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Research on grounded theory influencing the dimensions of building resilient cities

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Abstract: In the current social landscape, the increasing frequency of urban disasters presents an undeniable challenge. Bolstering urban risk management mechanisms and establishing resilient city systems to safeguard the well-being of residents has emerged as a critical imperative within the field of urban management. This research adopted the grounded theory research paradigm, employing semi-structured interviews with 20 experts to explore the core influencing factors in the process of building resilient cities. Findings show that government regulation effectiveness, the capacity of companies to address risks, social organizations' involvement, and the overall level of urban risk management exert a significant impact on building resilient cities. Specifically, enhanced government regulation effectiveness can effectively promote the implementation of policies and institutional safeguards essential for resilient city construction. The improved risk response capabilities of companies provide more robust material and technical support when cities confront various types of disasters. Active social organizations' involvement facilitates the integration and utilization of community resources, strengthening the social resilience of cities in coping with disasters. Comprehensive enhancement of the city's risk management capabilities is paramount, serving as the cornerstone for ensuring the overall effectiveness of efforts to build resilient cities, creating a safer and more sustainable urban environment.

Keywords: *Building resilient cities, Grounded theory, Risk management.*

1. Introduction

The concept of resilient cities has garnered considerable attention within contemporary urban studies in recent years [1, 2]. The escalating impacts of global climate change, the heightened frequency of natural disasters, and increasingly intricate socio-economic systems have significantly amplified the risks and vulnerabilities inherent in urban environments. In this context, the resilient cities paradigm has emerged, emphasizing the capacity of urban systems to rebound, adapt, and evolve sustainably amidst both internal and external stressors [3]. Consequently, urban planners and policymakers are increasingly compelled to prioritize urban ecosystems' holistic integrity and long-term sustainability when formulating and implementing urban development strategies. The construction of resilient cities necessitates the implementation of diversified risk mitigation and disaster response frameworks, the enhancement of public service provision, and the reinforcement of community social capital, these being identified as key mechanisms for bolstering urban resilience and adaptive capacity [4]. Successfully building resilient cities can contribute significantly to the long-term stability of both national and global systems. Therefore, identifying the key factors influencing the development of resilient cities constitutes a crucial element of optimizing urban governance. The multifaceted factors affecting the construction of resilient cities are characterized by their interconnectedness and synergistic

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effects, which collectively hold the potential to enhance the efficacy and responsiveness of governance mechanisms in addressing complex societal challenges.

In the research factor analysis process, many scholars explore the interrelationships among influencing factors through comprehensive reviews of existing literature and the construction of theoretical frameworks. However, while valuable for distilling existing theories and perspectives, the historical documentary methodology may introduce certain limitations regarding the comprehensiveness of factors extracted. Tabibian and Movahed [5] the researcher analyzed the disaster situation for the country's experience, he said that the government to strengthen the policy guidance, social enterprises to provide a large number of materials, social organizations to provide professional emergency response team, and the integration of the three for the development, it can be effective to achieve the building resilient cities [5]. Employing historical literature reviews and empirical investigations demonstrate the pivotal role of resilient cities in mitigating the impacts of the COVID-19. Their research identifies key factors influencing the building of resilient cities, including the regulation of public transportation systems, the strategic design of urban development patterns, and the provision of comprehensive social security measures for the population AbouKorin, et al. [6]. Peng, et al. [7] utilizing a combination of historical literature analysis and empirical research methodologies, conclude that social, economic, ecological, infrastructural, and organizational systems constitute the primary factors influencing the construction of resilient cities. Furthermore, they construct a comprehensive assessment system comprising 32 specific indicator factors [8].

It highlights economic development, government finance, technological innovation, public services, and the ecological environment [9] as key indicators influencing the building of resilient cities [9]. In summary, numerous researchers, building upon in-depth investigations of existing literature and informed by their own understanding of resilient city construction, employ empirical research or case study analysis, among other methods, intending to elucidate the underlying factors influencing the construction of resilient cities. However, this research methodology often relies on the subjective judgments of the researcher or objective evaluations from external sources, which may present challenges for practitioners involved in building resilient cities and translating the research findings into practical applications. The research employs Grounded Theory methodology to establish an information extraction process centered on urban governance, aiming to explore novel methods and techniques influencing the construction of resilient cities from a fresh perspective. This approach distinguishes itself from empirical research and historical document analysis by focusing on the inductive refinement of factors derived from established historical documents, cases, and perspectives to identify the key dimensions affecting the construction of resilient cities and providing a more practically oriented theoretical framework for practitioners in the field.

2. Research Methodology

Grounded Theory (GT), a systematic methodology for theory development, was pioneered by Anselm Strauss and Barney Glaser at Columbia University [10]. This approach seeks to analyze and synthesize the validity of specific social phenomena through rigorous practical observation and analysis, culminating in formulating conclusions relevant to the researcher's inquiry. Grounded Theory has four core qualities: it is based on practical experience, uses inductive logic to reason, is highly sensitive to theory construction, and follows a post-positivist research paradigm. These qualities have profound implications for research. The process of Grounded Theory involves three key stages. The first is the open coding stage, which involves meticulously analysing the data collected to identify underlying concepts, core themes and categories [11]. This is followed by axial coding, which involves consolidating the attributes identified in open coding and exploring the interrelationships between the various elements to construct a preliminary theoretical framework [12]. Finally, there is selective coding, which focuses on refining and deepening the theoretical framework developed in axial coding [13]. And constructing a comprehensive and systematic theoretical model by analysing the internal logical connections between the identified elements.

