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Research Article

Analysis of the Game Behavior of Smart Community Regulatory Participants to Co-Create the Smart City: Post-Human Stakeholder Perspectives

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The sustainable development of smart community is the key to China's grassroots governance and also the general trend of China's urban modernization. In the supervision of the smart community, the optimization of the behavior of the regulatory subject cannot be separated. Previous studies have focused more on how subjects participate in supervision and less on the behavior of stakeholders in the game. This paper analyzes the game behavior of regulatory participants in the process of sustainable development of smart community and studies the optimization strategy of regulatory behavior according to the game behavior logic among participants. The results show the following. (i) Government behavior plays a leading role in supervision. (ii) When the government invests resources in the screening of third-party evaluation agencies and service purchase and mainly adopts policy punishment methods for stakeholders with rent-seeking behavior, the probability of regulatory participation stakeholders' positive behavior is the greatest. (iii) The improvements should be made from the aspects of information network construction, the refinement of reward and punishment measures, and the improvement of evaluation party access rules. This not only helps to enhance the good supervision situation of the supervision enthusiasm of the participants but also can realize the self-discipline operation of the smart community and enhance the responsibility consciousness of the evaluation institutions.

1. Introduction

At present, the rapid growth of urban smart community population is an important trend of smart community development in China. China is facing the current situation of sudden increase in urban population and increasing pressure on smart community management. China has given a positive response and support to the construction of the smart community management system and the improvement of the supervision of smart community services [1] and issued a series of policies to help promote the sustainable development of smart communities. For example, the opinions on deepening the construction of smart communities jointly issued by nine government departments in China put forward the requirements of strengthening the supervision of smart community services [2]. The opinions of the Ministry of Civil Affairs on vigorously cultivating and developing smart community social organizations issued by the Ministry of Civil Affairs clarify the overall requirements for the cultivation of smart community [3].

With the continuous improvement of the legal supervision of smart community, the operation of smart community is also gradually optimized, and the service supply of smart community is also moving towards high quality. At the same time, the strict supervision of the smart community provides a reliable guarantee for the sustainable development of the communities. Although the regulatory problem of wisdom community has been the focus of the relevant

government departments, there are still problems in the wisdom community regulation, such as the legal pertinence of the weak supervision system, the criticism of the supervision subject, the light practice of the supervision law, the lack of feedback mechanism and feedback mechanism setting in the supervision process, and the weak awareness of the system supervision of the community residents. These practical problems become the crux of the wisdom community regulation and also greatly hinder the healthy development of wisdom community [4].

From the current model of smart community supervision, China still adopts the model of trinity supervision of the government and the market society. According to the current regulatory effect, the multi-subject regulatory model still needs to be improved. As the leader of smart community supervision, the government should carry out active supervision from the aspects of legislation, supervision, government purchase evaluation services, and so on. However, when it comes to purchasing regulatory services, there is rent-seeking behavior in smart communities. Therefore, the strict supervision of the smart community depends only on the supervision of the government, which is not enough to form a perfect regulatory system. To promote the upgrading of the supervision level, we should focus on coordinating the game behavior of multiple subjects.

At present, the research on the supervision of smart community is mainly conducted from two perspectives: differences in game behavior of different participants and factors influencing game behavior [6]. From the perspective of the differences in the game behaviors of different participants, the game behavior in the regulation will produce different effects with the participation or withdrawal of different subjects [7]. In the policy dissemination of employment supervision, if the employee as the subject of the game is not considered, the effect of mutually beneficial policy communication will be greatly reduced. Similarly, in the process of financial product supervision, it is more conducive to strengthening the timeliness of supervision when they join the weak investors in the game [8]. Scholars show that the behavior differences of different game subjects are closely related to process of the game. When the subject of the game is comprehensively considered, the study of regulatory effectiveness will open up new ideas [9]. These statements provide the logical basis for a comprehensive consideration by the participants.

From the perspective of game behavior factors, scholars have found that in the process of regulatory game, information asymmetry, incentive policy, the interests of the resource allocation, and commitment and effectiveness of threat are important factors affecting game behavior. The number of the game will change the behavior of the subject, so how to change the repetition of the game to grasp the effect of regulation is also valuable research direction [10].

According to the theoretical basis of the above scholars, this study, from the comprehensive consideration of the participants, not only identifies the third-party evaluation agency as one of the game subjects but also extends the new research perspective and focuses the problem on the supervision of government purchase. This study constructs the game model to clarify the role of each stakeholder in regulation. In addition, the paper analyzes the key factors affecting the game behavior of each subject and provides theoretical contributions for subsequent research.

Based on the principal-agent theory and the evolutionary game theory, the rest of this paper is organized as follows. Section 2 proposes the theoretical background and determines the stakeholders of the game. The game behavior analysis of multiple participants in smart community supervision is described in Section 3, and Section 4 describes the simulation analysis of the game behavior of participants in smart community supervision. Section 5 proposes countermeasures in view of research. Finally, in Section 6, the theoretical implications and limitations of this study and the direction of future research are briefly discussed.

2. Theoretical Basis and Subject Determination

2.1. Theoretical Basis

2.1.1. Analysis Based on Principal-Agent Theory and Supervision of Smart Community. Principal-agent theory was proposed in 1976 by American scholars Jensen and Meeking. The theory aims to study the restriction mechanism between the principal and the agent and the optimal way to complete the contractual relationship between the two sides. Regulators and agents often have information asymmetry in regulation, and thus the conflict can be analyzed by the principal-agent theory. The research, development, and extensive application of the principal-agent theory in China mainly focuses on the supervision of investment and financing platforms, supply chain supervision, and PPP projects. The application of principal-agent theory in the supervision process of government procurement behavior is very common. From the perspective of the applicability of wisdom community regulation research, wisdom community regulation exists and government purchases third-party evaluation agency services, in order to optimize the supervision process. In the evaluation process of the third party, the government seeks to maximize regulatory benefits, and evaluation agencies may, because of the wisdom community rent-seeking behavior, choose not to give the actual evaluation results [11], which leads to conflicts of interest between the government, agency, and the wisdom community, thus affecting the effect of regulation. It can be seen that the principal-agent theory has applicability and theoretical support value in the research of intelligent community supervision.

2.1.2. Analysis on the Behavior of Evolutionary Game Theory and Multiple Participants Based on Smart Community. Evolutionary game theory is gradually developed from Darwin's evolution theory and Lamarck's genetics theory and refers to the process in which game parties reach a stable equilibrium state through long-term dynamic evolution. At present, Chinese scholars have deeply studied and established the evolutionary game model, including the financial platform supply and demand cooperation strategy model [12], the product quality tripartite supervision model, the

Internet multi-regulatory game model, and the environmental multi-party cooperative protection game model. From the perspective of the applicability of evolutionary game theory in the research of intelligent community regulation, due to the information asymmetry and uncertainty, the intelligent community and third-party government procurement evaluation agencies have the characteristics of limited rationality, thus forming a stable state among multiple subjects.

2.2. Determination of Regulatory Participants

2.2.1. The Government. As an important subject of quality supervision of smart community service, the government is responsible for ensuring the service level of smart community. Note that the Chinese government in wisdom community regulatory way has certain Chinese characteristics [8]. First of all, the combination of political parties and governments and supervision models responds to Xi Jinping's new socialist and Chinese characteristics [13]. Moreover, the government should strengthen the supervision of community institutions from the ideological and political aspects. Second, community residents introduce the situation of residents' participation and government supervision through online platforms. Therefore, in this study, the definition of government covers three aspects: civil affairs departments, grassroots party organizations, and community residents. This is a unique way that Chinese party organizations and government organizations coordinate and actively participate in the community residents to carry out the supervision work from the bottom up [14].

