Research on the Relationship Between Government Governance Efficiency and Urban Resilience in Public Health Emergencies

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Abstract. The system dynamics model of the relationship between the efficiency of government governance and the growth of urban resilience is constructed by using Vensim PLE software, and the simulation analysis is carried out. The results of system operation show that the model can better reflect the actual situation of the relationship between the efficiency of government governance and urban resilience. The number of public opinions and the efficiency of government governance are correlated with the growth of urban resilience. This study makes a theoretical contribution to the field of enhancing urban resilience, and provides references and suggestions for the government to rebuild the urban image in the face of public health emergencies.

Keywords: urban resilience · efficiency of government governance · public health emergency · system dynamics

1 Introduction

Due to the centralized distribution of population and industry in a city, the normal operation of each subsystem in the city will be inevitably affected by disasters. Therefore, since the 21st century, how to enhance urban resilience has become a hot topic in urban governance and planning. Urban resilience means that cities are expected to have a spring-like ability to bounce back quickly after a shock. Resilient cities can reduce their own losses, restore economic vitality and ensure the normal life order of their residents at the fastest speed in any environment. However, one of the problems that need to be solved is how to lead the government to make the city bounce back quickly after the impact fades away. Studies on urban resilience have already covered the relationship between climate change and urban resilience [1], the impact of tourism development on urban resilience [2], and how to improve urban resilience in disaster-prone areas [3]. From the perspective of urban planning, studies have been made on how cities can make specific planning based on their natural resource strengths and weaknesses to improve urban resilience [4, 5]. The relevant factors affecting the growth of urban resilience are discussed, and how to make full use of the relationship among various elements to govern the city is analyzed [6, 7]. From the perspective of urban development and residents' life,

the impacts of residents' employment and economic fluctuations on urban resilience are discussed, and the concept of "Urban Resilience Capacity Index" [8, 9] is proposed. The construction of resilient cities, the influencing factors of the uneven spatial distribution of urban resilience and the measurement indicators of urban resilience have been constantly brought into the scope of urban planning. The main research methods are mathematical analysis, index analysis and GIS spatial analysis.

From the perspective of the efficiency of government governance, the efficiency of government governance includes the timeliness of public opinion governance and the effectiveness of the recovery policies issued after public health emergencies, the satisfaction of the needs of the masses and the efficiency of the introduction of urban constructive measures. In this process, there will be delays, time for the government to obtain the needs of the people, and time for the policy to adjust accordingly to the actual situation. Research focuses on two public opinion quantity change and governance efficiency factors and toughness increase the dynamic relationship between the city, by building a system dynamics model, and the simulation analysis and sensitivity analysis, in order to make clear the government governance efficiency and the resilience, the relationship between the city and provide suggestions for how to promote the steady growth of urban resilience.

2   System Dynamics Model of the Relationship

2.1   The Dimensions of Governance Efficiency and Urban Resilience

After a public health emergency, the resistance of tourists from other provinces to the city where the incident originated and the concern of local residents for their own life, health and safety will make the number of public opinions fluctuate and change in a certain period of time. As social network public opinion is an important way to express the needs of the masses, it has a great impact on urban recovery and development. The government needs to acquire public opinion information in a timely manner, analyze the reasons, and take corresponding governance measures according to residents' concerns and the social situation at that time.

2.1.1   Efficiency of Government Governance

On the basis of maintaining social order and stability as far as possible, economic recovery and development, and meeting the demands of the masses, the impact on urban resilience should be considered. The efficiency of government governance is divided into two dimensions, namely, the actual decision-making efficiency of the government and the expected decision-making effect of the government, which respectively reflect the governance ability of the government for the network public opinion after public health emergencies and the ability of building the urban prevention and control governance system.

- Ability to manage public opinion.

On the one hand, whether the official public opinion guidance that the government should give play to after the event is timely and effective; on the other hand, part of the spontaneous public opinion of the masses is full of positive energy, while the other part is full of negative emotions, which will harm the social order and even cause panic. Therefore, the government needs to take timely measures to deal with it.

