasp why institutional arrangements present differentiated effects at the grassroots level [18]. Research on supply chain governance further illustrates that placing key links within a continuous action chain helps identify how resource constraints and collaborative behaviors jointly affect final performance [19]. Discussions on causal process tracing in public management research point out that the explanation of complex governance issues requires examining case materials, key processes, and causal judgments within the same evidence chain [20]. The QCA method emphasizes multiple concurrent causalities, equivalent paths, and asymmetry, which can effectively address the question of why similar accidents lead to different governance outcomes [21]. Therefore, this paper combines case comparison with configuration analysis to enhance the contextual explanatory power of research conclusions.

In terms of sample control, this paper does not simply pursue an expansion of the number of accidents but emphasizes comparative consistency and data verifiability among cases. In other words, the sample size must cover different regions, accident types, and governance pressure contexts while ensuring that each case can provide a sufficiently clear evidence chain to support outcome variable judgment and conditional variable calibration. For fsQCA, such treatment of a small-to-medium

sample size can both retain case differences and help avoid set assignment bias caused by incomplete data.

The core purpose of the above screening process is to balance event heterogeneity and comparative consistency under a controllable sample size. For this research, the 25 cases can cover different regions, accident types, and governance pressure contexts without weakening the accuracy of single-case data verification due to an excessive number of samples. This sample size matches the characteristics of fsQCA in handling small-to-medium samples and emphasizing configuration differences and provides operational space for tracing path results back to specific cases.

### 4.2. Variable Design and Research Model

**Table 1.** List of Production Safety Accident Cases

| No. | Date of Accident | Location | Name of Accident |
|---|---|---|---|
| 1 | March 14, 2022 | Baotou City, Inner Mongolia | "3·14" Major Fire Accident in the Roaster Renovation Project of Baotou Steel Rare Earth Steel Plate Co., Ltd. |
| 2 | May 6, 2022 | Jinzhong City, Shanxi Province | "5·6" Fly Ash Silo Collapse Accident of Shanxi Wanbaodelong New Building Materials Co., Ltd. |
| 3 | May 17, 2022 | Fuzhou City, Fujian Province | "5·17" Combustion and Explosion Accident of Hongmiaoling Haixia Environmental Protection Co., Ltd. |
| 4 | November 22, 2022 | Shuozhou City, Shanxi Province | "11·22" Major Gas (Suffocation) Accident in No.3 Underground Mine of China Coal Pingshuo Group Co., Ltd. |
| 5 | January 15, 2023 | Panjin City, Liaoning Province | "1·15" Major Explosion and Fire Accident of Haoye Chemical Co., Ltd. |
| 6 | February 22, 2023 | Alxa League, Inner Mongolia | "2·22" Extra Major Collapse Accident of Open-pit Coal Mine of Xinjing Coal Industry Co., Ltd. |
| 7 | March 10, 2023 | Maanshan City, Anhui Province | "3·10" Poisoning and Suffocation Accident of Jinxing Titanium Dioxide (Group) Co., Ltd. |
| 8 | April 17, 2023 | Jinhua City, Zhejiang Province | "4·17" Major Fire Accident of Zhejiang Weijiali Industry & Trade Co., Ltd. |
| 9 | June 22, 2023 | Yingkou City, Liaoning Province | "6·22" Major Scald Accident of Yingkou Iron & Steel Co., Ltd. |
| 10 | July 24, 2023 | Changchun City, Jilin Province | "7·24" Major Fire Accident of Lishi Wedding Dress Dream City |
| 11 | September 13, 2023 | Chengdu City, Sichuan Province | "9·13" Major Collapse Accident of Jinjianren Expressway Project |
| 12 | September 24, 2023 | Liupanshui City, Guizhou Province | "9·24" Major Fire Accident of Shanjiaoshu Coal Mine |
| 13 | November 28, 2023 | Shuangyashan City, Heilongjiang Province | "11·28" Major Gas Explosion Accident of Shuangyang Coal Mine, Shuangyashan Mining Branch, Longmei Group |
| 14 | January 12, 2024 | Pingdingshan City, Henan Province | "1·12" Major Coal and Gas Outburst Accident of No.12 Mine, Shantian Coal Industry Co., Ltd. |
| 15 | March 19, 2024 | Linfen City, Shanxi Province | "3·19" Major Road Traffic Accident of Hubei Expressway (Linfen Section, Shanxi) |
| 16 | May 17, 2024 | Xishuangbanna Prefecture, Yunnan Province | "5·17" Mountain Collapse Accident in Jinghong City |
| 17 | May 23, 2024 | Jiujiang City, Jiangxi Province | "5·23" Major Poisoning and Suffocation Accident of Jinjiu Renewable Resources Co., Ltd. |
| 18 | June 10, 2024 | Xinzhou City, Shanxi Province | "6·10" Major Water Inrush Accident of Dahongcai Iron Mine in Dai County |
| 19 | September 17, 2024 | Wuwei City, Gansu Province | "9·17" General Poisoning and Suffocation Accident of Youran Animal Husbandry Co., Ltd. |
| 20 | December 7, 2024 | Weihai City, Shandong Province | "12·7" Major Fire Accident of Qidong Haitong Cold Chain Warehouse, Rongcheng Lanrun Group |
| 21 | December 9, 2024 | Sanming City, Fujian Province | "12·9" Major Collapse Accident of Sanming Steel MinGuang Co., Ltd. |
| 22 | March 8, 2025 | Qinhuangdao City, Hebei Province | "3·8" Dust Explosion Accident of Huachuan Machining Co., Ltd. |
| 23 | May 18, 2025 | Zhanjiang City, Guangdong Province | "5·18" Major Poisoning and Suffocation Accident of Mazhang Chenming Pulp and Paper Co., Ltd. |
| 24 | May 27, 2025 | Weifang City, Shandong Province | "5·27" Major Explosion Accident of Youdao Chemical Co., Ltd. |
| 25 | July 17, 2025 | Fuzhou City, Fujian Province | "7·17" Major Expressway Construction Accident in Changle |