2.2.2. Smart Community. Smart community relies on advanced technology systems to provide intelligent services to community residents. In the regulatory game by regulators, compared with the general community, especially smart community, there is a need for more intelligent technology and personalized services to support operations, so the regulation of smart community needs a third-party professional to conduct comprehensive evaluation [15]. The research on smart community supervision shows that, first of all, the strategy of government purchasing regulatory services has been widely used in practice. However, when the government buys evaluation services, the smart community has rent-seeking behavior from third parties, which affects the regulatory effect. Secondly, from the perspective of community resource allocation, it can be seen that there is unbalanced allocation of resources caused by regional advantages and policy support in China [16]. How to coordinate and integrate resources to ensure their sustainable development will become a new problem faced by smart communities. Thus, it can be seen that, as the recipient of supervision, the subject position of smart community in the supervision process is beyond doubt.

2.2.3. Third-Party Professional Evaluation Agency. At present, the main way for China's third-party evaluation agencies to participate in the supervision of smart communities is for the government to purchase. That is, the government gives part of the professional content to for-profit evaluation agencies to evaluate and obtain results, so as to achieve the effect of professional supervision [17]. Therefore, for the supervision of smart communities and even various industries, the third-party professional evaluation institutions are all important regulatory participants, which not only undertake professional regulatory capabilities but also supplement a part of the regulatory functions of the government [18].

3. Analysis of Game Behavior of Multiple Participants in Smart Community Supervision

3.1. Behavior Model and Assumption Construction of Multiple Participants. In the supervision process of smart communities, civil affairs departments generally adopt the method of government procurement to involve third-party institutions in the supervision of insufficient professional supervision content. In response to regulation, smart communities may exhibit rent-seeking behavior in agency assessments to increase self-interest. In order to seek their own survival and development, the third-party organization is faced with the choice of whether to accept the rent-seeking of the smart community. The regulatory behavior of the third-party organization in the smart community occurs directly, and compliance with the evaluation process will also have an important impact on the regulatory effect. This is the logic of the game behavior of the government, smart community, and third-party organizations in the process of smart community supervision. The relationship between the three is shown in Figure 1. The solid line indicates that regulatory behavior will inevitably occur, and the dotted line indicates that regulatory behavior will occur randomly.

Assumption 1. In regulation, the government enters participant x, the smart community as participant y, and the third-party evaluation agency as participant z. The behavior selection of the three subjects is a dynamic process in the short-term process. With the increase of the number of repeated games, the process will stabilize and finally form the optimal strategy.

Assumption 2. The government's behavior in the regulatory process includes (strict regulation, loose regulation). Under the strict regulatory strategy, the government conducts sampling inspections of the smart community assessed by the third-party organizations. Under the loose regulation strategy, the government's regulatory awareness is not strong, and it fully accepts the evaluation results of the third-party institutions.

Assumption 3. The smart community strategy selection is (self-discipline, not self-discipline), and the smart community meets operating standards and will cooperate truthfully with the supervision and evaluation of the third-

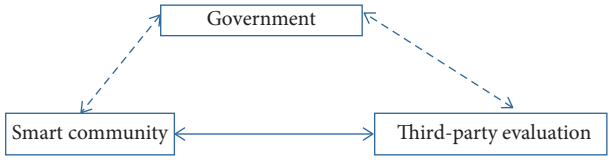

Figure 1: Game behavior of smart community regulatory participants.

party organization, without producing rent-seeking behavior. In the state of not self-discipline, the smart community cannot meet operating standards and will choose to seek rent from the third party to avoid punishment by the civil affairs authorities.

Assumption 4. Professional evaluation agencies in the game process accept or refuse rent-seeking behaviors. If they choose to accept, the third-party organization will deliberately relax standards in the regulatory process, and it is possible to modify and optimize the smart community. If the third-party organization chooses to refuse, it will adhere to strict regulatory standards, according to the requirements of the government evaluation, and obtain scientific and reasonable evaluation results.

Assumption 5. When the government, smart community, and third-party assessors are in the initial stages of the game, the possibility of active regulatory behavior is x ($x \in [0, 1]$), if the "loose regulation" is 1-x; similarly, the possibility of self-regulatory behavior is y ($y \in [0, 1]$). When "not self-discipline," the ratio is 1-y; when the third-party assessors adopt "refuse rent-seeking" strategy, z ($z \in [0, 1]$) and "accept rent-seeking" is 1-z.

Assumption 6. The relevant parameters of the government, the smart community, and third-party professional evaluation agencies in the smart community regulatory order are set out in Table 1.

According to the above parameters and assumptions, construct the interests of government, smart community, and third-party professional evaluation agencies as shown in Table 2.

3.2. Analysis of the Behavior and Strategy of External Regulatory Participants. Based on Table 2, we get the following.

3.2.1. Copy Dynamic Analysis of Government Behavior Choice. For the government, assuming that when the government behavior is "strict regulation," the gain is L_1, and the behavior is "loose regulation," the gain obtained is L_2, and $\overline{L}$ represents the average of earnings, calculated by columns, and the expression of $L_1, L_2, \overline{L}$ is

$$\begin{aligned} L_1 &= zy\left(P_x - C_{x1} - P_{y2} + C_{z2}\right) + z(1-y)\left(P_x - C_{x1} + C_{y4} + C_{z2}\right) \\ &\quad + (1-z)y\left(P_x - C_{x1} - P_{y2} - P_{z3}\right) + (1-z)(1-y)\left(P_x - C_{x1} - P_{z3} + C_{y4}\right) \\ &= z\left(2C_{x1} + C_{z2} + P_{z3}\right) - y\left(P_{y2} + C_{y4}\right) + P_x + C_{y4} - C_{x1} - P_{z3}, \\ L_2 &= zy\left(-R_x - C_{x2}\right) + z(1-y)\left(-R_x - C_{x2}\right) + (1-z)y\left(-R_x - C_{x2}\right) \\ &\quad + (1-z)(1-y)\left(-R_x - C_{x2}\right) \\ &= -R_x - C_{x2}, \\ \overline{L} &= xR_1 + (1-x)R_2. \end{aligned} \tag{1}$$

It can be concluded that the dynamic equation of government replication is

$$\begin{aligned} F(x) &= \frac{d(x)}{d(t)} \\ &= xR_1 - \overline{R} \\ &= x(1-x)\begin{bmatrix} z\left(2C_{x1} + C_{z2} + P_{z3}\right) - y\left(P_{y2} + C_{y4}\right) + \\ P_x + C_{y4} - C_{x1} - C_{x2} - P_{z3} - R_x \end{bmatrix}. \end{aligned} \tag{2}$$

This is now available for the $F(x)$ guidance:

$$F'(x) = (1-2x)\begin{bmatrix} z\left(2C_{x1} + C_{z2} + P_{z3}\right) - y\left(P_{y2} + C_{y4}\right) + \\ P_x + C_{y4} - C_{x1} - C_{x2} - P_{z3} - R_x \end{bmatrix}. \tag{3}$$

The stability principle of the equation states that only if $F(x) = 0$ and $dF(x)/\mathrm{d}(x) < 0$, a stable strategy can be formed.

