Simulated Evolution:A Rights Safeguarding Event of School District Housing

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Abstract: Establish a simulation model for rights safeguarding events of school district housing(RSEOSDH) is important for improving the effectiveness of risk management. Therefore, this paper uses the three-stage evolutionary process in Yuwenli case to carry out the simulation of the evolution mechanism of RSEOSDH risk under the deterministic background and uncertainty logic. Experimental conditions of Multi-Agent system, including general parameters, time of behavioral transformation and major factors of behavioral transformation, are predetermined based on this case. Based on that, this paper restores the evolutionary mechanism and evolutionary logic of RSEOSDH events, which provides a theoretical reference for the phased measurement and prevention of local governments in the effective governance of the national modernization field.

1. Introduction

In the context of the uneven distribution of education resource and the complex changes in school district policies, the problem of "school district housing" in China has become a deep-rooted social stubbornness, as it involves interests of different stakeholders. The combination of the policy of "Key Schools", the policy of "Near - enrollment", and the marketization of housing has led to an escalation of risks in educational field: every year, many students of school age face difficulty in being school admission, and the chaos of school district housing is commonplace, leading to increasingly fierce competition in education and inequality in education. Competition is becoming increasingly fierce and inequality in education is increasing. The social risks posed by school district housing are of great complexity, and this has led to the inevitability of conflicts among groups of people over school district housing, in particular the frequent occurrence of rights violations, some of which have even turned into group incidents, with a bad impact on social stability.

Throughout the researches over the years, we can find that scholars in the field of school district housing have studied more on issues such as "Near - enrollment", "Equity in Education" and "school choice fever". In the area of group events, most articles focus on the macroscopic process of group events, and are mostly descriptive and analytical, with few cases in focus. For example, scholars Dinghua Zhang, Weijun Li and Shifei Shen use system dynamics and multi-agent methods to carry out hybrid simulation of group events, so as to capture the whole process of the evolutionary mechanism of group events; there are also a small number of empirical analysis, for example, scholars Qiquan Wang and Weixian Wang use scenario simulation methods to analyze and calculate various simulated cases and arrive at suitable intervention points. In general, no scholars in the current academic field have yet combined the school district housing issue with group events such as rights defense incidents for empirical research.

In this paper, we will take the incident happened in Chengdu City Yuwenli Community, a rights safeguarding event of school district housing, as a typical example, and sort out the dynamic evolution process of the outbreak and its expansion, establish a multi-agent-based system simulation model, so as to reveal the inner logic of the evolution of social risks in the context of school district housing, and provide a reliable basis for the risk governors to choose the time of intervention and determine the means of governance, so as to improve the risk management. This will provide a reliable basis for risk

governors to choose the right time of intervention and determine what governance tools to use, thus improving the effectiveness of risk management.

2. Research Perspective and Framework for Analysis

2.1 Source of Case: Rights Safeguarding Events with Yuwenli Community

The Yuwenli community is located within the east gate of the Wangjiang Campus of Sichuan University, 150 meters away from the Sichuan University Affiliated Primary School and 1.4 kilometers away from the Sichuan Conservatory of Music Affiliated Primary School (as the figure shows below). In terms of resident composition, the residents of the district are all faculty and staff of Sichuan University, and the group's original housing before moving into the Yuwenli district were all in the school district of Sichuan University Affiliated Primary School. After Sichuan University demolished the old building in 2016 and built the new Yuwenli District, the residents found that the school district they belonged to had changed. In response, the residents launched a series of advocacy actions for the university office and the Education Commission, which triggered attention of social media.

Fig.1 Location of Wenli District

2.2 Research Methodology

2.2.1 Introduction of Multi-Agent System

Multi-Agent system is a society as a whole consisting of multiple agents with different functions and structures interacting through communication and collaborating with each other through certain organizational management strategies and protocols, and different agents can control or influence different parts of the environment. In a group event, the Multi-Agent system can be applied to model public individuals with different behavioral states by determining their basic attributes such as external perception, coordination and control strategies, and state transition rules, and adjusting relevant parameters such as environment and initial conditions.

2.2.2 The Theory of Public Behavioral Decision-Making

The public behavioral decisions studied in this paper are the coping strategies made by the public in various aspects of the risk evolution, mainly including "watch, demand, potential resistance, resistance, exiting" five states, The externalized manifestations of the behaviors are mainly collective action. No matter how other individuals act, the watcher has a wait-and-see mentality in the process of risk event evolution, and does not participate in the action unless the final victory is achieved; the claimant is

mostly an individual who has an interest in maintaining the claim; the potential resisters is an individual who has a claim but will decide whether to participate in the fight according to the situation; the exiters is an individual who has actively participated in the fight, but gradually loses the enthusiasm to participate and withdraws due to frustration or disappointment to some subjects in the process of the fight. It is crucial to study the evolution of risk events into group events through studying the behavioral strategies of the public in the process of risk event evolution.