- Capacity for prevention, control and governance.

Innovative construction is also an important part of government governance, including emergency management, medical system management and improvement and establishment of prevention system. It refers to a series of innovative construction projects to attract consumption in order to restore economic development.

2.1.2   Urban Resilience

Urban resilience is mainly determined by the growth demand of urban resilience and the expected resilience of cities, and the construction capacity depends on whether a series of measures taken by cities in the process of facing the problem really play a full role. The growth of urban resilience as a whole is also related to the growth of the resilience of the masses. Psychological resilience consists of resilience against pressure and resilience against pressure. Psychological resilience refers to tourists' resistance to the city of origin after the city suffers from public health emergencies. Faced with this mentality, the city's ability to bear the resistance and take measures to alleviate the resistance as soon as possible. Psychological resilience against pressure refers to the ability of people in this city to self-ease and guide the psychological pressure in the process of fighting against the epidemic, which can be observed through quantitative analysis and semantic analysis of network public opinion.

In this paper, the Vensim PLE software was used to build a causal model of the relationship between government governance efficiency and urban resilience, as shown in Fig. 1.

2.2   System Flow Diagram

According to the causality model, this paper constructs the related system flow diagram, which involves 22 variables. Among them, there are 3 state variables, 4 flow rate variables, 10 auxiliary variables and 5 constants, as shown in Fig. 2.

2.3   Design of Main Equations

This paper deals with the equations of the variables involved in the model, and the main equations are as follows:

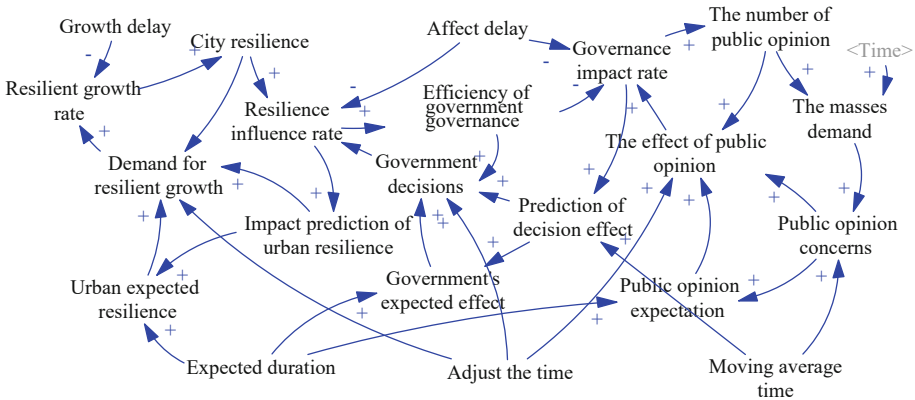- City resilience = INTEG (Resilience growth rate-Resilience impact rate, 3000).

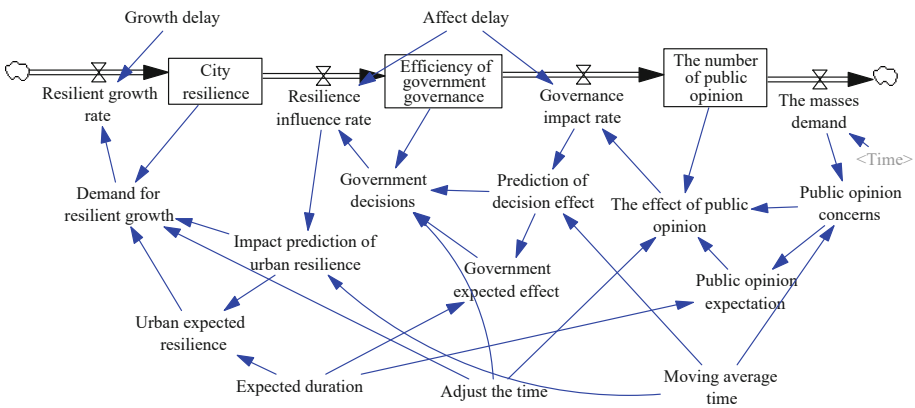**Fig. 1.** Causality model.