Conclusion 1

$$z\left(2C_{x1} + C_{z2} + P_{z3}\right) - y\left(P_{y2} + C_{y4}\right) + P_x + C_{y4} - C_{x1} - C_{x2} - P_{z3} - R_x = 0. \tag{4}$$

Table 1: Parameter symbols and significance.

Parameter	Significance
P_x	The public gains made when the government actively regulates $P_x > R_x$
R_x	Public welfare loss when the government supervises loosely
C_{x1}	The cost of regulation paid for when the government actively regulates it ($C_{x1} > C_{x2}$)
C_{x2}	The cost of regulation incurred when the government regulates it loosely
P_{y1}	Normal income from the operation of smart community
P_{y2}	When the government strictly supervises, it gives smart community self-discipline management rewards ($P_{y2} > P_{y3}$)
P_{y3}	Additional credit benefits derived from the self-management of smart community
P_{y4}	Additional benefits earned when smart community is not disciplined
C_{y1}	The cost of the smart community in self-regulation
C_{y2}	The cost of smart community paying when they are not disciplined
C_{y3}	Additional costs incurred when smart community is not self-disciplined (including rent-seeking costs)
C_{y4}	Punishment of smart community for not being self-disciplined when the government strictly supervises them (including penalties for rent-seeking activities)
P_{z1}	Normal income of third parties
P_{z2}	Third parties accept additional proceeds from rent-seeking
P_{z3}	Rewards for refusing rent-seeking to third parties when governments actively regulate them
C_{z1}	Cost of third-party supervision (assuming equal rent-seeking)
C_{z2}	Third-party agencies accept rent-seeking penalties when the government strictly supervises them

Under the circumstances, $F(x) = 0$, and it means that, regardless of any value taken by x, the choice of the government does not change due to the change of time, which is an equilibrium and stable state.

Conclusion 2. In this case, it can be seen that at this point, $x = 1$ is the stable point. That is, when the smart community chooses not self-discipline operation, the third-party institutions choose to accept rent-seeking. The government's active regulation of public benefits outweighs the regulatory cost. At the same time, due to the lack of self-discipline in the smart community and the refusal of third-party institutions to rent-seeking. The government, without additional spending incentives, chose active regulation as the optimal strategy.

Conclusion 3.

$$z\left(2C_{x1} + C_{z2} + P_{z3}\right) - y\left(P_{y2} + C_{y4}\right) + P_x + C_{y4} - C_{x1} - C_{x2} - P_{z3} - R_x < 0. \tag{5}$$

It can be seen that smart communities choose self-discipline management, while third-party institutions choose not to accept rent-seeking. The government is regulating behaviour. Public revenue is less than the sum of the additional spending and positive regulatory costs awarded by smart communities and third-party agencies. In the case of stability point for $x = 0$, the government negative regulatory behavior can achieve higher returns.

It can be seen from the above conclusions that the choice of government regulatory behavior has a certain synergistic relationship with the behavior of smart community and third-party professional evaluation agencies, and the choice of government behavior is influenced by the game behavior of other subjects.

3.2.2. Copy and Dynamic Analysis of Smart Community Behavior Selection. For smart community, the benefit of smart community in choosing the "self-discipline management" behavior is N_1, the benefit of choosing the "undisciplined management" behavior is N_2, and the average return is $\overline{N}$; when smart community chooses different behaviors, N_1, N_2, $\overline{N}$, the expression is as follows.

The expected return of smart community when choosing "self-discipline management" is

$$\begin{aligned} N_1 &= xz\left(P_{y1} + P_{y2} + P_{y3} - C_{y1}\right) + x(1-z)\left(P_{y1} + P_{y2} + P_{y3} - C_{y1}\right) + \\ &\quad (1-x)z\left(P_{y1} + P_{y2} + P_{y3} - C_{y1}\right) + (1-x)(1-z)\left(P_{y1} + P_{y3} - C_{y1}\right) \\ &= x(1-z)P_{y2} + zP_{y2} + P_{y1} + P_{y3} - C_{y1}. \end{aligned} \tag{6}$$

Table 2: Income matrix of government, smart community, and third-party professional appraisal agencies.

		Smart community Y	Government X	
			Strict supervision	Loose supervision
Third-party institution z	Refuse rent-seeking	Self-discipline	$P_x - C_{x1} - P_{y2} - P_{z3}$ $P_{y1} + P_{y2} + P_{y3} - C_{y1}$ $P_{z1} + P_{z3} - C_{z1}$	$-R_x - C_{x2}$ $P_{y1} + P_{y3} - C_{y1}$ $P_{z1} - C_{Z1}$
		Without self-discipline	$P_x - C_{x1} - P_{z3} + C_{y4}$ $P_{y1} + P_{y4} - C_{y2} - C_{y3} - C_{y4}$ $P_{z1} + P_{z3} - C_{z1}$	$-R_x - C_{x2}$ $P_{y1} + P_{y4} - C_{y2} - C_{y3}$ $P_{z1} - C_{Z1}$
	Accept rent-seeking	Self-discipline	$P_x - C_{x1} - P_{y2} + C_{z2}$ $P_{y1} + P_{y2} + P_{y3} - C_{y1}$ $P_{z1} + P_{z2} - C_{z1} - C_{z2}$	$-R_x - C_{x2}$ $P_{y1} + P_{y2} + P_{y3} - C_{y1}$ $P_{z1} + P_{z2} - C_{Z1}$
		Without self-discipline	$P_x - C_{x1} + C_{y4} + C_{z2}$ $P_{y1} + P_{y4} - C_{y2} - C_{y3} - C_{y4}$ $P_{z1} + P_{z2} - C_{z1} - C_{z2}$	$-R_x - C_{x2}$ $P_{y1} + P_{y4} - C_{y2} - C_{y3}$ $P_{z1} + P_{z2} - C_{Z1}$

The expected income of smart community to choose "operating without self-discipline" is

$$\begin{aligned} N_2 &= xz\left(P_{y1}+P_{y4}-C_{y2}-C_{y3}-C_{y4}\right)+x(1-z)\left(P_{y1}+P_{y4}-C_{y2}-C_{y3}-C_{y4}\right)+\\ &(1-x)z\left(P_{y1}+P_{y4}-C_{y2}-C_{y3}\right)+(1-x)(1-z)\left(P_{y1}+P_{y4}-C_{y2}-C_{y3}\right)\\ &=-xC_{y4}+P_{y1}+P_{y4}-C_{y2}-C_{y3}. \end{aligned} \tag{7}$$

The average expected return for a smart community is

$$\overline{N}=yN_1+(1-y)N_2. \tag{8}$$

The replication dynamic equation for smart community behavior selection is

$$\begin{aligned} F(x)&=\frac{\mathrm{d}(x)}{\mathrm{d}(t)}\\ &=yN_1-\overline{N}\\ &=y(1-y)\begin{bmatrix} x(1-z)P_{y2}+zP_{y2}+P_{y3}-\\ C_{y1}+xC_{y4}-P_{y4}+C_{y2}+C_{y3}\end{bmatrix}. \end{aligned} \tag{9}$$

When $F(y)$ guide is available,

$$F'(y)=(1-2y)\begin{bmatrix} x(1-z)P_{y2}+zP_{y2}+P_{y3}-C_{y1}+\\ xC_{y4}-P_{y4}+C_{y2}+C_{y3}\end{bmatrix}. \tag{10}$$

The equation stability principle states that the policy stability requirement is $F(y)=0$ and $\mathrm{d}F(y)/\mathrm{d}(y)<0$.