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This research employed Grounded Theory as the primary methodological framework, with the objective of elucidating the core constructs related to resilient city construction through a comprehensive analysis of participant experiential narratives, established scholarly literature, and insightful case study analyses [14]. During the open coding phase, data were triangulated using three distinct sources: interview transcripts, newspaper and magazine articles, and media reports. This multi-faceted approach enhanced the reliability and depth of the inquiry. During the axial coding phase, the deep coding process is applied to obtain a small number of words that essentially reflect the correlation and repetition of different influencing factors by eliminating invalid phrases and merging similar influencing factors, thus these words are the indicators of resilient city building. During the selective coding phase, the different perspectives from which the researchers selected the influencing factors led to the re-merging of different words, which resulted in a process of axial coding. Through this process, it is possible to access more in-depth influences on the impact of resilient city building, which lay the foundation for enhancing the dynamics and resilience of resilient city building.

3. Research Process

3.1. Interview Process

This research mainly used historical data collection, structured interviews and semi-structured interviews and, three methods to obtain analyzed data. A data triangulation framework was constructed using these three methods to further enhance the validity and authenticity of the research data.

In the collection of historical resources, the researcher collects the national policies [15] government work reports [16] and newspapers and magazines related [17] to the research topic. Make sure that the research content is consistent with national policies and social hotspots. At the same time, it provides reference value for the questions raised during the interviews.

In the structured interviews, the researcher conducted one-on-one interviews with 20 experts based on the designed questions, and each expert was interviewed for 60 minutes. The researcher recorded the core ideas of the interviews through pen and paper and converted the ideas into electronic text to obtain the first data source.

In the semi-structured interviews, 20 experts were randomly divided into 4 focus groups, and each group presented and discussed one by one according to the scope of discussion proposed by the group leader, and the discussion duration of each group was 120 minutes. The researcher recorded the discussion content through audio recording. In order to ensure the validity of the discussion content, the views expressed by each expert during the focus group discussion were compared and analyzed with the views expressed by the experts in the structured interviews. After analyzing the statements, the views expressed by the same experts on the same issues were consistent. Thus, the focus group interviews provided a second data resource.

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Table 1.
Summary Table of Data Coding.

Influencing Factors	Free Node	Frequency of Free Nodes	Original Statement	Source of the Statement
Regulatory mechanisms at the governmental level	Urban Administratio	26	The most critical component of urban management is urban risk management. The government can be of excellent value in urban management, especially as it continues to strengthen its regulatory role and oversight of risk management so that governmental regulation can positively impact risk management.	Focus Group Interviews (Group 1, 3) Personal Interviews (Experts 2,3,17,18)
	Urban Services	25	The government regulatory mechanism serves as the institutional cornerstone for the high-quality development of urban services. Through legislative norms, standard setting, and dynamic assessment, it sets the bottom line and clarifies the direction for urban service supply, ensuring that fairness, sustainability, and innovation in public welfare services are given equal weight.	Focus Group Interviews (Group 1, 2) Personal Interviews (Experts 1,8,10,16)
	Urban Benefit Guarantee	20	Urban welfare security relies on government supervision to achieve "institutional supply". Through access thresholds, service standards and performance evaluations, the public welfare and sustainability of welfare are balanced. The market mechanism stimulates efficiency within the regulatory framework and forms a governance pattern of "government-led and multi-party participation".	Focus Group Interviews (Group 3, 4) Personal Interviews (Experts 1,5,9,19)
Capacity building at the company level	Material Security Capacity	17	The capacity for emergency material support is a core component of the national and social emergency management system. As the key entities in material production, storage and allocation, the capacity building of enterprises directly affects the efficiency and effectiveness of emergency responses.	Focus group Interviews (Group 2, 3) Personal Interviews (Experts 2,13,11,18)
	Production and Management Capabilities	29	Inevitably, there will be a variety of corporate with different forms, capacities, and industrial values in the urban area, so the risks in the metropolitan area will come not only from the residents but also from the corporate. By improving their emergency response capacity, corporate can protect their own safety and provide risk management value for urban residents. Therefore, corporate can positively influence urban risk management by improving their capacity.	Focus Group Interviews (Group 1, 3) Personal Interviews (Experts 3,12,19,20)
	Emergency Response Capability	21	Corporate development can bring significant value to the development of resilient cities because resilient cities construction needs a lot of financial and resource support; corporate development can provide the inevitable conditions for resilient cities construction.	Focus Group Interviews (Group 1, 4) Personal Interviews (Experts 3,12,14,20)
Active involvement at the social organization level	Urban Resident Council	29	The construction of resilient cities emphasizes the ability of cities to quickly recover, adapt and transform in the face of disasters and crises. As the core force of grassroots governance, the degree of participation of residents' committees and social organizations directly affects whether the "capillaries" in the construction of resilient cities are unobstructed.	Focus Group Interviews (Group 1, 2) Personal Interviews (Experts 4,6,13,15)
	Urban Volunteer Team	19	The construction of resilient cities requires the joint participation of multiple forces. As representatives of social forces, the collaborative cooperation of urban volunteer teams and social organizations is the key to enhancing the city's ability to cope with disasters and crises.	Focus group interviews (Group 2, 4) Personal Interviews (Experts 1,4,5,10)