Fig. 2. System flow diagram.

- Government governance efficiency = INTEG (Resilience impact rate-Governance impact rate, 3000).
- Number of public opinions = INTEG (Governance impact rate-Public demand, 3000).
- Resilience growth rate = DELAY3 (Demand for resilient growth, Growth delay).
- Resilience impact rate = DELAY3 (Government decision, Impact delay).
- Governance impact rate = DELAY3 (Public opinion impact, Impact delay).

Among them, the number of public opinions will change with the residents' concerns and demands and expectations for government decision-making after public health emergencies. There is a time delay between the residents' expression of demands and the government's knowledge of them, which will lead to the change of the number of public opinions. Public opinion includes positive energy and negative energy. On the one hand, negative public opinion will aggravate the city residents' worries about life, health

and safety; on the other hand, it will deter non-local tourists and affect the economic recovery and development of the city.

The efficiency of government governance refers to the timeliness of official public opinion guidance and the governance efficiency of spontaneous public opinion formation after public health emergencies. Governance efficiency will be affected by the complexity of the events and the influence of the moving average time changes, policies formulated according to the development of the event and the actual situation to make adjustment and correction, in order to achieve the management of the government expected effect, often with the execution process and policy promulgated after the adjustment is in line with the needs and so on, so the adjustment of government decision-making in the model in time and moving average as the constant variables.

Cities have their own demand for resilient growth, but the growth rate is delayed by multiple factors, and there is always a certain gap between the expected resilience and the actual resilience growth. In cities with strong resilience, the government is often more efficient in decision-making, more able to control the normal development of public opinion in the first time and stabilize the social order.

3 Simulation Analysis

The initial values of the number of public opinion and urban resilience were set as 3000, the delay time of growth and impact was set as 3 days, and the simulation step size was set as 1 day.

The simulation time is set to be 200 days, and the simulation results of the three variables of urban resilience, government governance efficiency and the number of public opinions are shown in Fig. 3.

As can be seen from Fig. 3, the overall environmental condition and economy of the city suffered a huge impact after the public health emergency.
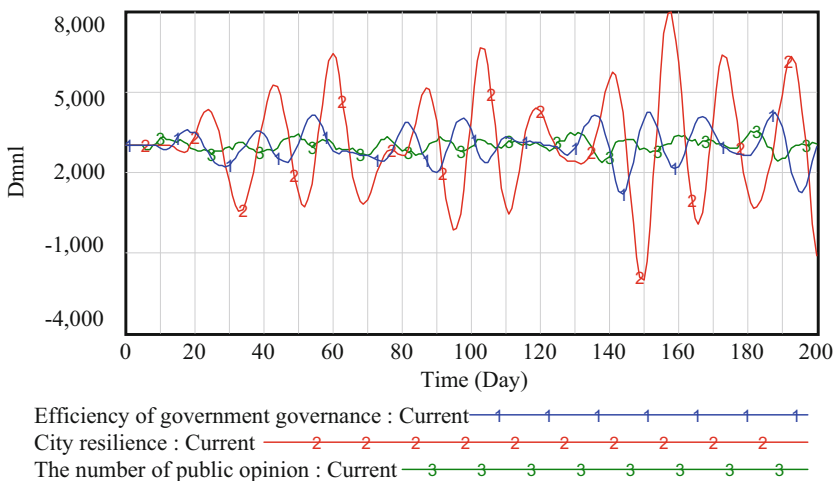

Fig. 3. Simulation analysis results.

3.1 The Number of Public Opinions Will Change with the Demand of Residents, Presenting a State of Fluctuation

Although the government took measures to protect the lives, health and safety of residents in the first place, the public, due to the limited information, could not get the latest developments in the first time, so they would have anxiety. As time goes by, the number of public opinions will change with the demand of residents, presenting a state of fluctuation. Residents expressed their concerns through public opinion, expecting a response from the government. There are a large number of important remarks, which need timely attention from the government, and relevant policies should be formulated to guide and govern the situation in the first time to ensure the true situation, so as to avoid the fermentation of the incident and more negative impacts.