Table 1 shows the temporal, regional, and accident-type distribution of 25 typical production safety accidents. The sample covers eastern, central, western, and northeastern regions and high-risk industries such as hazardous chemicals, mining, construction, and transportation. It well reflects the heterogeneity of production safety accident scenarios and provides a comparable event basis for subsequent configurational comparison.

To ensure operability of subsequent configurational comparison, this paper integrates outcome and conditional variables into a unified analytical framework.

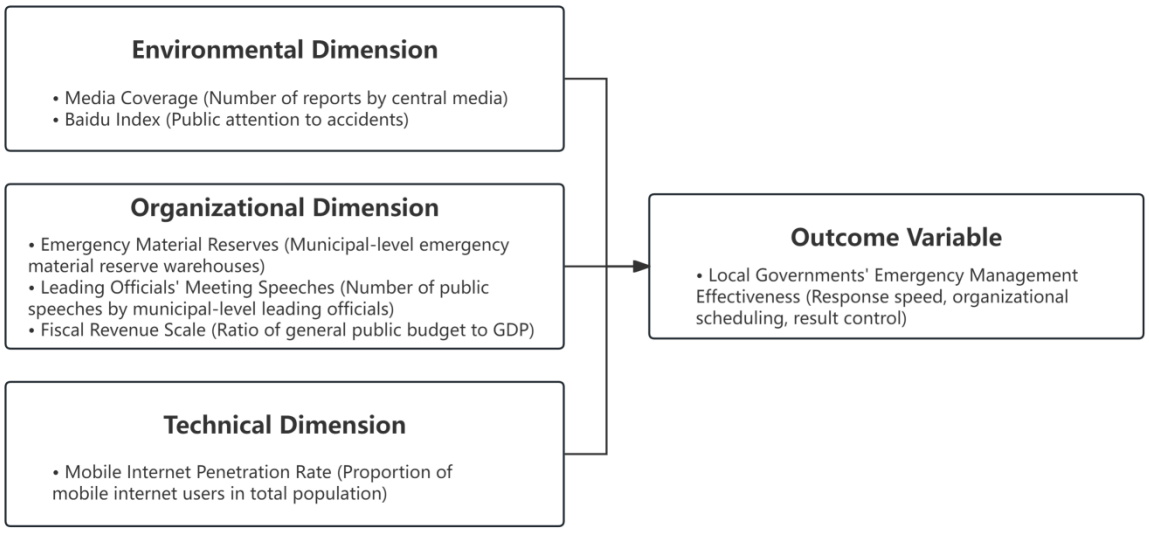


**Figure 1.** Research Model of Influencing Factors on the Emergency Management Efficiency of Local Governments

Figure 1 takes local governments' emergency management effectiveness as the outcome variable and incorporates media coverage, Baidu Index, mobile internet penetration rate, emergency material reserves, leading officials' meeting speeches, and fiscal revenue scale into the environmental, technical, and organizational dimensions respectively. This figure not only summarizes the variable structure of this paper but also provides a clear analytical reference for subsequent calibration, truth table construction, and path explanation.

**Table 2.** Variable Names and Data Statistics

| ./.., | Analytical Perspective | Variable Name | Variable Data Statistics |
|---|---|---|---|
| Outcome Variable | — | Emergency Management Effectiveness of Local Governments | Rescue Completion Time |
| Outcome Variable | — | Emergency Management Effectiveness of Local Governments | Casualties |
| Condition Variable | Environmental Perspective | Media Coverage (A) | Number of Reports by Central Media |
| Condition Variable | Environmental Perspective | Baidu Index (F) | Public Attention and Participation in the Accident |
| Condition Variable | Technical Perspective | Mobile Internet Penetration Rate (B) | Proportion of Mobile Internet Users in Total Population |
| Condition Variable | Organizational Perspective | Leaders' Conference Speeches (D) | Number of Public Speeches by Leaders on the Accident |
| Condition Variable | Organizational Perspective | Municipal Emergency Material Reserve Depot (C) | Adequacy of Emergency Material Reserves |
| Condition Variable | Organizational Perspective | Fiscal Revenue Scale (E) | Ratio of General Public Budget to GDP |

Table 2 illustrates the operationalization of outcome variables and conditional variables. By corresponding rescue completion time, casualties in accident handling with external reports, public attention, technical foundations, and organizational resources, this paper converts information scattered in different texts and statistical data into comparable set variables.