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	Urban Citizen Self-Defense Team	22	In the construction of resilient cities, the urban residents' Self-Defense Force is closely related to and mutually reinforcing the active participation of social organizations: The residents' Self-Defense Force is spontaneously formed by community residents, familiar with the local environment and neighborhood needs, and can respond quickly to emergencies. Residents' Self-Defense teams have become the "localized executors" of social organizations, and social organizations have become the "capability enablers" of the Self-Defense Forces, jointly promoting the transformation of resilient cities from "passively waiting for rescue" to "community self-rescue and mutual assistance".	Focus Group Interviews (Group 3, 4) Personal Interviews (Experts 2,5,14,11)
Strategy formulation in risk management	Risk Identification	21	Disaster identification and the formulation of risk management strategies are closely related and mutually supportive: Disaster identification is the foundation of risk management. Through a comprehensive investigation of urban hazards, it clarifies "where incidents may occur and what they might happen". Disaster identification requires the participation of multiple parties, and risk management strategies need to clearly define the responsible entities, ultimately forming a closed loop of "precise identification - scientific assessment - dynamic response", enabling cities to shift from "passively bearing disasters" to "actively predicting risks and systematically reducing losses".	Focus group Interviews (Group 2, 3) Personal Interviews (Experts 6,7,9,15)
	Disaster process management	22	Disaster response and the formulation of risk management strategies are closely related and mutually driven: Risk management serves as the "pre-defense line" for disaster response. By identifying potential threats and formulating long-term preventive measures, it reduces the possibility of disasters occurring or mitigates their impact. Disaster response relies on the data accumulated from risk management, ultimately forming a virtuous cycle of "early risk identification - early plan formulation - rapid response during disasters - quick review after disasters", enabling cities to shift from "disaster relief and remediation" to "disaster prevention and loss reduction", maintaining the operation of core functions and quickly restoring vitality in the face of disaster impacts.	Focus Group Interviews (Group 1, 4) Personal Interviews (Experts 3,6,7,17)
	Post-Disaster Recovery	14	The formulation of strategies for post-disaster recovery and risk management is closely intertwined and mutually feedback: risk management provides an "action guide" for post-disaster recovery. Post-disaster recovery is the "practical correction field" of risk management, exposing risk loopholes during the recovery process. Post-disaster recovery and risk management form a dynamic closed loop of "exposing shortcomings during disasters - restoring and filling loopholes - upgrading management and pre-control", enabling cities to shift from "passive post-disaster reconstruction" to "actively enhancing resilience", and thus possess stronger shock resistance and rapid recovery capabilities in the face of future disasters.	Focus group Interviews (Group 2, 3) Personal Interviews (Experts 4,8,9,16)

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3.2. Analysis Process

In this research, Nvivo software was used to analyze the information from three areas: historical data collection, structured interviews and semi-structured interviews [18]. The researcher imported the raw materials into the software and utilized the automatic coding function of the software to open code the statements and fragments in the analyzed materials to obtain the corresponding core words. Sentence-by-sentence analysis was carried out for the three kinds of information provided by the researcher, and 378 free nodes were initially identified for management. Further analysis revealed that a subset of these nodes exhibited limited relevance to the core focus of the research – the construction of resilient cities – and were consequently excluded. After this rigorous screening process, 265 free nodes were retained. Upon closer examination of these remaining nodes, it was observed that a substantial proportion expressed similar or identical content, differing primarily in their specific wording. Therefore, for these 265 free nodes, the research employed three nodes for thematic association, ultimately culminating in selective coding, which resulted in the identification of 12 selective codes. Subsequently, these 12 coding results were merged into overarching categories, ultimately identifying 4 key influencing factors. This iterative process aimed to synthesize disparate and fragmented information, extract more generalizable and representative themes, and establish a solid foundation for subsequent theoretical framework development.

4. Findings

4.1. Selective Coding Results

The research identifies the key influencing factors for building resilient cities by systematically categorizing relevant concepts. Specifically, the research aims to identify critical urban governance entities that warrant national attention to effectively promote the construction of resilient cities within an established urban governance framework. Based on this objective, the previously identified 265 free nodes were classified in the research, with concepts exhibiting similar or related content selectively merged to form 12 main categories. These 12 main categories are: urban administration, urban services, urban benefit guarantee, material security capacity, urban administration, urban services, urban benefit guarantee, material security capacity, production and management capabilities, emergency response capability, urban resident council, urban volunteer team, urban citizen self-defense team, disaster identification, disaster response, post-disaster recovery. These categories encompass multiple key dimensions of urban governance and provide a comprehensive framework for understanding and enhancing the process of building resilient cities.

4.1.1. Urban Administration

Experts emphasized that urban administration is central to building resilient cities, emphasizing the need to analyze its value and impact from a governance perspective. While municipal governments prioritize urban management as the primary management body, they often lack sufficient investment and attention in building resilient cities. Experts have identified three key dimensions linking urban administration and resilient city construction. First, urban governments should integrate resilient city construction into overall planning, establishing clear assessment criteria and implementation pathways to raise governmental awareness and ensure synergy with broader urban development goals. Integrating development strategies can promote policy implementation and enhance a city's resilience to risks. For example, prioritizing disaster-resistant materials and technologies in infrastructure projects and formulating incentive policies to encourage public participation is essential. Second, urban governors must disseminate timely warning information, enhance residents' risk awareness, and strengthen emergency preparedness.