3.2 The Efficiency of Government Governance Fluctuates with the Change of the Number of Public Opinions

In order to better govern the society and give full play to its responsibilities, the government usually formulates more emergency plans to meet the needs according to the current social situation after obtaining the actual situation, so as to be ready for emergencies. Therefore, the efficiency of government governance will produce greater fluctuations and changes in a period of time after the change of public opinion, that is, the formulation and improvement of various emergency plans.

3.3 The Growth Rate of Urban Resilience Fluctuates with the Change of Governance Efficiency

Whether the government's handling of public opinion is timely and effective will have an impact on the influence, confidence and cohesion of the city, and will also drive the change of the demand for resilient growth. After a period of government governance, a construction atmosphere with urban characteristics will be formed. Good construction progress and timely and effective handling of intractable problems will enhance urban resilience and increase the growth rate of resilience in a certain period of time. However, some factors cannot be controlled due to the delay of the acquisition speed, which may lead to some events that are not planned, thus slowing down the growth rate of urban resilience.

3.4 The Interaction Between Urban Resilience and Governance Efficiency

Strong urban resilience will also improve the efficiency of government governance, which is mainly reflected in two aspects: innovation construction and psychological construction.

- Innovation and construction.

In cities with high resilience, based on summarizing the development rules of the process, the government will be quicker to find out the areas to be innovated in urban

development infrastructure, which will help the city quickly reduce the negative impact caused by health emergencies. Enhance the resilience of innovative construction by increasing innovative construction in cities.

- Psychological construction.

The government can improve the degree of psychological construction by reducing the resistance of tourists and strengthening the anti-pressure mentality of urban citizens, and help to restore the development of urban tourism, so as to achieve the effect of driving economic improvement expected by the government. With the improvement of the urban governance level and the satisfaction of the needs of the masses, the network public opinion will develop in a positive and stable direction. It can be seen that the development trend of the above three variables over time is consistent with the actual situation, and the system dynamics model constructed in this paper can better simulate the realistic situation of the relationship between government governance efficiency and urban resilience.

4   Sensitivity Analysis

The validity and rationality of the model are verified by simulation analysis, and the sensitivity analysis is carried out. Sensitivity analysis is to investigate the influence on the model by changing the relevant parameters or structure of the model, so as to provide theoretical and decision support for the research work. In this paper, the numerical analysis is carried out by adjusting the delay time. Keep the values of other variables unchanged, take the toughness growth delay and influence delay as 3 in turn, and obtain Current; If I take 4, I get Current 2; If I take 5, I get Current 3; If I take 6, I get Current 4. The sensitivity analysis results of urban resilience growth change and government governance efficiency are shown in Fig. 4 and Fig. 5.

As can be seen from Fig. 4 and Fig. 5, when the delay time is 3 days, the fluctuation of government processing efficiency and urban resilience growth is the least. The less time it takes to receive information, the more timely it will be for the government to adjust policy arrangements after knowing the social status, and the more stable the normal operation of the city in the special period. As the delay time increases, the curve changes more obviously. The longer it takes on behalf of the government to receive the needs of the masses; it is not conducive to timely arrangement of measures, which will make the fluctuation of governance efficiency more obvious. In the figure, when the delay time is 6 days, the change range of government governance efficiency is the largest. A large number of issues need to be dealt with in a single period of time, and effectiveness is bound to be reduced.