Conclusion 4. At that time, $x(1-z)P_{y2}+zP_{y2}+P_{y3}-C_{y1}+xC_{y4}-P_{y4}+C_{y2}+C_{y3}=0$, $F(y)=0$, and when the value of y is constantly changing, the behavior change of the smart community cannot affect the stable equilibrium state.

Conclusion 5. At that time, $x(1-z)P_{y2}+zP_{y2}+P_{y3}-C_{y1}+xC_{y4}-P_{y4}+C_{y2}+C_{y3}>0$, $F'(0)>0, F'(1)<0$, and in this case, the stabilization point is $y=1$. It means that when the government behavior is strict supervision and the behavior of the third-party organization does not accept rent-seeking by the smart community, the rewards of self-discipline and additional credit benefits obtained by the smart community are greater than their cost, and the smart community will tend to self-operate to maximize their own interests.

Conclusion 6. At that time, $x(1-z)P_{y2}+zP_{y2}+P_{y3}-C_{y1}+xC_{y4}-P_{y4}+C_{y2}+C_{y3}<0 F'(0)<0, F'(1)>0$, and in this case, it can be seen that the normal profit of smart community, reputation income, is less than its operating cost, so it is the best strategy.

3.2.3. Copy Dynamic Analysis of the Selection Strategy of the Third-Party Evaluation Agencies. For the third-party appraisal agency, the third-party appraisal agency is "refuse rent-seeking," its income is S_1, the revenue from adopting the "accept rent-seeking" strategy is S_2, and the average return is $\overline{S}$, and when a third party chooses a different behavior, S_1, S_2, $\overline{S}$, the expression is as follows.

When a third party "rejects rent-seeking," S_1 is

$$\begin{aligned} S_1 &= xy\left(P_{z1}+P_{z3}-C_{z1}\right)+x(1-y)\left(P_{z1}+P_{z3}-C_{z1}\right)+\\ &(1-x)y\left(P_{z1}-C_{Z1}\right)+(1-x)(1-y)\left(P_{z1}-C_{Z1}\right)\\ &=xP_{z3}+P_{z1}-C_{Z1}. \end{aligned} \tag{11}$$

When a third party chooses "accept rent-seeking," S_2 is

$$\begin{aligned} S_2 &= xy\left(P_{z1}+P_{z2}-C_{z1}-C_{z2}\right)+x(1-y)\left(P_{z1}+P_{z2}-C_{z1}-C_{z2}\right)+\\ &(1-x)y\left(P_{z1}+P_{z2}-C_{z1}\right)+(1-x)(1-y)\left(P_{z1}+P_{z2}-C_{z1}\right)\\ &=-xC_{z2}+P_{z1}+P_{z2}-C_{z1}. \end{aligned} \tag{12}$$

The average expected income for a third party is

$$\begin{aligned}\overline{S} &= zS_1 + (1-z)S_2\\ F(x) &= \frac{\mathrm{d}(x)}{\mathrm{d}(t)}\\ &= zS_1 - \overline{S}\\ &= z(1-z)\left[x\left(P_{z3}+C_{z2}\right)-P_{z2}\right].\end{aligned} \tag{13}$$

The derivative of $F(z)$ is

$$F^{'}(z) = (1-2z)\left[x\left(P_{z3}+C_{z2}\right)-P_{z2}\right]. \tag{14}$$

The stability conditions for behavioral selection at this time are

$$\begin{aligned}F(z) &= 0,\\ \frac{\mathrm{d}F(z)}{\mathrm{d}(z)} &< 0.\end{aligned} \tag{15}$$

Conclusion 7. At that time, $x(P_{z3}+C_{z2})-P_{z2}=0$, $F(z)=0$, and the value change of z and the behavior choice change of the third-party professional evaluation institutions cannot affect the equilibrium and stable state.

Conclusion 8. At that time, $x(P_{z3}+C_{z2})-P_{z2}<0$, $F^{'}(0)<0, F^{'}(1)>0$, and in this case, stable point: $x=1$. At this time, if the government actively regulates the behavior, the third party gets the punishment of accepting rent-seeking more than the reward of refusing to accept rent-seeking. At this time, the third party chooses to refuse rent-seeking as the best strategy.

Conclusion 9. At that time, $x(P_{z3}+C_{z2})-P_{z2}>0$, $F^{'}(0)>0, F^{'}(1)<0$, and in this case, when the third party accepts rent-seeking, the additional profit received is greater than the punishment received. Even if the government adopts strict supervision, the third party receives less punishment than its profit, and then the third party chooses to accept rent-seeking as optimal strategy.

3.3. Stability Analysis of Behavior Selection by Government, Smart Community, and Third-Party Professional Evaluation Agencies. According to the stability strategy, the three equations equal to 0, and x, y, and z are played. According to the replication dynamic equations of the government, the smart community, and the third-party agency, the equilibrium points of the government, the smart community, and the third-party professional evaluation agency are

$$(0.0.0),\ (0.0.1),\ (0.1.1),\ (0.1.0),\ (1.0.0). \tag{16}$$

Jacobian matrix is used to analyze the stable equilibrium point, and the Jacobian matrix of the government, pension institutions, and third-party institutions can be obtained as follows:

$$J = \begin{bmatrix} (1-2x)\begin{bmatrix} z(2C_{x1}+C_{z2}+P_{z3})-y\left(P_{y2}+C_{y4}\right)+\\ P_x+C_{y4}-C_{x1}-C_{x2}-P_{z3}-L_x \end{bmatrix} & x(1-x)\left(-P_{y2}-C_{y4}\right) & x(1-x)\left(2C_{x1}+C_{z2}+P_{z3}\right)\\ y(1-y)\left[P_{y2}+C_{y4}-zP_{y2}\right] & (1-2y)\begin{bmatrix} x(1-z)P_{y2}+zP_{y2}+\\ P_{y3}-C_{y1}+xC_{y4}-P_{y4}+C_{y2}+C_{y3} \end{bmatrix} & y(1-y)\left[xP_{y2}+P_{y2}\right]\\ z(1-z)\left(C_{z2}+P_{z3}\right) & -z(1-z)P_{z2} & (1-2z)\left[x\left(P_{z3}+C_{z2}\right)-P_{z2}\right] \end{bmatrix}. \tag{17}$$

The Russian mathematician and mechanic A.M.'s system stability theory states that the condition to meet the stability point of the system is $\delta<0$. When $\delta>0$, the system is unstable. The analysis results are shown in Table 3.

According to the table, when the government, smart community, and third parties are in the coordinated order of the smart community, stable strategies are formed in different situations. The following is a strategy stability analysis for different situations.