The government should guide resident safety by improving information dissemination mechanisms, strengthening community cooperation, conducting public education campaigns, and establishing a robust emergency response system. Finally, resilient cities require adequate funding. Governments

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should provide financial inputs for infrastructure development, risk assessment, disaster early warning systems, emergency response, and post-disaster recovery. Funding can be mobilized through increased financial allocations, the issuance of special bonds, and the facilitation of social capital participation. Supervision should be strengthened to prevent misappropriation of funds. Simultaneously, establishing a disaster insurance system can effectively spread risks. Urban administration is defined as the process by which governments implement urban governance. The construction of resilient cities positively impacts the efficiency and effectiveness of urban management. Incorporating the concept of resilience can build safe, sustainable, and livable cities, ultimately improving residents' quality of life and well-being.

4.1.2. Urban Services

Experts emphasized that urban services are fundamental to urban operations, aiming to secure residents' basic needs and foster high-quality living. This encompasses convenient living, efficient healthcare, equitable education, and accessible transportation. Urban services, essentially government-provided safeguards for residents' livelihoods, are increasingly transitioning from a solely government-led model to one incorporating collaborative partnerships with enterprises to meet evolving needs. Experts have identified three key dimensions linking urban services and resilient city construction. First, governments should provide efficient and equitable access to essential daily services and emergency support during resilience-building, catering to the needs of all groups, particularly vulnerable populations. Examples include establishing accessible shelters, providing multilingual services, and strengthening community-based emergency response teams. Second, governments must prioritize building reliable and resilient living infrastructure. This includes prioritizing facilities that enhance urban safety and resilience, such as flood control systems, earthquake-resistant materials, and intelligent monitoring systems. Furthermore, essential elements for daily life, such as rainwater harvesting systems and green spaces, need to be developed and maintained for safety and comfort. Third, governments should guarantee the accurate and timely dissemination of crucial emergency information. This includes effectively guiding residents' evacuation procedures to avoid panic. A robust and multi-channeled information dissemination mechanism is necessary. Regular emergency drills and training should enhance residents' self-rescue capabilities.

Urban services are conceived as government-led initiatives that support residents. From a resilient city perspective, efficient urban services are critical for sustainable urban development. Building resilience improves service efficiency and facilitates effective public feedback and investment returns. This provides convenient, efficient, and robust essential urban services, ultimately enhancing residents' quality of life and a positive sense of well-being.

4.1.3. Urban Benefit Guarantee

Experts emphasized that urban benefit guarantee is paramount for sustainable urban development, aiming to enhance their quality of life, sense of well-being, and perceived security. This encompasses diverse domains, including housing, social support networks, employment opportunities, and healthcare access. Experts identified three crucial dimensions linking urban benefit guarantee and resilient city construction. Firstly, a comprehensive social security system is crucial for ensuring resident peace of mind and stimulating innovative capacity. Mechanisms such as unemployment insurance, comprehensive medical insurance, and robust pension plans provide residents with essential financial security [19]. Concurrently, governments must prioritize the needs of vulnerable populations, particularly low-income families and individuals with disabilities, ensuring equitable access to appropriate support and assistance. Secondly, stable housing represents a fundamental determinant of personal well-being. Governments should proactively ensure that residents have access to stable accommodation through the construction of affordable housing units, the provision of targeted financial assistance programs, the regulation of rental markets, and other related interventions [20]. Thirdly, guaranteed employment rate can contribute to a more stable social and economic operation. The

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Government can re-employ the unemployed through on-the-job training and training for new occupations. The government can also promote the diversification of the employment situation by enriching the types of social jobs and subdividing their duties. Finally, the government can promote fairness and justice in employment by strengthening labor supervision in the market.

Finally, since residents in cities mainly live in groups and have high population density, the risk of disease transmission is higher, and the government needs to avoid the spread of large-scale epidemics through measures such as strengthening investment in public health facilities, improving disease prevention and control systems, and promoting environmental health testing [21]. In this research, urban benefit guarantee is defined as the safeguards provided by the government to residents to promote safe, stable and healthy living in the city. From the perspective of building resilient cities, cities need to have sound benefit guarantee measures to satisfy the daily life of residents, and at the same time to guarantee the safety of the urban environment, so as to attract a large number of people to live in the city in a stable manner, and thus to ensure the sustainable development of the city.

4.1.4. Material Security Capacity

Experts emphasized that building resilient cities need significant material support. In urban areas where the natural environment is volatile, maintaining an efficient material reserve system is crucial to enhancing the ability to respond to emergencies, thereby ensuring the stability of residents' daily lives and maintaining social order. Experts believe that the link between material security capacity and building resilient cities is mainly reflected in the following three aspects. Firstly, increasing the amount of materials stockpiled by enterprises can significantly enhance the overall disaster prevention and mitigation capacity of cities, and the stockpiles of enterprises are a powerful supplement to the government's stockpiles. Experts suggest that city stockpiles should cover basic resources such as food, drinking water and basic medical supplies [22]. The government should adopt targeted policies to incentivize enterprises to participate in the material reserve system and strengthen the supervision of reserve resources to ensure their quality and safety. Secondly, corporate social responsibility is a key force in promoting the building of resilient cities. In the event of a disaster, the provision of material donations, technical assistance and financial support by enterprises is a manifestation of their social responsibility. The government should actively guide enterprises to integrate social responsibility into their overall development strategies, establish a sound social responsibility assessment system, and supervise and motivate enterprises to actively fulfill their social responsibility.

