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Incentive Management on Activated Conservation of Historic Buildings in China

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Abstract

With the current economic and social development of the country, the conservation of historic buildings has brought new issues; historic buildings need to be conserved and activated. Effective incentive management to promote economic development and the preservation of historic buildings is an important issue. Through the study of analysis strategy of the participants and decision-making of urban historic buildings conservation, game theory explains incentive management from a historic buildings activated conservation development perspective of the demand and supply side design to conserve the historic buildings. Based on the three major stakeholders in the conservation process of historic buildings, an evolutionary game model of "government-developers" and "government-the people" is constructed to study the strategy selection behaviors of the government in the implementation of incentive policies. Developers and the people put forward the strategy suggestions to achieve optimal equilibrium. The results show that the strategy choice is affected by the initial state and parameters of the game. The government through subsidies, market mechanism intervention measures guides of developers to activate and protect historic buildings; The government promotes public awareness through economic encouragement and propaganda, participates in the conservation of historic buildings, and finally realizes the win-win situation of the three parties.

Keywords

Activated Conservation, Game Theory, Historic Buildings, Incentive Management, Stakeholders

1. Introduction

As one of the four ancient civilizations in the world, China has a long history and many historic buildings. Scientific management of this human wealth is our

responsibility. It has been more than half a century since the founding of the People's Republic of China, and the progress and achievements in the conservation of historic buildings in China are obvious to all. However, with the current economic and social development of the country, the conservation of historic buildings has brought new issues, historic buildings can't just be mothballed in the city. Historic buildings need to be conserved and activated. They are the treasure of economical and cultural development sustainably. Now we are living in an era of rapid economic development and rapid urbanization. There are conflicts and mutual development between economic construction and architectural heritage protection, but this is a real problem that we must face and coordinate.

Due to the different goals and complex relationships among stakeholders in the process of protection and development, some sharp contradictions have arisen: demolition problems in the early stages of development of historic buildings; disputes over the management rights between development entities; contradiction between over-commercialization; a lack of funds for conservation of historic buildings; and the distribution of benefits in development. These problems are affecting the sustainable development of historic buildings activation conservation, and are getting more and more attention from inside and outside the industry.

Lan Zhongjian (2015) proposed that activated conservation was not excessive commercialization, but the so-called excessive commercial "kill" of ancient buildings. Just as cultural heritage is called "cultural wealth" in Japan, the Japanese treat cultural heritage as wealth. Livio de Santoli (2009) found that a series of management strategies, such as developing tourism, building theme parks and building creative industries were put forward for the concept of historical buildings conservation and management. Wu Zhengzeng (2012) meanwhile found that "Activation" was to re-endue historic buildings with cultural significance or use scenes to re-integrate it into modern life, so as to solve the contradiction of "heritage protection restricts development and development destroys heritage protection". Ruan Yisan (2015) later found that with culture as the leading factor, culture and life were revitalized, protected and restored. Every city is similar, exhausted the original intention of historical building protection.

What theory is the basis of effective incentive management to promote economic development and the preservation of historic buildings is an important issue. The study object of game theory includes the relationship between people, the mutual influence and interaction between people's behavior, the conflict, competition and cooperation between people. The theory to analyze interest conflicts is applicable in the activated conservation and development of historical buildings. Fei Wei (2015) studied that based on evolutionary game theory, a game model of interest among tourism enterprises, local government departments and indigenous people in the process of ecotourism development is constructed. Chen Yuena (2011) found that fit in the process of the historical block protection and began to send all the members of the collaboration between the

interests of mutual influence and restriction, the game theory into the block protection and began to study. Therefore, this study aims to fulfill the research gaps that mention above. The present study, based on the perspective of game theory, analyzes the contradiction between the activating and conservation of historic buildings and discusses the incentive management.

2. Literature Review

The brief related literature to analyze and summarize activated conservation of historic buildings, game theory, incentive management and stakeholders in the conservation of historic buildings.