The key to variable design is not to list each factor in isolation but to ensure that data from different sources correspond to the same case unit and form comparable set scores. To this end, this paper maintains a unified case caliber between outcome variables and conditional variables and selects indicators that can be cross-identified from accident investigation reports, government public information, public statistical data, and public opinion texts as much as possible to reduce the interference of single-source bias on path identification. Such treatment not only helps improve the consistency of inter-case comparison but also enables configuration explanations to return to specific accident handling scenarios rather than remaining at the abstract variable level. Meanwhile, this paper

adheres to the principles of "consistent caliber, verifiable sources, and justified thresholds" in variable calibration, avoiding the direct juxtaposition of data from different statistical dimensions or time granularities, thereby improving the stability of conditional comparison.

This paper does not merely aim to stay at the conceptual level of the variables but tries to translate indicators into actual and comparable case evidence. Since the performance of emergency management in local governments can only be evaluated according to one efficiency indicator, the outcome variable is designed taking into account the time to rescue completion and casualties, while conditional variables are designed based on environmental pressure, technical foundation and organizational resources, so that for different accident scenarios, the media attention, information capabilities and the assurance of rescue resources can be uniformly integrated into the comparison framework. This kind of treatment not only keeps the complexity of the accident handling processes but also offers a better basis for measuring the relationship between paths in terms of substitution, complementarity and compensation.

In addition, the principle of the same case, the same period, and the same caliber of evidence for the treatment of all variables has been followed in this paper. Intermediary indicators such as media coverage and Baidu Index can't be interpreted as governance performance but are designed to characterize the level of external attention and public opinion pressure following accidents; the mobile internet penetration rate is not necessarily viewed as the level of technological advancement, but as a basic indicator of the local information feedback and online collaboration capability. By juxtaposing these indicators with emergency material reserves, leading officials' meeting speeches, and fiscal revenue scale into the same framework, this paper can clearly distinguish the different roles of "pressure sources", "information capabilities", and "organizational resources" in accident handling, thereby providing a more stable measurement basis for explaining substitution, complementarity, and compensation relationships between subsequent paths.