Situation 1. The balance point is (0.0.0), that is, when the government supervises loosely, smart community is not self-disciplined, and third-party organizations accept rent-seeking. The constraints to form a stability strategy are

$$\begin{aligned}&P_{\mathrm{x}}-C_{x1}-C_{x2}-R_{\mathrm{x}}-P_{z3}+C_{y4}<0,\\ &C_{\mathrm{y3}}-C_{y1}+C_{y2}-P_{y4}+P_{y3}<0,\\ &-P_{z2}<0.\end{aligned} \tag{18}$$

In this situation, the income of smart community from non-self-disciplined operation is greater than all its costs, and they do not need to bear the punishment costs caused by non-self-disciplined operations. Compared to the cost of self-disciplined operation, it is reduced and income is increased. Therefore, smart community will choose non-self-disciplined operation as their business strategy. For the third party, the benefits of accepting rent-seeking are not only greater than the cost but also do not bear the risk of government punishment.

Table 3: Balance point and the eigenvalues.

Equilibrium point	Characteristic root δ_1	δ_2	δ_3	Fruit	Stability condition	Number
(0, 0, 0)	$P_x + C_{y4} - C_{x1} - C_{x2} - P_{z3} - R_x$	$P_{y3} - C_{y1} - P_{y4} + C_{y2} + C_{y3}$	$-P_{z2}$	ESS	$P_x - C_{x1} - C_{x2} - R_x - P_{z3} + C_{y4} < 0 C_{y3} - C_{y1} + C_{y2} - P_{y4} + P_{y3} < 0 - P_{z2} < 0$	①
(0, 0, 1)	$C_{x1} + C_{z2} + P_x + C_{y4} - C_{x2} - R_x$	$P_{y2} + P_{y3} - C_{y1} - P_{y4} + C_{y2} + C_{y3}$	$P_{z2} P_{z2}$	Instability	$C_{x1} + C_{z2} + P_x + C_{y4} - C_{x2} - R_x < 0 P_{y2} + P_{y3} - C_{y1} - P_{y4} + C_{y2} + C_{y3} < 0 P_{z2} < 0$	—
(0, 1, 1)	$C_{x1} + C_{z2} - P_{y2} + P_x - C_{x2} - R_x$	$-P_{y2} - P_{y3} + C_{y1} + P_{y4} - C_{y2} - C_{y3}$	P_{z2}	Instability	$C_{x1} + C_{z2} - P_{y2} + P_x - C_{x2} - R_x < 0 P_{y2} + P_{y3} - C_{y1} - P_{y4} + C_{y2} + C_{y3} < 0 P_{z2} < 0$	—
(0, 1, 0)	$P_x - P_{y2} - C_{x1} - C_{x2} - P_{z3} - R_x$	$-P_{y3} + C_{y1} + P_{y4} - C_{y2} - C_{y3}$	$-P_{z2}$	ESS	$P_x - P_{y2} - C_{x1} - C_{x2} - P_{z3} - R_x < 0 - P_{y3} + C_{y1} + P_{y4} - C_{y2} - C_{y3} < 0 - P_{z2} < 0$	②
(1, 0, 0)	$-P_x - C_{y4} + C_{x1} + C_{x2} + P_{z3} + R_x$	$P_{y2} + P_{y3} - C_{y1} + C_{y4} - P_{y4} + C_{y2} + C_{y3}$	$P_{z3} + C_{z2} - P_{z2}$	ESS	$-P_x - C_{y4} + C_{x1} + C_{x2} + P_{z3} + R_x < 0 \; P_{y2} + P_{y3} - C_{y1} + C_{y4} - P_{y4} + C_{y2} + C_{y3} < 0 \; P_{z3} + C_{z2} - P_{z2} < 0$	③
(1, 0, 1)	$-C_{x1} - C_{z2} - P_x - C_{y4} + C_{x2} + R_x$	$P_{y2} + P_{y3} - C_{y1} + xC_{y4} - P_{y4} + C_{y2} + C_{y3}$	$-P_{z3} - C_{z2} + P_{z2}$	ESS	$-C_{x1} - C_{z2} - P_x - C_{y4} + C_{x2} + R_x < 0 \; P_{y2} + P_{y3} - C_{y1} + C_{y4} - P_{y4} + C_{y2} + C_{y3} < 0 \; -P_{z3} - C_{z2} + P_{z2} < 0$	④
(1, 1, 0)	$-P_x + P_{y2} + C_{x1} + C_{x2} + P_{z3} + R_x$	$-P_{y2} - P_{y3} + C_{y1} - C_{y4} + P_{y4} - C_{y2} - C_{y3}$	$P_{z3} + C_{z2} - P_{z2}$	ESS	$-P_x + P_{y2} + C_{x1} + C_{x2} + P_{z3} + R_x < 0 \; -P_{y2} - P_{y3} + C_{y1} - C_{y4} + P_{y4} - C_{y2} - C_{y3} < 0 \; P_{z3} + C_{z2} - P_{z2} < 0$	⑤
(1, 1, 1)	$-C_{x1} - C_{z2} + P_{y2} + C_{y4} - P_x - C_{y4} + C_{x2} + R_x$	$-P_{y2} - P_{y3} + C_{y1} - C_{y4} + P_{y4} - C_{y2} - C_{y3}$	$-P_{z3} - C_{z2} + P_{z2}$	ESS	$-C_{x1} - C_{z2} + P_{y2} + C_{y4} - P_x - C_{y4} + C_{x2} + R_x < 0 \; -P_{y2} - P_{y3} + C_{y1} - C_{y4} + P_{y4} - C_{y2} - C_{y3} < 0 \; -P_{z3} - C_{z2} + P_{z2} < 0$	⑥

Situation 2. The balance point is (0.1.0), that is, when the government regulates negatively, smart community operates in self-discipline, and third-party organizations accept rent-seeking, the constraints for forming the stability strategy are

$$\begin{aligned} &P_x - P_{y2} - C_{x1} - C_{x2} - P_{z3} - R_x < 0, \\ &- P_{y3} + C_{y1} + P_{y4} - C_{y2} - C_{y3} < 0, \\ &- P_{z2} < 0. \end{aligned} \tag{19}$$

In this case, when the government has a loose regulation behavior, the costs of its supervision and reward are compressed. For the government, revenue from the strict regulation is less than the negative regulation cost. From the perspective of economic benefits, the government will have loose regulation behavior. For smart community, although they cannot get the government reward for their self-discipline management, the harvest of extra credit income and normal income of the sum is greater than the cost of self-discipline management and less than the cost of not self-discipline management, so compared to bearing the cost of rent-seeking and lost customer opportunity cost, the smart community is more inclined to choose self-discipline management to gain profits. This precondition leads to the rent-seeking cost of the third party refusing to take regulatory measures greater than the normal benefits. However, due to the loose regulation of the government, the reward of refusing rent-seeking and the penalty of accepting rent-seeking will not happen. The additional benefits of accepting rent-seeking and the regulatory benefits can always add up to more than the regulatory costs. Therefore, the third party will choose to accept rent-seeking as the optimal strategy.

Situation 3. The balance point is (1.0.0), that is, when the government actively manages, smart community is not self-disciplined to operate, and third-party organizations accept rent-seeking. The constraints to form a stability strategy are

$$\begin{aligned} &- P_x - C_{y4} + C_{x1} + C_{x2} + P_{z3} + R_x < 0, \\ &P_{y2} + P_{y3} - C_{y1} + C_{y4} - \\ &P_{y4} + C_{y2} + C_{y3} < 0, \\ &P_{z3} + C_{z2} - P_{z2} < 0. \end{aligned} \tag{20}$$

In this case, the smart community chooses to self-regulate business revenue. Government incentives and credit income are lower than rent-seeking income. Although the government penalizes smart communities for indiscipline, the penalties are still small relative to rent-seeking income. Therefore, the smart community will choose non-self-regulated management strategies as the best choice. The third party accepting rent-seeking will also be punished by the government, but the income it accepts is greater than the penalty. Therefore, accepting rent-seeking becomes the best choice for third parties. For the government, although the cost of strict supervision is greater than the cost of loose supervision, the public benefits of strict supervision are greater than the cost of supervision. Therefore, under comprehensive consideration, the government will choose active regulation as its behavioral strategy.