2.1. Activated Conservation of Historic Buildings

Multi-angle qualitative analysis (Powell, 1999) described reconstruction and reuse has been discussed comprehensively. Field investigation and research (Zeng, 2016) showed practice of historic building management. Live interview, case analysis and comparison (Jiang, 2012) built commercial protection and redevelopment

2.2. Game Theory

Whether it is a Nash equilibrium or a coordinated game, the result of a game is generally understood to be an equilibrium reached through certain strategies (Lv & Geng, 2013). However, the strategy described above actually refers to the way of action in the game process, and the strategy in the real sense is not so-called one point. Action is a form of countermeasure, that is, the behavioral response after the action of the environment or other participants, so the strategy of all participants is mutual affecting and change (Gibbons, 1999). In addition, it is a misunderstanding of "equilibrium" and "game result" to regard equilibrium as game result in general sense. The so-called "equilibrium" actually refers to a kind of rule. The equilibrium strategy refers to the best combination of strategies selected by all players in a game, that is, the strategy selected by all players when they maximize their personal gains. The result produced by all players after they choose this optimal strategy can be called the equilibrium result. But this is not the outcome of the game. The real "outcome of the game" is the set of factors that the modeler is interested in from the values of actions, payments, and other variables after the game. This is the essence of the game. For each game model, the result is not the final benefit, but what the modelers are concerned about, which can be the benefit of the participants, the action choices of the participants, and even the way to determine the participants. Discussing strategy in heritage conservation showed ways of management in cultural heritage.

Incentive mechanism design (Wang & Liu, 2019) built commercial protection and redevelopment. Modern management (Certo & Certo, 2006) showed Management theories and concepts are introduced, and the challenges of contemporary management are discussed. Incentive mechanism design and incentive strength research (Liu & Li, 2014) developed incentive management for green building.

2.3. Stakeholders in the Conservation of Historic Buildings

Peng & Zhou (2012) introduced stakeholders and cooperative game theory, and proposed to establish a cooperative game theory to promote activating conservation historic buildings; Chen Shu (2013) divided the renewal modes of historic buildings into seven categories according to different stakeholders; Xie Shiyu (2009) discussed the renovation of historic buildings. The researchers based on social conflicts and interest games, analyze the role of social actors in the renewal of historic buildings, and propose corresponding strategies.

Ioannis Poulios (2014) summed up the relationship among different stakeholders in conservation of historic buildings, analyzes the existing problems in the process of sustainable development of historic buildings conservation, and proposes the strategy from the perspective of different stakeholders; Fei Wei (2015) according to the evolutionary game theory, constructed the game model of incentive interest among tourism companies, relevant local government departments, and indigenous peoples in the process of ecotourism development. Wu Zhengzheng (2012) introduced based on game theory for the conservation strategy of Han Chang'an city heritage. The solution achieves the collective rationality and the individual rationality "Win-Win", realizes the site protection and the regional development coordination.

There are many scholars' research achievements in the aspects of conservation concept and planning. Tan Jie (2019) issued regulations on the protection of traditional buildings to strengthen protection. Li Fei et al. (2019) meanwhile researched the display and use of historic revolutionary sites. Borri & Corradi (2019) addressed the problem of the conservation and protection of architectural heritage in Italy. Ripp & Rodwell (2017) researched urban heritage in Jaipur. The Historic Urban Landscape Approach in Action the case where the culturally sensitive historic cores of towns and cities are the primary focus of pressures for major change or redevelopment and counterbalancing policies are not in place to address those pressures proactively.

In terms of management philosophy, Cui He (2005) used game theory to analyze the demolition problem and the inspiration to the planning. Eduardo Rojas (2007) showed a task for all social actors that is the conservation and development of the urban heritage. Wang & Liu (2009) designed incentive mechanism for energy conservation in new buildings based on game analysis. Through the appeal of stakeholders the researcher used the model to get incentives. Yao & Dai (2011) researched the transformation of historic block protection strategy. The significance is to change "space reconstruction" to "value reconstruction". Chen Yuena (2011) investigated how to enrich the theory of historic buildings protection and tourism development, expand the research horizon, actively promote the integration of disciplines, and provide theoretical basis and practical guidance for the development of historical buildings. Lv & Geng (2013) meanwhile studied the Game relationships involved in the historic protection and activation on "value resetting".

2.4. Incentive Management

The understanding and management of people has always been a primary issue in business management practice, and also is the focus of research and debate of various management schools in incentive research of foreign countries.

Maslow (1943) showed human in order needs from the lower level to the higher level. Frederick Herzberg (1959) has done business survey put forward "Two-factor theory". Liu and Li (2014) cited incentive management for green building. Wang and Liu (2009) build commercial protection and redevelopment. It is summarized in **Table 1**.

Table 1. Summary of results of incentive management.