The change of urban resilience growth is not only related to the efficiency of government governance, but also affected by the uncertainty of people's needs and the stability of the government's grasp of social conditions, resulting in a growth delay. As can be seen from Fig. 4 and Fig. 5, the shorter the growth delays, the smaller the range of change. The longer is the delay, the greater is the range of variation. When the growth delay was 3 days, the resilience growth was the most stable. Therefore, in order to achieve a stable
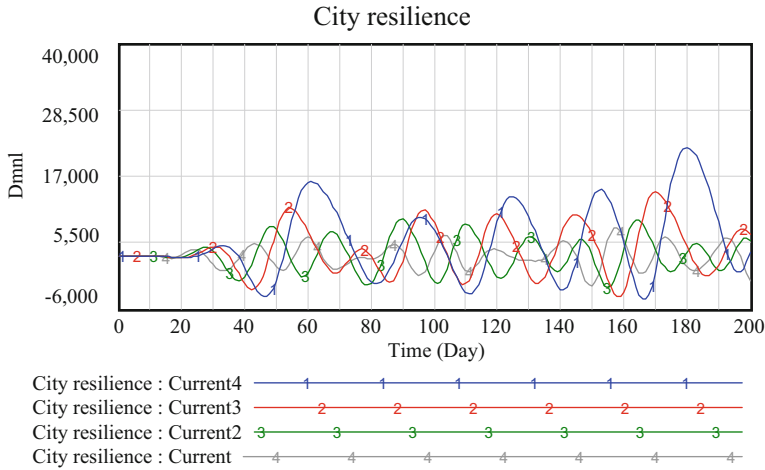
City resilience

Fig. 4. Results of sensitivity analysis (a).
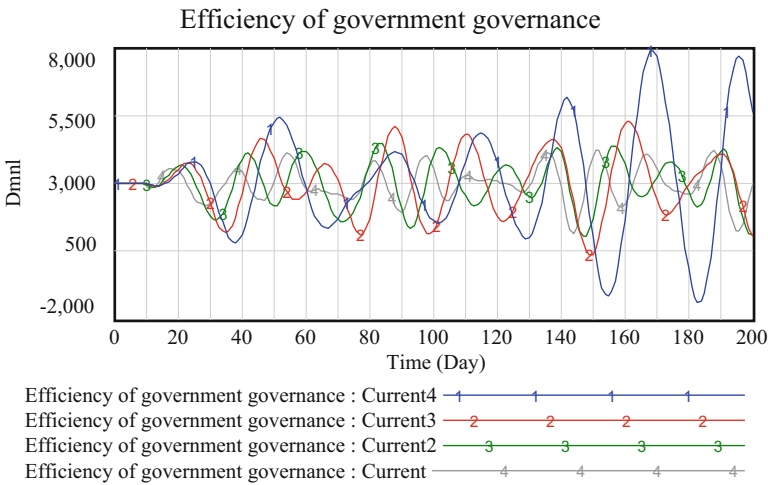
Efficiency of government governance

Fig. 5. Results of sensitivity analysis (b).

and healthy growth of urban resilience, the delay time should be shortened as far as possible.

As can be seen from Table 1, people's expectations cannot be met in the first time, which will lead to ferment of public opinions and increase in the range of quantity change. At this point, the government should not only analyze and process the information obtained in a timely manner, but also formulate solutions. More relevant emergency plans should be formulated according to the existing situation to prevent the emergence of various possible derivative problems, and the efficiency changes are obvious.

Table 1. Sensitivity analysis table of delay effect.

Variable	Computational results	Day								
		0	25	50	75	100	125	150	175	200
City resilience	Current	3000.00	4225.16	1228.57	2620.02	3944.83	2829.78	-2031.88	5744.16	-1123.39
	Current2	3000.00	4127.09	7751.32	591.66	-1412.44	2012.04	3254.74	484.80	5726.39
	Current3	3000.00	3478.14	7344.11	3784.55	8900.73	6267.60	6875.60	1090.50	6996.93
	Current4	3000.00	3118.92	-1161.93	3498.22	7620.50	13426.10	12985.90	15571.10	3740.46
Efficiency of government governance	Current	3000.00	2482.01	3045.23	2401.50	3555.83	2913.93	3976.29	2750.70	2928.87
	Current2	3000.00	3108.07	2170.05	1934.48	4021.66	3513.51	1689.54	3771.70	1102.40
	Current3	3000.00	3618.61	3928.76	1457.78	1229.54	1981.45	385.11	1952.78	1029.45
	Current4	3000.00	3793.36	5252.51	2541.14	1617.34	1791.19	1052.31	4293.37	5134.31
The number of public opinion	Current	3000.00	2657.22	3397.72	3183.22	2951.98	3070.73	2861.96	2875.81	3027.27
	Current2	3000.00	2521.36	3457.32	3134.81	3001.20	3007.06	3108.63	2810.74	3066.83
	Current3	3000.00	2486.25	3328.29	2957.43	3137.42	3085.21	3049.08	2877.74	2829.33
	Current4	3000.00	2546.68	3426.92	2811.90	2981.85	2936.65	2647.79	2610.42	2415.34