Situation 4. The balance point is (1.0.1), that is, when the government strictly supervises, the smart community does not self-regulate the operation, and the third-party organizations refuse to seek rent-seeking. The constraints to form a stability strategy are

$$\begin{aligned} &-C_{x1} - C_{z2} - P_x - \\ &C_{y4} + C_{x2} + R_x < 0, \\ &P_{y2} + P_{y3} - C_{y1} + C_{y4} - P_{y4} + \\ &C_{y2} + C_{y3} < 0, \\ &- P_{z3} - C_{z2} + P_{z2} < 0. \end{aligned} \tag{21}$$

At this point, the government chooses active regulation and does not provide incentives for smart community self-discipline, and the public income and punishment for smart community are greater than the cost of active regulation, although it still wants to give a third party rent-seeking reward; compared with the above benefits, it is still able to obtain benefits, so the government will choose active regulation as optimal strategy. For smart community, the additional income and rent-seeking income from normal operation are greater than the cost, so smart community will choose non-self-discipline operation as a strategy to save costs and obtain more benefits. For the third-party institutions, under the strategy of government active regulation strategy, if the third party accepted rent-seeking, the punishment is greater than normal, additional income, and the third-party operating income and government incentives are greater than the regulatory cost, so regardless of cost or benefit, it chooses to refuse rent-seeking which is the best strategy of the third party.

Situation 5. The balance point is (1.1.0), that is, when the government strictly supervises, smart community self-operates, and third parties accept rent-seeking, the constraints for forming the stability strategy are

$$\begin{aligned} &-P_x + P_{y2} + C_{x1} + C_{x2} + \\ &P_{z3} + R_x < 0, \\ &-P_{y2} - P_{y3} + C_{y1} - C_{y4} + \\ &P_{y4} - C_{y2} - C_{y3} < 0, \\ &P_{z3} + C_{z2} - P_{z2} < 0. \end{aligned} \tag{22}$$

When the public income of the government strictly supervises, it is more than the cost of the government and the reward of the smart community for self-regulation, and it can obtain a certain income when punishing the third-party organization, and the government department will choose the strict supervision strategy. From another point of view, if, in this case, the smart community chooses not to operate as self-disciplined, then the cost and punishment of its non-self-disciplined operation are greater than all its benefits. Therefore, considering the different outcomes of

these two strategies, the smart community will choose to operate as self-disciplined. For the third party, accepting rent-seeking benefits will be greater than refusing rent-seeking, and the regulatory cost and punishment are less than accepting rent-seeking benefits. No matter what strategy, the third-party institutions have benefits, and the third party accepts rent-seeking when there is more income. Therefore, the third party chooses to accept rent-seeking as the best strategy.

Situation 6. The balance point is (1.1.1), that is, when the government strictly supervises, the smart community self-operates, and third-party organizations refuse to seek rent, the constraints to form a stability strategy are

$$\begin{aligned} &-C_{x1} - C_{z2} + P_{y2} + C_{y4} - \\ &P_{\mathrm{x}} - C_{y4} + C_{x2} + R_{\mathrm{x}} < 0, \\ &-P_{y2} - P_{y3} + C_{y1} - C_{y4} + \\ &P_{y4} - C_{\mathrm{y2}} - C_{\mathrm{y3}} < 0, \\ &-P_{z3} - C_{z2} + P_{z2} < 0. \end{aligned} \tag{23}$$

If in active regulation, public income is greater than the sum of costs, then the government will choose the strict regulation strategy. At the same time, when the government strictly regulates the smart community, the benefits of self-management, additional credit benefits, and government incentives will be greater than the benefits of self-management. This is greater than the benefits of self-regulation by the intelligent community, which chooses a self-regulation strategy. It is difficult for the third party to obtain government rewards through the smart community self-discipline management and government supervision strategy. Smart communities do not shirk their responsibilities through rent-seeking. The benefits of a third party are greater than their costs and greater than their choice to accept rent-seeking. In this case, the third party chooses to reject the rent-seeking strategy.

Therefore, in smart communities, the stable strategy selection of the government, smart communities, and third-party professional evaluation agencies needs to go through the process of evolutionary game. The change of one agent's behavior is accompanied by the change of other agents' strategy choice. The optimal combination state is (1.1.1), and the following conditions should be met:

$$\begin{aligned} &-C_{x1} - C_{z2} + P_{y2} + C_{y4} - \\ &P_{\mathrm{x}} - C_{y4} + C_{x2} + R_{\mathrm{x}} < 0, \\ &-P_{y2} - P_{y3} + C_{y1} - C_{y4} + \\ &P_{y4} - C_{\mathrm{y2}} - C_{\mathrm{y3}} < 0, \\ &-P_{z3} - C_{z2} + P_{z2} < 0. \end{aligned} \tag{24}$$

4. Simulation and Analysis of the Game Behavior of Regulatory Participants in the Smart Community

In order to achieve the optimal state of the evolution of the game behavior of the smart community regulatory subject (the government strictly supervises, the smart community self-regulation, and third-party organizations do not accept rent-seeking), i.e. ($x = 0$, $y = 1$, $z = 1$), this section attempts to analyze the role of the change in the probability of one party's behavior on the game behavior of other subjects. According to the conclusion of the study, to achieve the ideal state (1.1.1), the following conditions must be met at the same time:

$$\begin{aligned} &-C_{x1} - C_{z2} + P_{y2} + C_{y4} - \\ &P_{\mathrm{x}} - C_{y4} + C_{x2} + R_{\mathrm{x}} < 0, \\ &-P_{y2} - P_{y3} + C_{y1} - C_{y4} + \\ &P_{y4} - C_{\mathrm{y2}} - C_{\mathrm{y3}} < 0, \\ &-P_{z3} - C_{z2} + P_{z2} < 0. \end{aligned} \tag{25}$$

According to the above requirements, set the following parameter values:

$$\begin{aligned} C_{x1} &= 8, \\ C_{x2} &= 6, \\ P_{z3} &= 8, \\ P_{z2} &= 3, \\ P_{\mathrm{x}} &= 15, \\ R_{\mathrm{x}} &= 14, \\ P_{y2} &= 2, \\ P_{y3} &= 1, \\ C_{y4} &= 5, \\ C_{y3} &= 3, \\ C_{y2} &= 6, \\ P_{y4} &= 3, \\ C_{z2} &= 3, \\ C_{y1} &= 4. \end{aligned} \tag{26}$$

In the process of simulation and analysis of the evolutionary game, the value of the game behavior probability of individual subjects will be controlled, so as to verify the change and influence of the game behavior change of other subjects on the subject behavior of the other party.

4.1. Numerical Simulation and Analysis of the Government Game Behavior. Assuming that the initial value of the government, the smart community, and the third party is $x = 0.7, y = 0.4, z = 0.5$, control the initial policy value of the government and change the strategic value of the smart community and the third party. The results are shown in Figure 2.