## 5. Empirical Analysis

### 5.1. Univariate Necessity Analysis

In conventional QCA operations, univariate necessity analysis is conducted through the consistency indicator. If condition X (a single condition or a combination of conditions) is a sufficient condition for outcome Y, the fuzzy-set score of X should be less than or equal to that of Y, and the consistency indicator is generally required to be greater than 0.8. If Consistency ($Yi \leq Xi$) is used to judge whether X is a necessary condition for Y, X can be regarded as a necessary condition when the consistency indicator is greater than 0.9. After determining sufficient or necessary conditions, the coverage indicator can be used to examine the explanatory power of conditions or conditional combinations, i.e., to judge the empirical interpretation scope of different conditional configurations on local governments' emergency management effectiveness. After calculation by the fsQCA software, the results of necessity anal

**Table 3.** Necessity Analysis Results of Single Condition Variables

| Explanatory Variable | Consistency | Coverage |
|---|---|---|
| Media Coverage | 0.851107 | 0.723197 |
| Mobile Internet Penetration Rate | 0.716762 | 0.726119 |
| Municipal Emergency Material Reserve Depot | 0.589601 | 0.569279 |
| Leaders’ Conference Speeches | 0.804679 | 0.710024 |
| Fiscal Revenue Scale | 0.743164 | 0.703639 |
| Baidu Index | 0.800189 | 0.635103 |

## 5.2. Conditional Combination Analysis

**Table 4.** Configurational Analysis Results

| Condition Variables & Statistical Indicators | Configuration 1 (Attention-Resource Driven) | Configuration 2 (Technology-Resource Driven) | Configuration 3 (Technology-Fiscal Dominated) | Configuration 4 (Compensatory) |
|---|---|---|---|---|
| **Environmental Dimension** | | | | |
| High Central Media Coverage (A) | ● | ● | ● | ● |
| High Baidu Index (F) | ⊙ | | ⊙ | ○ |
| **Technical Dimension** | | | | |
| High Mobile Internet Penetration Rate (B) | | ○ | ○ | ⊙ |
| **Organizational Dimension** | | | | |
| Adequate Emergency Material Reserves (C) | ○ | ○ | ⊙ | ⊙ |
| Frequent Leaders' Conference Speeches (D) | ○ | ○ | ⊙ | ○ |
| High Fiscal Revenue Scale (E) | ● | ● | ● | ● |
| Combined Expression | A·C·D·E·~F | A·B·C·D·E | A·B·E·~C·~D·~F | A·D·E·F·~B·~C |
| Consistency | 0.978 | 0.968 | 0.961 | 0.955 |
| Raw Coverage | 0.215 | 0.274 | 0.18 | 0.13 |
| Unique Coverage | 0.042 | 0.087 | 0.035 | 0.054 |

As shown in Table 4, from the output results of the complex solution, the overall solution coverage and overall solution consistency reach 0.638633 and 0.953156 respectively, indicating that all conditional combinations can explain approximately 64% of the cases with a relatively stable overall explanatory direction. Since fsQCA emphasizes the combined effects of conditional combinations, this result does not mean that a single factor can independently determine emergency management effectiveness but rather that efficient response is more manifested as the collaborative configuration of several key conditions in specific contexts.

It should be noted that the overall coverage does not mean that unexplained cases lack governance logic but rather that some accidents are affected by on-site command, industry characteristics, or sudden environmental constraints, making it difficult to fully incorporate them into the current conditional combinations. For fsQCA, this result precisely suggests that path analysis is more suitable for identifying typical conditional collocations of high-effectiveness response rather than compressing all accidents into the same causal formula.

Specifically, there are four conditional combination paths with consistency scores greater than 0.9, indicating strong explanatory power. Translating them back into Chinese names:

Local Governments' Emergency Management Effectiveness = Media Coverage + Material Reserves + Meeting Speeches + Fiscal Revenue + Low Baidu Index (Path 1) + Media Coverage + Mobile Internet Penetration Rate + Material Reserves + Meeting Speeches + Fiscal Revenue (Path 2) + Media Coverage + Mobile Internet Penetration Rate + Fiscal Revenue + Low Material Reserves + Low Meeting Speeches + Low Baidu Index (Path 3) + Media Coverage + Meeting Speeches + Fiscal Revenue + High Baidu Index + Low Mobile Internet Penetration Rate + Low Material Reserves (Path 4)

A subsequent analysis revealed the following:

The basic supporting conditions of achieving high emergency management effectiveness are "media coverage" + "high fiscal revenue scale. In all four high-effectiveness paths, these two conditions always occur together, and have a raw coverage of 0.589, which is the highest of all the conditional collocations. This means that the pressure source and resource guarantee for emergency response rapid initiation is the combination of external attention by central media and local fiscal resources.