5 Conclusion and Enlightenment

5.1 Conclusion

The model constructed in this paper can better reflect the actual situation of the relationship between the efficiency of government governance and urban resilience after the occurrence of public health emergencies. The results of simulation analysis show that the system dynamics method is suitable for analyzing the relationship between governance efficiency and urban resilience, and can better simulate the situation of urban resilience in reality.

The growth rate of urban resilience is related to the efficiency of government governance. The results of sensitivity analysis show that with the increase of delay time and the ferment of public opinion, the change range of government governance efficiency will increase, and the growth rate of urban resilience will also have a significant change. Therefore, it can be concluded that the length of delay time has an important impact on the efficiency of government decision-making and the growth of urban resilience after public health emergencies.

In order to promote the steady growth of urban resilience, we should try our best to control the impact of shortening the delay time. The government should make emergency plans and take active and effective measures to minimize the urban losses immediately after the event. Pay close attention to the aspirations of the masses. For the needs of the masses, special departments should be set up to collect and listen to the needs of the masses and take them into consideration in a timely manner. To solve the problem in a timely manner, we should promote urban vitality and resilience to stabilize trend growth through policies conducive to economic recovery and development, stimulating employment and meeting the needs of the people.

5.2 Enlightenment

In the subsequent restoration and urban construction, cities with strong resilience will pay more attention to detailed construction and link design, and their capabilities in planning and deployment and policy implementation will continue to improve. According to the results of the study on the relationship between governance efficiency and urban resilience, in the face of public health emergencies, the government needs to improve the governance capacity after the impact, and adopt strategies for the different areas that need to be involved in the improvement of governance efficiency within the urban system.

5.2.1 The Government Should Pay Full Attention to Official Public Opinion Governance

In the process of improving the efficiency of government governance, the government should pay attention to the positive leading role of official public opinion, stand on the government level, give full play to the leading role, and drive the network public opinion to develop in a positive direction after public health emergencies. For the spontaneous public opinion on the Internet, we should actively respond, timely release the real data, and timely appease the public mood, so as to avoid the public opinion from continuing to ferment due to improper response. The management of network level lays the foundation for the government, and the influence in the process of ascension in the city to form a new construction ideas and concepts. The government should positive construction with characteristic of urban economic development plan, and development innovation tourism project; It should also strengthen propaganda to eliminating resistance of tourists, and as soon as possible in the city under the premise of improving all aspects to enhance compressive psychology of the people in town;The city is still full of confidence about the future.

5.2.2 The Government Needs to Improve Governance Capacity in Health Prevention and Control and Infrastructure Construction and Improvement

We will improve the air quality monitoring and prevention system in cities, strengthen the medical treatment system, and continue to improve the emergency response plans for various health emergencies. Enhanced infrastructure equipment, complete restoration system, enhanced capacity in various aspects, enhanced civic cohesion, gradually formed a good atmosphere for urban resilience construction, improved innovation resilience of urban construction, enhanced psychological resilience of the masses, from a systematic perspective, multi-level view of the connection between various aspects of construction. The efficiency of government governance plays an important role in the development of a city. The policies issued by the government are in line with the development needs of the society at that time and can meet the immediate needs of residents. Only in this way can the city build a better image and improve its ability of sustainable development.

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