2.3 Public Behavioural Decision Making and Evolutionary Condition Setting

2.3.1 Stage 1: General Group - Risk Group

In 2016, Sichuan University rebuilt the Yuwenli community after demolishing the old buildings on the former Sichuan University campus for overall construction planning as well as for the improvement of faculty and staff accommodation conditions. Before moving into the university's newly constructed Yuwenli community, residents lived within the school district of Sichuan University, but during the handover process, it was discovered that the Yuwenli community no longer belonged to the school district of Sichuan University, but was included within the school district of Sichuan Conservatory of Music. It is worth noting that before the delivery of the house, residents of Yuwenli community know nothing about this information.

Residents believe that this move undermines their original right to acquire quality education resources. This means that the average individual has developed a risk perception of the school district issue and, in a sense, an initial motivation to engage in a protest against the interests of the average individual. In the face of the school district issue, the group of people with such homogeneous perceptions in the same district as the arts and sciences formed a certain size and became a group perception (motivation). The motivation of the general group is between "0 and 0.5", but the "0.5 threshold" is not uncrossable. In reality, the general group is subject to cognitive reconstructions, identity shifts and behavioral shifts due to the influence of other publics in their social network. When the motivation of individual participation becomes zero, the general group turns into a dropout; when the motivation of individual participation breaks through the "0.5 threshold", the interest of the general population increases and the motivation of participation becomes stronger, completing the transformation of "general group - risk group". When the individual's motivation for participation breaks the "0.5 threshold", the interests of the general group increase and the motivation for participation becomes stronger, completing the transformation of "general group - risk group".

2.3.2 Stage 2: Risk Group - Potential Resisters

After the agreement was reached, the residents went to the Sichuan University Office and the Education Committee of the Wuhou District to complain about the matter several times, and later submitted a joint petition on "restoring the school places of Sichuan University Affiliated Primary School", proposing "adjusting the enrollment scope of Sichuan University Affiliated Primary School, including the Yuwenli community into the school district of Sichuan University Affiliated Primary School, and restoring the school district of the Yuwenli community".

After the risk group expresses its demands, further changes in public behavioral decisions occur under the combined influence of the risk governance body's awareness of communication, the governance effectiveness of public opinion, the role of opinion leaders and the degree of satisfaction of public demands: "risk group - exiters", "risk group - general group" and "risk group - potential resisters". In this case, the Board of Education did not respond positively during the pre-petition stage, nor did it investigate the matter on the ground to coordinate a resolution. As a result, the residents' complaints were not taken seriously in the early stage; at the later stage, the faculty members jointly submitted a petition for the restoration of Sichuan University Primary School places, but the response given by the Board of Education did not convince the faculty. In this context, a further transformation of the risk group occurred. The triangular distribution is characterized by the ease of obtaining exact

boundary properties through the smallest, most probable value. Assuming that the participation motive P is likely to resisting obey the triangular distribution function, through consultation with relevant experts and based on reliable information and historical data, when P<0.2, the transition from "risk group" to "exiters" is completed; when 0.2≤P<0.5,the transition from "risk group" to "general group" is completed; when P≥0.5, the transition from "risk group" to "potential resisters" is completed.

2.3.3 Stage 3: Potential Resisters - Active Resisters, Potential Resisters - Exiters, Active Resisters - Exiters

Further behavioral evolution of potential resisters at this stage occurs under the combined effect of the credibility of the risk governors and its choice of strategy, media information, and the direction of public opinion. In this case, residents' dissatisfaction intensified in the face of the response from the Board of Education and the school. Some of the owners proposed an initiative in the initiative letter "To the Good Neighbors of Yuwenli" - to gather a crowd under the administration building of Sichuan University to negotiate with the university and the Education Commission. The thought that "the more people, the greater the influence, the more important this matter" was highlighted. Due to the timely intervention of the risk governors, the balance was temporarily maintained by stabilizing the leader in private, pressuring the faculty with their status, and making partial compromises. In the same way as in the previous setting, if potential resistance P actively resisting obeys the triangular distribution function, it is also assumed that: when P < 0.2, "potential resisters - exiters" is chosen; when 0.2 ≤ P < 0.8, "potential resisters -general group"; when P ≥ 0.8, "potential resisters - active resisters" is chosen.