There are two sentences related to the emergency material reserves: both 'sufficient emergency material reserves' and 'insufficient emergency material reserves' occur in different paths, which indicates that the emergency material reserves are not enough to determine whether high emergency management effectiveness can be achieved. Path 1 and Path 2 support the argument that, even if material reserves are sufficient, media attention and organizational mobilization conditions are needed to be effective in terms of response efficiency; Path 3 and Path 4 indicate that, even if material

reserves are inadequate, the conditions of media attention and organizational mobilization can be strong to achieve high effectiveness in terms of the efficiency of the response. This once again shows that the position of material reserves is more like an organisational resource which must be brought into play through information flow and fiscal security.

Under certain technical conditions, the speeches made by leading officials at meetings and public attention captured by the Baidu Index have a certain substitution phenomenon. Path 2 and 3 both show a high effectiveness, meaning that if a local government operates in a technical environment with a high penetration rate of mobile internet and relatively smooth information channels, it is not necessarily crucial for the local government to make frequent public statements from leading figures and can be more dependent on information systems to use as a basis for its internal command.In environments with a high mobile internet penetration rate and relatively smooth information channels (Path 2 and 3), it becomes less important for the local government to make frequent public statements by leading figures and it can be more dependent on the information systems it uses as a basis for internal command, with a possibility of faster reactions thanks to a synergy of technical systems and fiscal resources. Political attention and public opinion pressure are to some extent a functional equivalent at this time.

(4) Even with low internet penetration rates and limited material stockpiles, but high media coverage, regular speeches by leading officials, good fiscal support and high public attention, it can be very effective. This path includes the cases of Linfen (Shanxi) and Sanming (Fujian) which are a "compensation-type high-effectiveness path under technical constraints" based on attention and resources.

If one compares the four high effectiveness paths one will notice that there is not one fixed template for efficient emergency management. Path 1 suggests that media attention and fiscal guarantees are mutually reinforcing in certain situations and that, when there is a lot of external pressure, it is crucial to have both at the same time in order to achieve rapid response. Path 2 emphasizes that, in certain contexts, media attention and fiscal guarantees are mutually reinforcing, and that in situations where there is significant external pressure, both conditions are important simultaneously in order to achieve high disposal efficiency. Path 3 highlights the importance of the simultaneous presence of media attention and fiscal guarantees in certain situations to achieve high disposal efficiency. Path 4 emphasizes the supporting role of technical conditions in organizational coordination and information transmission, suggesting that in situations with smooth information flow, a high disposal efficiency could be maintained even if media attention and fiscal guarantees come together later in the process. It can thus be determined that the essence of the emergency management effectiveness of local governments is not "the strongest" but to obtain temporal approximation and functional complementarity of different conditions on the accident context.

Observing the four paths within the accident response chain, it can be found that they correspond to different governance starting points respectively. Some local governments take fiscal guarantees and media pressure as the forerunner, completing resource assembly first and then promoting organizational coordination; some rely on good information infrastructure to achieve rapid information aggregation and inter-departmental linkage at the early stage of accidents; others, although with a general technical foundation, form a compensation mechanism through authoritative responses, public opinion stability, and external support. The differences between paths indicate that efficient response is not a direct projection of individual departmental capabilities but a comprehensive result of the coupling of multiple conditions within a specific time window.

### 5.3. Robustness Test

To avoid configurational conclusions over-reliance on single parameter settings, robustness tests are conducted after main analysis. Research on set-theoretic methods notes that robustness judgment should comprehensively examine the stability of main paths considering disturbances in consistency thresholds, case frequency thresholds, and calibration schemes rather than relying solely on single calculation results. Studies on QCA robustness verification further indicate that judging conclusion

reliability depends on whether parameter adjustments change core conditions and explanatory directions. The parameter perturbation tool provided by SetMethods supports rechecking in this study. Given the sample size of 25 (typical medium-small sample), minor parameter adjustments directly reflect the sensitivity of configurational paths to setting changes.