In the process of evolution, government behavior with game time increases steadily to 1. As can be seen from the simulation results, the proportion of intelligent communities choosing self-discipline and third-party institutions choosing to reject rent-seeking is very small. The government has oscillated between a heavy-handed and light-touch regulatory strategy. However, with the improvement of self-discipline of smart communities and rejection of rent-seeking behavior by third-party organizations, the active supervision behavior of government departments is also improving. Finally, the government chooses active regulation as a stable strategy.

4.2. Numerical Simulation and Analysis of Smart Community Mechanism Game Behavior. Similarly, assuming that the initial value of government, smart community, and third-party organization is $x = 0.7, y = 0.4, z = 0.5$, control the initial policy value of smart community, and change the strategy choice of government and third-party organization. The results are shown in Figure 3.

As can be seen from Figure 3, the proportion of self-discipline management in smart community tends to 1 with the increase of game times. When the probability of the government strictly regulating the strategy is less than 0.5, the choice of smart community and third party strategy will go to 0. When the government probability is greater than 0.5, the choice of the two strategies gradually approaches 1. This situation shows that smart community strategy choices depend on government strategy. When the government chooses to strictly regulate, smart community gradually tends to self-discipline, and the choice of the third party gradually tends to reject rent-seeking strategy.

4.3. Numerical Simulation and Analysis of the Game Behavior of the Third-Party Evaluation Organizations. Similarly, the initial policy value of government, smart community, and third-party organizations is $x = 0.7, y = 0.4, z = 0.5$, and the results are shown in Figure 4.

Control the initial strategic value of third-party institutions and change the strategic proportional value of government and smart community. According to Figure 4, the behavior of third-party institutions is influenced by the behavior of the other two subjects. While the proportion of positive behavior of other subjects continues to increase, the proportion of third-party institutions choosing not to rent-seeking is also approaching 1. Therefore, the strict supervision of the government and the self-disciplined operation of the smart community have an important impact on the probability of the third-party institutions choosing to refuse rent-seeking.

5. Discussion

This section puts forward the strategy of improving participants' behavior in smart community supervision, that is, resource allocation strategy. When regulatory behavior occurs, government departments should invest resources in third-party evaluation agencies screening and service purchase. The government should punish rent-seeking behavior in smart communities. Increasing costs can be used to constrain the misconduct of smart communities and third-party evaluators. As the government's resources in the supervision process are limited, the reasonable allocation of supervision resources can effectively coordinate the game behavior of various subjects and enhance the effectiveness of the supervision of smart community. Supervision should be improved from the introduction of the subject, multi-interest measurement, clear behavioral pain points, and rationalization of incentive and punishment, so as to obtain the supervision effect of low-cost government supervision and self-regulation of smart community, and third-party institutions do not accept rent-seeking.

5.1. Strategies for Government Behavior Improvement. First of all, the government civil affairs department's purchase of third-party evaluation services has consumed part of the cost, and then investing resources to mass repeat sampling smart community evaluation results is not economical. Therefore, the optimization strategy focuses on how to use government resources. On the basis of active supervision, third-party evaluation should maximize the effect and minimize the remaining costs. To achieve the above objectives, we should start from the third party and smart community game behavior, by perfecting the legal system, setting up self-discipline management reward, increasing the punishment of the smart community not self-discipline management, removing the cooperation of third-party rental evaluation agencies, improving the cost of smart community rent-seeking, making its exit from rent-seeking cooperation [19], at the same time strengthening the strict incentive of smart community self-discipline management, and awarding honorary titles to smart community. Secondly, in order to restrain the behavior of third-party professional evaluation institutions, civil affairs departments should raise their entry threshold, establish a trust-breaking system, and severely punish or even eliminate third-party institutions that have evaluated trust-breaking for many times, so as to increase the cost of third-party institutions to accept rent-seeking and form a credible threat. Finally, to regulate the behavior of smart community, the civil affairs department can break the fluke psychology of wavering by increasing the punishment of non-self-discipline operation and giving self-discipline management rewards and avoid their rent-seeking behavior at low cost [20]. From the government's own point of view, it should try to reduce costs after the purchase and evaluation, replace repeated supervision with penalty clauses, and use advance prevention instead of post-investigation.

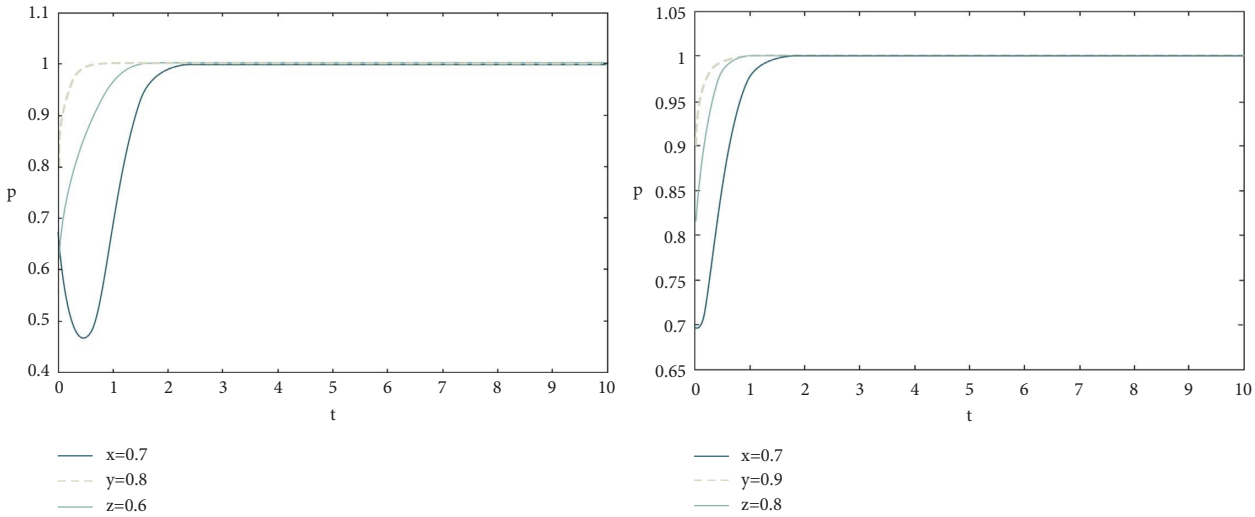

Figure 2: Simulation analysis results of government evolution strategy.