3. Research Process

3.1 Design of Simulation Platform

System simulation displays the evolution of events that occur in real systems by a model, and verify facts that already exist or may occur through experiments of this model. In this paper, a simulation platform for the evolution of rights safeguarding event of school district housing is designed in a Anylogic software, based on the setting of relevant conditions and the identification of the key factors inherently driving them. After setting the parameters and relevant variables, the platform is running.
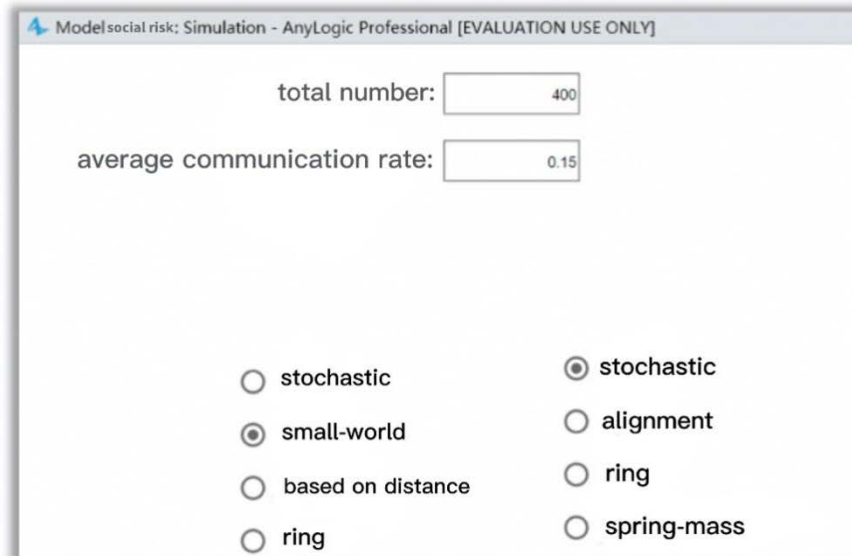

Fig.2 Simulation Platform Design

3.2 Predetermination of Experimental Conditions

In order to ensure the simulation platform works successfully and simulate the evolution rule of members' number with condition changes, the evolutionary conditions need to be predetermined.

3.2.1 General Parameters

In this stage, the total number of members, the average communication rate and the type of relational network are predetermined.

Firstly, according to the interviews, more than three WeChat groups are relevant to this event. After examining the members, the number of participants is approximately 400.

Second, the type of public relationship network is "small-world". The clustering coefficient and the average path length are two major indicators currently used to examine the small-world phenomenon. The residents of the school district housing rights case are more often communicate by WeChat group, and they live close with each other. Therefore, the network has a strong cohesion. The public relationship network type is small-world type.

Thirdly, the average communication rate is 0. 15. Referring to Ms. Henxia' s article, the two social risk situations are similar, the communication methods are similar. Residents are seamlessly connected between reality and the internet, which is in line with the small world condition. So the average communication rate is set at 0. 15.

3.2.2 Time of Behavioural Transformation

In this case, the transformation of the public' s behavioral strategy follows this rule: in the initial state of the rights defense incident, due to the different level of the motivation to participate, public can be divided into the general population and potential protesters; In the small-world type relationship network, due to the interaction of public emotions, the motivation of general population strengthens inevitably if governments don't take action to prevent it. At this condition, they tend to be potential protesters; Then, under the combined influence of factors such as the strategic choice of governments and the public opinion, potential protesters will further evolve into active protesters. When the number of protesters reaches the boundary, it will evolve into a large- -scale protest event.

However, during the process, the individual strategy choices are different due to personal interest and external factors. In the case of the general population, they will choose to resist or withdraw according to the intensity of motivation. In the case of potential resisters, they will choose to resist directly or withdraw. In the case of active resisters, they will choose to withdraw when the propensity to withdraw is high.

In terms of the duration of the event, there is not a long period from the starting state to the white-hot phase. Therefore, based on the case in this paper, the duration is from early June to late July, approximately 45 days. It is assumed that the average time from at-risk population to potential protesters is 10 days; the average time from potential protesters to active protesters is 30 days and the average time required for active protesters to exit is 8 days.

3.2.3 Major Factors of Behavioral Transformation

Shifts in public behavioral strategies are influenced by media opinion and governmental behaviors and attitudes. Set q1 for low government credibility, q2 for negative government communication, q3 for passive government strategy choice, and q4 for negative media coverage. When q1, q2, q3 and q4 add up to a certain value, i. e. q reaches a certain value, it will cause further transformation of the public state.

3.3 Analysis of Simulation Results

After running the simulation platform according to the previous settings, the evolution of the public condition at each stage is dynamically presented in the software.