Specifically, robustness tests recheck the benchmark model from two dimensions: consistency threshold and case frequency threshold, while keeping case sets, variable calibration anchors, and outcome variable definitions unchanged. Table 5 summarizes the rechecking ideas and judgment results. If core conditions, edge conditions, overall consistency, and overall coverage of main configurations remain basically stable under alternative thresholds without reversed explanatory direction, the conclusions are considered robust. Otherwise, the research design needs re-examination in variable calibration and case selection.

**Table 5.** Robustness Test Results

| Test Dimension | Benchmark Setting | Alternative Setting | Judgment Result |
|---|---|---|---|
| Consistency Threshold | 0.80 | 0.85 | The core conditions and explanatory directions of the main configurations remain stable, passing the robustness check |
| Case Frequency Threshold | 1 | 2 | The core structure of high-effectiveness paths is not reversed, and the conclusions are parameter-robust |

The results of the robustness test show that moderately increasing the consistency threshold and case frequency threshold does not lead to directional changes in the core conditions of main paths, indicating that the high-effectiveness configurations identified in this research are not accidentally driven by a single parameter setting. More importantly, the synergistic relationships among media attention, fiscal guarantees, technical conditions, and organizational resources maintain strong explanatory continuity under different parameter windows, enhancing the applicability and credibility of conclusions in similar accident scenarios.

This also means that the conclusions of this research do not rely on the accidental establishment of an isolated path but reflect relatively stable coupling relationships among several key conditions. For research on local governments' emergency management, the significance of the robustness test lies not only in proving the repeatability of the model but also in demonstrating that the three elements of media pressure, resource guarantees, and technical support maintain similar explanatory directions under different settings, thereby enhancing the credibility of subsequent policy discussions.

## 6. Conclusions and Policy Implications

From the local government perspective, this paper extracts conditional variables based on the TOE framework and conducts fsQCA on 25 production safety accidents. The core conclusions are as follows: overall, high emergency management effectiveness is not driven by a single condition but is more likely to translate into rapid response and effective disposal when media attention, technical infrastructure, organizational resources, and fiscal support are matched.

1.Media attention and fiscal support jointly form the most widely covered high-effectiveness combination. All four paths include “media coverage” and “high fiscal revenue scale,” indicating synchronized external reporting pressure and fiscal resource support are critical supports for local governments to achieve rapid responses.

2.Both “sufficient emergency material reserves” and “insufficient emergency material reserves” appear with opposite values in the four high-effectiveness paths. This shows material conditions alone cannot determine high effectiveness. Paths 1 and 2 indicate sufficient reserves need coordination with media attention, fiscal support, and organizational mobilization to translate into efficiency. Paths 3 and 4 show strong media attention, fiscal support, and technical conditions can achieve high effectiveness even with insufficient local reserves through cross-regional allocation and systematic coordination.

3.Leaders' speeches and Baidu Index show a substitution relationship. Paths 2 and 3 indicate local governments can rely more on information systems for internal command and public opinion monitoring under high internet penetration and smooth information channels. This reduces dependence on frequent public statements by leading officials and achieves rapid responses through coordinated technical systems and fiscal resources.

4.Technical conditions are not the only pivot. Path 4 shows high effectiveness can still be achieved with low internet penetration if media coverage, fiscal support, leaders' speeches, and public attention form a compensatory combination. This indicates political attention and resource inclination can effectively compensate for efficient emergency responses under weak technical infrastructure.

Furthermore, improving local government emergency management effectiveness follows a governance logic of "condition matching" rather than "single-point optimization." Regions differ in fiscal foundation, information infrastructure, and organizational mobilization capacity, but high-level emergency responses can be achieved by forming effective resource combinations around accident scenarios. This finding provides empirical evidence for differentiated policy recommendations.