Finally, practical cooperation between governments, companies, and social organizations is indispensable. Collaborative governance of urban operations is particularly crucial during disaster response. Governments should establish sound collaborative mechanisms, clearly delineate responsibilities, strengthen communication channels, and encourage collaborative research and development of innovative technologies to meet cities' evolving safety and security needs. The research defines material security capacity as the quantity and quality of material reserves provided by companies to ensure a city's safe and stable operation. From the perspective of building resilient cities, adequate material security represents an essential element for healthy urban development, providing a solid foundation for addressing risks and challenges, ensuring the normal functioning of the city, and maintaining social stability.

4.1.5. Production and Management Capabilities

Experts emphasized that robust production and management capabilities serve as the cornerstone of business operations, directly impacting the development of individual companies and the progress of entire cities. When companies possess strong and adaptable capabilities, the overall efficiency of urban development is enhanced. Experts identified three crucial dimensions linking production and management capabilities with resilient city construction. Firstly, the comprehensiveness and effectiveness of a company's internal management system determines its ability to respond effectively to emergencies and, consequently, is a key factor in building resilient cities. A well-designed and

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implemented management system can improve a company's risk resistance and operational efficiency, ensure continued production during crises, and support the city's economic stability. Secondly, companies should align their core business philosophy with social responsibility principles to enhance the urban environment's resilience. Companies should strive to balance the pursuit of economic benefits with a commitment to generating positive social impacts, actively participating in initiatives that contribute to building resilient cities.

Finally, the synergistic combination of corporate innovation and resilient city development is critical. Improving a company's innovation capacity and ability to integrate resources effectively can yield novel solutions for urban disaster response, ultimately enhancing overall resilience. The research defines a company's production and management capabilities in terms of its social value and contribution to building resilient cities. From the perspective of building resilient cities, companies can fundamentally enhance the resilience of the urban environment by improving their own organizational and operational resilience. In a significant disaster, companies can provide crucial financial and material support for the city's disaster response efforts while ensuring their continued development. Companies' stability and sustained growth represent an important force enabling cities to withstand diverse risks, providing continuous economic support, ensuring material security for the city's population, and promoting rapid recovery following adverse events.

4.1.6. Emergency Response Capability

Experts highlighted that a company's emergency response capability is a crucial indicator of its effective risk management practices. The proper handling and efficient response of companies to risks encountered during production and operations directly contribute to enhancing the resilience of cities. Therefore, accurately identifying and effectively responding to these risks constitutes a core element in improving a company's comprehensive capabilities. Experts identified three crucial dimensions linking emergency response capability with resilient city construction. Firstly, companies should ensure the rapid deployment of emergency supplies to designated groups, particularly in major disasters. The timeliness and accuracy of material transportation are fundamental for mitigating losses and ensuring the livelihoods of affected populations. Secondly, companies should prioritize strengthening employee safety and providing comprehensive emergency response training. Improving employee self-help and rescue capabilities and effective risk identification and response strategies can significantly enhance corporate operational capabilities.

Thirdly, companies should actively participate in post-disaster reconstruction efforts. Through financial and material support, companies can help affected individuals and communities rebuild their homes and enhance the company's social image and brand value. The research defines emergency response capabilitiy as the comprehensive skills and resources demonstrated by a company in disaster prevention and response. From the perspective of building resilient cities, strengthening the emergency response capabilities of companies is crucial for ensuring urban safety and stability. Companies are the driving force behind economic development and represent an important guarantee for urban safety. Their emergency response capabilities have become a key force enabling cities to withstand risks and achieve rapid recovery, playing an irreplaceable and central role in building resilient cities.

4.1.7. Urban Resident Councils

Experts highlighted that urban resident councils, as an integral component of urban administration, play a central role in community affairs and facilitate the in-depth integration of resilient city construction with community-level activities. Experts identified three crucial dimensions linking urban resident councils with resilient city construction. Firstly, resident councils are familiar with their communities, enabling rapid responses to crises and effectively resolving practical problems. This local knowledge positions them as valuable early warning systems within the community, enhancing overall safety and preventative capabilities. Secondly, resident councils serve as crucial communication bridges, connecting residents, companies, and the government, thereby improving communication efficiency and

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ensuring the smooth implementation of emergency management protocols. They represent a key link for information transmission and effectively coordinating diverse stakeholder interests. Finally, resident councils play a vital role in organizing emergency drills, improving residents' emergency response capabilities, enhancing self-rescue and mutual-aid skills, and ultimately reducing disaster-related losses.

The research defines urban resident councils as the basic-level managers of urban communities, providing a critical communication link between governments and residents. From the perspective of building resilient cities, the stronger the operational capacity of resident councils, the greater the value they add to the overall process of building resilient cities. They constitute an important cornerstone for resilient city development, enhancing community cohesion, improving residents' risk awareness and response capabilities, and providing a solid guarantee for cities' overall safety and security. The effective operation of resident councils is indispensable in building resilient cities.

4.1.8. Urban Volunteer Teams

Experts highlighted that urban volunteer teams are influential public welfare organizations within cities, providing cost-effective technical services and fostering diverse public welfare initiatives based on the professional skills of residents. Experts identified three crucial dimensions linking urban volunteer teams with resilient city construction. Firstly, volunteer teams enhance residents' awareness of disaster prevention and their ability to provide self-help through professional training programs and public outreach activities disseminating scientific knowledge, thereby building a resilient social and cultural environment. Their professional expertise encompasses disaster prevention knowledge dissemination, emergency rescue training, ecological protection initiatives, and other related areas, providing essential soft cultural strength for building resilient cities. Secondly, volunteer teams effectively organize and actively participate in urban disaster rescue efforts to enhance urban resilience. In the processes of urban planning, governance, and safety assurance, volunteers integrate their professional expertise, understanding of local living habits, and awareness of cultural differences to provide diverse approaches and measures, enhancing the scientific rigor of urban planning practices, the humanization of governance strategies, and the professionalism of safety assurance measures.