There is a tendency for the risk evolution time to be prolonged because of the intervention of a key factor q. When the conflict occurs, due to the combined effect of q1, q2, q3 and q4, the first eight days become the risk accumulation stage, where the general population, potential protesters, quitters and active protesters interact with each other and reach a consensus on protesting, and more people become active protesters; Within the 10th-45th days, the motivation of public participations further strengthens, and the number of active protesters and the general population increase during this period, while the majority of people remain on the sidelines; When the risk builds up and reaches a certain number, in the last five days or so, the social risk is transformed into a public crisis. The number of active protesters reach the peak, and social crisis happens.
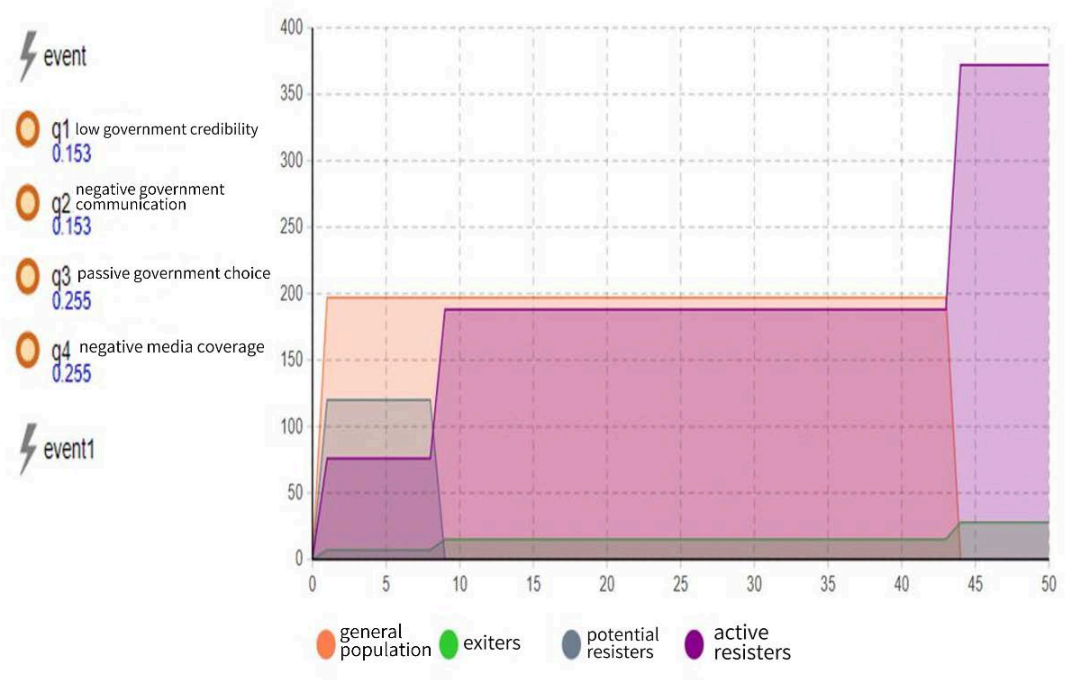

Fig.3 Simulation Platform Operation

4. Conclusions

According to the results of the simulation analysis, the interaction between the government behavior and the public opinion has an important impact on the evolution of social stability risks. In other words, it has a catalytic effect on the fermentation of the rights defense incident. During this process, public tends to behave in a protesting manner.

There are three stages in the evolution of social stability risks: the latent phase, the continuing fermentation phase, and the white-hot phase. The main factors that influence the public behavioral changes in these three stages include the attitude of government, the credibility of government, the strategic choice of government, the behavior of opinion leaders and the negative media coverage. As these factors are obvious, risk management agents can improve the capability of preventing social risk, which is based on the risk evolution stages.

4.1 The Latent Phase

Firstly, we should deal with the original factor. Solving the problem about the inequality of education through promoting the equalization of educational resources. Secondly, it is important to strengthen the communication between various departments, increase the extent of information disclosure, establish an information sharing platform for the public. So that every property owner can obtain complete and truthful information about the school district before purchasing a house;   Thirdly,

in order to increase the level of public participation and reflect will of public in policies, we need to strengthen the institution building in social governance and improve the law-based social governance model under which Party committees exercise leadership, government assumes responsibility, non-governmental actors provide assistance, and the public get involved.

4.2 The Continuing Fermentation Phase

At this stage, firstly, the government should adopt a proactive strategic choice and establish a specialized handling mechanism with the purpose of calming the incident down. Plus, governments should make good use of media to publish relevant information and avoid the negative fermentation of online public opinion.

4.3 The White-Hot Phase

In this stage, it is necessary to formulate a strategy to control and handle the serious situation. Government should pay attention to the strategy choice of the opinion leaders. It is advisable to accurately identify the core demands of the opinion leaders and negotiate with them, so that attitude of the opinion leaders can be changed to be more peaceful. A positive attitude of the opinion leaders can effectively stabilize the suspicion and panic of the tenants and avoid further intensification of the events.

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