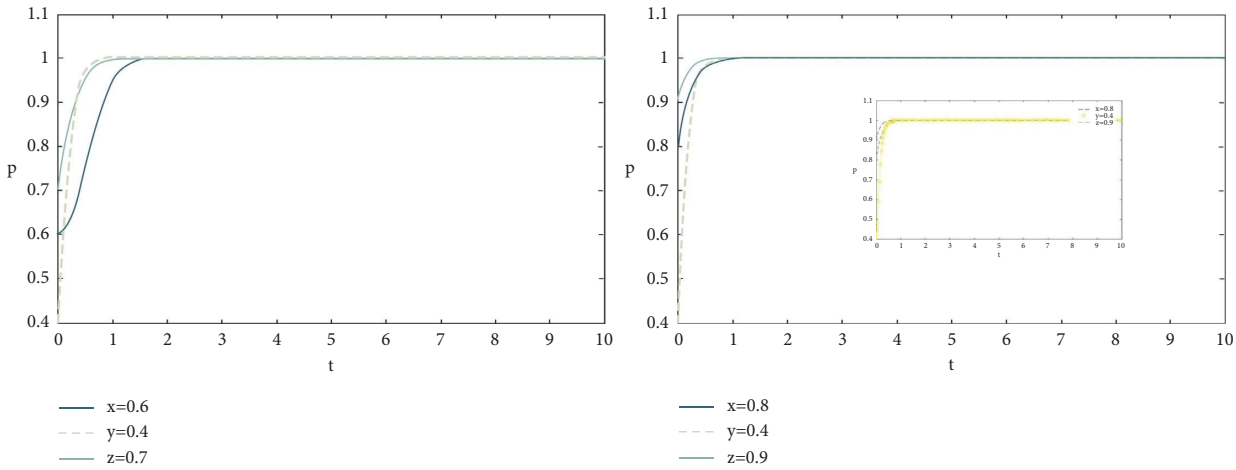

Figure 3: Simulation and analysis results of smart community evolution strategies.

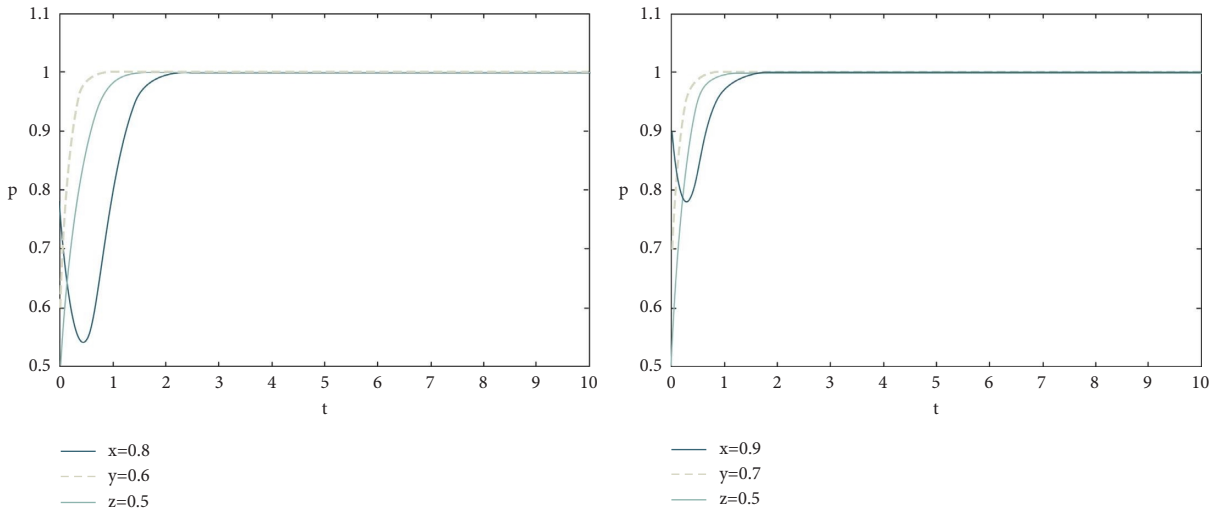

Figure 4: Simulation and analysis results of third-party organization evolution strategies.

5.2. Behavior Improvement Strategies of Third-Party Professional Evaluation Agencies. Third-party professional evaluation agencies, in the process of smart community regulation, should pay attention to its policy environment, accept the government entrusted third-party agencies, and should have a comprehensive grasp of local policy; in the face of possible smart community rent-seeking behavior, the third-party institutions should be positioned and clear their own interests. In the process of supervision, the third party institutions are in a state of repeated game. It should choose long-term government cooperation in the game process to seek long-term development [21]. In addition, the third-party institutions should also make it clear that if they choose to accept rent-seeking, then the punishment and losses may be irreparable, and an act of dishonesty may not be exposed, but as long as exposed once, there will be completely lost opportunities [22]. Based on the principle of rational choice and risk avoidance, third-party institutions should not choose to take risks but should always maintain good cooperation with government departments and assume social responsibility to improve the regulatory effect of the smart community.

5.3. Strategies for Institutional Behavior Improvement for Smart Communities. For the rapid development of contemporary urban community, smart community, as the carrier of smart community service, should be clear about long-term pursuit and cost saving [23, 24]. Therefore, in the face of institutional evaluation, the smart community should not regard this as a task to meet the indicators but as a direction to motivate their own operation and development. The supervision standard of the government civil affairs department is the national guidance on the operation of smart community. In comparison, it can play a positive role in correction, which is a kind of top-down communication [25]. At the same time, smart community should also make clear the dissatisfaction and desire of smart community residents to demand, provide more efficient institutional services, and seek their own development with a bottom-up feedback mechanism [26]. Therefore, in the regulatory game, if smart communities shift their focus to their own operations, they will naturally not pay additional rent-seeking costs to cope with supervision, nor will they bear the serious punishment that may result from evading supervision.

6. Conclusion

This study constructs the game model to clarify the role of each stakeholder in regulation. In addition, the paper analyzes the key factors affecting the game behavior of each subject and provides theoretical contributions for future research. The results show the following. (i) Government behavior plays a leading role in supervision. (ii) When the government invests resources in the screening of third-party evaluation agencies and the purchase of services and mainly adopts policy punishment methods for stakeholders with rent-seeking behavior, the probability of regulatory participation stakeholders' positive behavior is the greatest. (iii) The improvements should be made from the aspects of information network construction, the refinement of reward and punishment measures, and the improvement of the evaluation party access rules.

The management implications of this study are as follows. When optimizing the supervision of smart community, the relationship of interest between the three parties should be comprehensively measured to form a joint force. Under the guidance of party building and the supervision resources of government departments, the role of rewards and punishments should be fully played, and the operation behavior of smart community should be restricted in time with government supervision at the grassroots level. Firstly, whether the third-party professional evaluation agency accepts rent-seeking is most affected by the amount of rent-seeking, the government's prior intervention, and post-treatment [27]. Secondly, whether smart communities are rent-seeking is the most influenced by the guidance and punishment of the government. Finally, in the regulation, the government should try to reduce the regulatory costs. In view of the above conclusions, we should raise the threshold of cooperation, increase the intensity of rent-seeking treatment, guide the cost of investment supervision, severely punish to replace the repeated supervision after the evaluation of the third-party institutions, and strengthen the feedback supervision system, so as to achieve the purpose of curbing rent-seeking behavior, the government streamlining administration and delegation of power, and improving the effectiveness of supervision.

The limitations and future research directions of this study are as follows. First, the selected literature is limited, the theory is not mature enough, and it is still in the preliminary stage of research. In fact, regulatory issues in the process of smart community sustainability are considered an important aspect of future urban governance. Relevant theories should be improved to enhance the applicability of the research. At the same time, only three participants were selected for this study. Smart community supervision is a gradual research process, and the results of this study are not comprehensive. In the future, digital green can be added to the research of the smart community regulatory game [28].

Data Availability

The data presented in this study are available on request from the corresponding author.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

SY and SL were responsible for resources and methodology. LW was responsible for supervision, investigation, and conceptualization. SL was responsible for original draft preparation, data curation, funding acquisition, and software. SL and LW were responsible for validation. SY and LW were responsible for review and editing. SY was responsible for project administration and formal analysis. All authors have read and agreed to the published version of the manuscript.

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