Finally, volunteer teams bridge the gap between the government and residents in disaster response scenarios. Their professional capabilities help to implement critical tasks and facilitate the rational allocation of disaster relief resources, translating the intentions of government policies into concrete actions and channeling corporate capabilities into practical assistance, thereby achieving efficient use and targeted allocation of resources. Urban volunteer teams provide invaluable technical support for building resilient cities, complementing the efforts of governments and companies. As an important force in building resilient cities, they effectively integrate social resources, enhance the ability of cities to withstand risks and respond to emergencies, and contribute to creating a safe, harmonious, and sustainable urban environment.

4.1.9. Urban Citizen Self-Defense Teams

Experts highlighted that the urban citizen self-defense teams, serving as a civilian security force dedicated to maintaining urban stability, offers a rapid response in the event of major disasters, providing rescue services based on geographical proximity to ensure the effectiveness of initial rescue efforts. Experts indicate that there are three critical connections between urban citizen self-defense teams and building resilient cities. Firstly, the urban citizen self-defense teams operates independently of government, enterprises, or other social organizations, with members actively engaging in the acquisition of relevant theoretical and practical skills. In the event of a disaster, they can respond swiftly until the government assumes control and provides emergency information. This independence and spontaneity ensure the rapidity and flexibility of rescue operations, highlighting residents inherent sense of responsibility for urban welfare. Secondly, urban citizen self-defense teams emphasize teamwork, during disaster response and post-disaster reconstruction, residents consolidate individual efforts to maximize resource utilization, thereby enhancing the efficacy of urban self-defense teams and

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fostering a collaborative atmosphere for overcoming challenges. Lastly, urban citizen self-defense teams stimulate residents intrinsic motivation, augmenting their sense of responsibility towards urban development and promoting harmony and stability within the city. As a grassroots force, urban citizen self-defense teams cultivate citizens recognition of the importance of urban maintenance, strengthening community belonging and fostering a supportive and caring community environment.

This reserach defines urban citizen self-defense teams forces as spontaneously organized groups aimed at maintaining urban stability. Within the framework of building resilient cities, these self-defense teams forces play a constructive role in the development of resilience. All residents may join the self-defense teams forces, contributing their individual expertise and experience to facilitate comprehensive urban development. By enhancing residents' disaster resilience, the successful building resilient cities can be ensured. This initiative not only strengthens governmental emergency management but also significantly bolsters the overall risk resistance capacity of the city.

4.1.10. Disaster Identification

Experts noted that in urban environments, the ability of residents to accurately identify disastes was critical and directly related to their safety and well-being. By accurately and efficiently identifying risks, residents and government agencies can significantly reduce the probability of disasters and their potential impacts. Experts identified three key links between disaster identification and building resilient cities. First, cities need to effectively integrate multiple sources of information, including expert assessments, historical data, resident feedback, and corporate reports, which together enhance a city's ability to predict potential risks. The richness of information sources is directly related to the accuracy of risk prediction, and comprehensive and multi-faceted analysis can help provide solid data support for city management. Secondly, pragmatic assessment of various risks is the core of risk avoidance. For example, city managers need to use weather forecasts to predict natural disasters, analyze epidemiological data to anticipate public health crises, and assess social dynamics to predict mass events. Finally, accurately identifying and understanding the interactions and dependencies between different risk types is critical for city managers. For example, residents' understanding of the relationship between extreme weather events and urban flooding helps them more accurately judge disaster conditions [23]. Once residents recognize these linkages, city managers can implement more systematic and comprehensive risk management strategies, thereby improving the overall effectiveness of emergency response.

From the perspective of building resilient cities, disaster identification constitutes fundamental work that not only provides critical early warning information, but also guides urban planning strategies and significantly improves the resilience of cities to various types of risks. These measures aim to ensure the overall safety and sustainable development of cities. Effective disaster identification practices can help cities to respond more effectively to challenges and ensure the continued well-being of their inhabitants.

4.1.11. Disaster Response

Experts highlighted that disaster response, as a core element of effective risk management, is critical to reducing the impact of urban disasters and safeguarding the lives and health of residents. Experts have identified three crucial linkages between effective disaster response strategies and the construction of a disaster-resilient city. First and foremost, cities must prioritize disaster response within both their infrastructure development initiatives and their comprehensive safety management frameworks. This prioritization reflects the government's firm commitment to safeguarding the safety and well-being of its citizens and serves as a foundational prerequisite for creating a truly disaster-resilient urban environment. To this end, strategic resources must be invested across all phases of disaster management, including prevention, response, and recovery efforts. Second, city managers should ensure that disaster response strategies and protocols are fully integrated throughout the planning, construction, and development process to effectively manage the entire process and significantly reduce the risk of secondary hazards. In the early stages of planning and design, managers

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should thoroughly assess potential risks and take appropriate measures to mitigate their potential impacts. For example, in new construction projects in the city, builders should commonly employ robust flood control and drainage systems, as well as building materials with superior seismic performance [24].