Based on this, local governments should focus not only on increasing single-input but also on reorganizing information transmission, material allocation, and accountability coordination mechanisms around different accident scenarios. Policy improvements must simultaneously answer "when resources arrive," "how information flows back," and "how departments act synchronously" to translate condition-matching logic into operable governance arrangements.

First, strengthen the bottom-line capacity of information infrastructure in grassroots scenarios. Production safety accidents often occur in spatial units with vulnerable information chains such as parks, mining areas, and construction sites. Local governments should incorporate communication support, on-site data feedback, and emergency command terminal configuration into normalized capacity construction. They should focus on improving network weaknesses in county, township, and high-risk industrial agglomeration areas. Stable basic information chains provide a realistic foundation for accelerating accident judgment, resource scheduling, and inter-departmental coordination.

Second, build a response mechanism for coordinated "materials-information-fiscal" linkage. Emergency material reserves, fiscal allocation, and information submission should not be separated management links. They should form a closed-loop process through unified command, trigger, and review. For local governments, the priority is not simply increasing material inventory but clarifying allocation triggers, payment responsibility levels, and information interfaces for synchronized disposal progress under specific accident scenarios. This reduces the time gap between resource arrival and on-site demand.

Third, shift emergency material reserves from static quantity orientation to scenario-matching orientation. Regions differ in accident types, industrial structures, and traffic conditions. Local governments should conduct differentiated allocation based on high-risk industry distribution, cross-regional allocation capacity, and fiscal pressure capacity. Regions with good logistics and strong fiscal support can strengthen agreement reserves and rapid transportation. Regions with scattered resources and severe accident consequences should maintain necessary pre-positioned reserves and key material redundancy to improve the certainty of initial disposal.

Fourth, improve hierarchical and classified public response and public opinion coping mechanisms. Research shows leaders' public statements and public attention have substitution relationships under specific technical conditions. This means local governments should neither equate public speaking with emergency efficiency nor ignore the role of authoritative responses in organizational mobilization and public opinion stability. A feasible approach is establishing a differentiated response mechanism based on accident level, information transparency, and network communication intensity. It enhances front-end disposal capacity of professional departments under good technical conditions and stabilizes expectations through timely authoritative responses under concentrated public opinion pressure.

Fifth, incorporate "media-fiscal" coordination capacity into normalized evaluation of local emergency management. This paper finds media attention and fiscal support frequently co-occur in high-effectiveness paths. This indicates local governments need not only rapid resource input capacity after accidents but also consistent capital allocation, inter-departmental coordination, and information disclosure under high public opinion pressure. Therefore, relevant evaluations should not focus solely on annual fund scale or institutional text completeness but more on allocation efficiency, inter-departmental coordination, and information disclosure consistency in accident scenarios.

Sixth, encourage resource-constrained regions to explore cross-regional coordination and agreement reserve mechanisms. For local governments with limited fiscal capacity and high physical reserve pressure, the key to improving emergency management effectiveness is not necessarily single-point warehouse expansion but establishing a stable and available external support network. Forming pre-positioned cooperation with surrounding regions, key enterprises, and professional rescue forces accelerates material transportation, professional support, and information sharing after accidents. This transforms passive response under resource constraints into predictable collaborative response.

Overall, the key to improving local government emergency management effectiveness lies not in mechanically superimposing a single type of resource but in establishing more efficient coordination mechanisms around accident scenarios. Only by integrating information infrastructure, organizational mobilization, resource scheduling, and public response into a unified emergency governance chain can local governments form stable rapid response capabilities across different risk scenarios.

In the long run, production safety accident governance is not a one-time disposal task but a centralized test of local governments' normalized governance capacity. Only when the emergency system forms stable information infrastructure, inter-departmental coordination rules, and resource allocation plans in peacetime can it quickly switch to efficient response states after accidents. This paper's analysis suggests that improving emergency management effectiveness requires focusing on both rapid on-site disposal and continuous construction of peace-war conversion mechanisms.

Third, this paper mainly focuses local government emergency management effectiveness on accident disposal efficiency and related outcomes. It does not fully incorporate longer-term performance dimensions such as social recovery, public trust, and long-term governance capacity. With the accumulation of research data, subsequent studies can construct a hierarchical outcome variable system to examine the differential impacts of different conditional combinations on multi-dimensional governance performance.

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