Finally, city managers must integrate disaster response capabilities into a comprehensive urban risk monitoring system to establish a rational and effective link between risk identification, assessment, response and continuous monitoring to ensure the overall safety and security of the urban environment. This requires a strong early warning system, a clear emergency response mechanism, and a comprehensive disaster recovery plan to improve the efficiency and overall effectiveness of disaster response efforts. The disaster response refers to the processes by which cities effectively manage the occurrence and development of disasters. From the perspective of resilient city building, effective disaster response is a key element, serving as an important indicator of urban resilience and a fundamental guarantee of sustainable urban development. Cities with strong and well-developed disaster response capabilities are better equipped to protect the safety of their residents, maintain social order, and promote sustainable economic development, even in the face of significant challenges.

4.1.12. Post-Disaster Recovery

Experts highlighted that post-disaster recovery is a core aspect of resilient city building and directly influences residents' evaluation of the city's public services and healthcare security system. Experts identified three crucial dimensions linking effective post-disaster recovery with resilient city construction. First, post-disaster recovery necessitates the city to coordinate the resources of the government, private enterprises, and social organizations to ensure synergy and maximize efficiency. The government should lead the development and implementation of a comprehensive recovery plan and coordinate the efforts of various governmental departments. Meanwhile, in the field of urban construction, governments, enterprises and social organizations all play key roles in providing funds, in-kind resources and technical support to enhance the effectiveness of resilient city construction [25]. In the process of building resilient cities, governments, enterprises, and social organizations should work together to build an efficient and coordinated cooperation framework, so as to enhance the overall effectiveness of post-disaster recovery and ensure the rational and fair distribution of resources. In the post-disaster management phase, a city's ability to implement recovery efforts quickly and effectively will greatly reduce economic losses and increase residents' trust in the community. Governments need to put in place rapid response mechanisms and strategically deploy emergency resources to ensure that recovery efforts can start quickly.

Ultimately, post- disaster recovery is defined as the ability of a city to quickly assist its residents in restoring order to their work and lives after a disaster. This process encompasses two core tasks: the rebuilding of physical infrastructure and the maintenance of the mental and physical health of residents [26]. Infrastructure restoration is essential to improve the quality of life of residents, while mental health restoration is the basis for social stability, and both are interdependent to enhance the overall resilience of the city. In the post-disaster recovery phase, residents need to focus on the reconstruction of physical infrastructure, as well as mental health counseling services and other supportive assistance provided by the government and social organizations to cope with their psychological needs. From the perspective of building a disaster-resilient city, efficient post-disaster recovery not only promotes sustainable urban development, but also accumulates valuable experience for future disaster preparedness and response strategies. Through in-depth summarization of experiences and lessons learned from disaster events, city managers can continuously optimize their risk management systems and enhance their ability to cope with future challenges, thus achieving long-term sustainable development of the city.

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5. Theoretical Coding Results

In this research, the coded data were carefully analyzed using a Grounded Theory approach with Nvivo software, which in turn led to the study's conclusions. The research found that the key factors for building resilient cities can be categorized into four dimensions. Among these four dimensions, the government, companies and social organizations are the main forces influencing, and they constitute the three main bodies influencing the building resilient cities. In addition, urban risk management is a key indicator of building resilient cities. In addition, urban risk management is a key indicator of resilient city building. Based on these findings, the framework for resilient city construction can be systematically divided into four core components: regulatory mechanisms implemented at the governmental level, capacity-building initiatives undertaken at the enterprise level, active participation and engagement at the social organization level, and comprehensive risk management strategies integrated throughout all aspects of urban development. This division strengthens the logical connections between the various components and clearly articulates the multi-dimensional and multi-layered characteristics of resilient city construction.

5.1. Regulatory Mechanisms at the Governmental Level

As the central entity within the urban governance structure, the government bears the significant responsibility of providing essential public services to urban residents and ensuring the smooth and orderly functioning of their daily lives. In the complex process of promoting resilient city construction, the role of the government and its effective functioning are particularly critical. The government must continuously strengthen the effectiveness of urban management practices, commit to improving the quality and efficiency of urban services, and effectively establish and implement a comprehensive urban welfare protection system to fully leverage its supervisory and leadership roles in building resilient cities. The urban management system encompasses a multi-layered structure characterized by complex interrelationships and constraints, forming a network of mutual supervision. In the provision of public services by the city government, the supervisory role of regulatory authorities is indispensable to ensure that public services genuinely benefit the general public and effectively meet their actual needs. The basic rights and interests of urban residents are safeguarded through the social welfare and security system, which is closely linked to their daily lives. In view of this, there is an urgent need for cities to establish a comprehensive monitoring system to ensure that the social welfare and social security system is carried out fairly and efficiently.

Governments play a central role in ensuring the quality of services for urban residents. As a core provider of urban public services and a key enabler of urban resilience, the government regulatory function is critical to building resilient cities. The government regulatory directly affects the city's ability to cope with challenges and risks, as well as to improve the overall resilience of the city. Therefore, efficient regulatory measures can be taken by the government to improve the rational allocation and efficient use of urban resources. These measures aim to promote the continuous optimization and enhancement of urban services, while safeguarding the stability and equity of the social welfare system, thereby creating a safer, more pleasant and harmonious living environment for residents [27].

5.2. Capacity Building at the Company Level

Companies play a critical role as enablers of sustainable urban economic development and prosperity. In building resilient cities, firms demonstrate their multidimensional capabilities, which can be summarized as: enhancing intrinsic motivation, expanding external influence, and assuming social responsibility [28]. Firm capability building is a complex and comprehensive task that cuts across all aspects of firm management. Enhancing the intrinsic motivation of the firm involves two main aspects, one is to secure the supply of materials needed by the city and the other is to ensure the smooth operation of the city's economic activities. Expanding the external influence of the enterprise also has two aspects, one is to optimize the production efficiency, and the other is to adopt advanced production

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management mode. Therefore, the enhancement of enterprises' intrinsic and extrinsic capabilities not only helps individual enterprises to enhance their market competitiveness, but also provides assistance to the industrial upgrading and structural optimization of the urban economy.

The ability of a company to fulfill its social responsibilities is most directly manifested in its effective emergency response strategies and actions taken in the face of unexpected events and crises. Companies with a strong sense of social responsibility can act decisively and swiftly during critical junctures, taking effective measures to mitigate the impact of disasters on the city, thereby protecting the lives and property of urban residents.

Building an enterprise's capabilities has far-reaching significance for the overall development of a city. It not only fully stimulates the inherent vitality of the city and promotes the sustained growth of the urban economy but also enhances the city's overall competitiveness and lays a solid foundation for its long-term sustainable development. Therefore, in constructing a resilient city, great importance should be attached to cultivating and enhancing the capabilities of enterprises. Through various mechanisms, such as strategic policy guidance and targeted financial support, the innovative vitality of enterprises can be stimulated, and the symbiotic relationship and shared prosperity of enterprises and cities can be promoted.

5.3. Active Involvement at the Social Organization Level

Social organizations, as a vital cornerstone of urban grassroots governance, provide extensive professional and technical support for the comprehensive development of cities. As social entities characterized by public welfare objectives, technical expertise, and voluntary engagement, social organizations maximize social benefits with minimal economic input through their efficient economic efficiency transformation mechanisms.

The urban residents' committee serves as a core social organization at the urban community level. This committee strives to provide comprehensive safety for residents' lives to the greatest extent possible and accurately captures and reflects the real needs and aspirations of urban residents, providing robust grassroots support for the construction of a resilient city. This multifaceted function of the urban residents' committee enhances both the democratic character and the scientific rigor of urban governance while simultaneously promoting the harmony and stability of urban society. As a public welfare social organization driven by professional skills, the urban volunteer service team provides critical technical support and invaluable rescue forces for the city, leveraging its specialized skills and selfless dedication to effectively meet the urgent needs of resilient city construction for professional expertise and emergency response capabilities. As a spontaneous group organization focused on urban safety maintenance, the urban resident self-defense team effectively improves the city's security prevention capabilities and emergency response speed through self-organization, self-management, and self-service initiatives.

The full participation of social organizations is of profound significance to urban development. The active engagement of social organizations not only fully stimulates the potential and vitality of individuals within society but also combines the dispersed individual strengths into powerful collective forces, thus maximizing the effectiveness and value of the construction and development of resilient cities.

5.4. Strategy Formulation in Risk Management

Risk management, a systematic process designed to minimize risk factors within a defined environment, is pivotal in building resilient cities. Its core purpose is to mitigate the diverse risks urban environments face, effectively ensure safety, and enhance urban residents' overall quality of life.

From an academic perspective, risk management typically encompasses three closely interrelated and progressively unfolding phases: disaster identification, disaster response, and post-disaster recovery. During the disaster identification phase, the primary task involves comprehensively and thoroughly analyzing the various disaster risks the city may face. The aim is to avoid, to the maximum extent

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possible, the occurrence of disasters through scientific prediction and proactive prevention strategies, thereby laying a solid foundation for the stable and sustainable development of the city. Risk management focuses on the rapid activation of the designated emergency response mechanisms in the disaster response phase, triggered when a disaster inevitably strikes. Through efficient organization, coordinated efforts, and strategic resource deployment, the focus is on safeguarding the lives and protecting residents' property while simultaneously striving to minimize the overall losses caused by the disaster.

The post-disaster recovery phase focuses on the city's reconstruction and restoring residents' lives after the disaster. Scientific planning and orderly implementation of recovery efforts aim to ensure that residents can return to their everyday lives as quickly as possible. Simultaneously, this phase aims to inject renewed vitality into the long-term sustainable development of the city. These three phases are intrinsically linked and mutually supportive, forming a complete and integrated framework for effective risk management. By carrying out comprehensive and in-depth risk management initiatives under this holistic framework, urban environments can not only effectively prevent and control potential urban disasters but also provide robust theoretical and practical support for the construction of resilient cities, thereby promoting the realization of more robust and sustainable urban development within a complex and constantly changing environment.

6. Conclusion

The research, grounded in grounded theory methodology, provides an in-depth analysis of the influencing factors of resilient city construction, identifying three core stakeholders: government entities, private enterprises, and social organizations. Specifically, governmental oversight, enterprise operational capabilities, and social organization participation are key factors influencing resilient city construction. Among these, urban risk management, as a central issue in resilient city construction, encompasses the three significant phases of disaster prevention, disaster response, and post-disaster reconstruction, thereby forming the foundational framework for building resilient cities. The aforementioned refinement and interpretation of influencing factors deepen the understanding of the factors impacting resilient city construction as documented in existing literature [29] and provide valuable additions for the further development and practical application of resilient city theory. From an expert perspective, the key to improving the construction of resilient cities lies in strengthening the effectiveness of governmental oversight, optimizing the operational mechanisms of private enterprises, stimulating the vitality and engagement of social organizations, and scientifically evaluating the effectiveness of urban risk management strategies. The research closely aligns with the actual needs of urban development, providing a solid theoretical foundation and practical guidance for formulating strategic urban planning initiatives, ultimately promoting the sustainable development of resilient cities within a complex and ever-changing global environment.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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