Authors	Factors/Formula	Findings
Maslow (1943)	Physiological needs, Safety needs, Love and belonging, Esteem and Self-actualization. In order needs from the lower level to the higher level	Maslow's hierarchy of needs
Frederick Herzberg (1959)	Business survey	"Two-factor theory" including "health care factor" and "incentive factor"
Liu & Li (2014)	Incentive mechanism design and incentive strength research	Incentive management for green building
Wang & Liu (2009)	Incentive mechanism design	Building commercial protection and redevelopment

3. Research Methodology

This research is quantitative by design, using game theory to discuss the optimal equilibrium of incentive management between the government and the demand-side, supply-side of the historic building activating conservation. This research provides a theoretical basis for incentive management of the government to conserve historic buildings.

There are three types of important stakeholders in the process of activated conservation of historic buildings. There are some relationships between the three stakeholders (the government, developers, the people). As the maker and promoter of public policy, the government is responsible for activated conservation of historic buildings and the maximization of social benefits. As the investment entity of the implementation policy, the developer is responsible for the maximization of corporate profits. Developers are guided by the government's mandatory policies and incentive policies. Although their investment decisions are made before the people's consumption decisions, the decisions of developers and the public influence each other through market mechanisms. As the final link of the market, the people's decision-making has certain influence on the investment decision of the developer, and is also guided by the government's macro policy.

The design of the incentive policy management mainly considers the gaming relationship between the main government, the developer and the public. Since there is no binding agreement between the interacting participants, the non-cooperative evolutionary game model can realize the quantitative analysis of the incentive mechanism by the government-developers, government-the people.

4. Results and Discussion

4.1. Evolutionary Game Theory to Construct Model of the Government-Developers

According to the above assumptions, the game matrix model of the government and developers. The game tree is shown in Figure 1.

1) The government and developers are selected as the two sides of the game, assuming that there are n developers in the market. The developers will respond to the government's different incentive policies.

2) Developers have two kinds of building products to develop: to build new buildings and to activate conservation of historic buildings, assuming that activating conservation perfectly integrates into the model, not commercial dominant. The government formulates relevant incentive policies to promote the conservation of historic buildings, which can be divided into economic incentive policies and formalistic incentive policies according to different incentive levels.

3) Both sides of the game are bounded rationality, and their rationality degree is not equal.

4) α : The probability of government implementing economic stimulus policy;

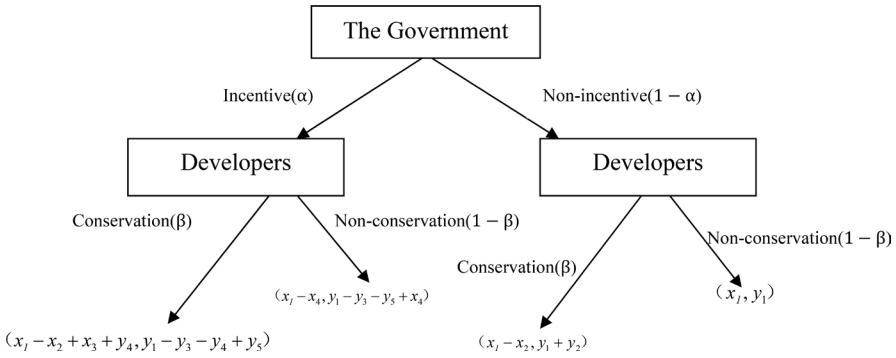
β : The probability of developers activating and conserving historic buildings;

x_1: Income of developers from constructing new buildings;

x_2: Extra cost of developers pay to conserve historic buildings;

x_3: Additional economic benefits of developers responding to the government's active call to get good social reputation and enhance brand value, under the incentive policies implemented by the government;

x_4: Losses of punishing by the government adopts strong incentive policies which developers still choose to build new buildings are not achieved by relevant



Source: Based on Game Equation drawn by the author

Figure 1. The government-developers model game tree.

indicators, such as destroying traditional cultural buildings, floor area ratio and land use;

y_1: Income of government implementing incentive policy just as a formalization;

y_2: Additional social benefits of developers taking the initiative to develop activating conservation of historic buildings, under the incentive policies formalized by the government, such as social recognition and funding of advocacy protection group;

y_3: Cost of government promoting incentive policies, such as costs of field research, organizational construction, policy research, conservation publicity and implementation;

y_4: Subsidies of government paying to developers;

y_5: Long-term benefits of developers under the government implementation incentive policies, such as resource conservation, urban culture promotion, quality improvement of cultural life, efficiency growth and public credibility improvement (but without a positive response from developers, the long-term benefits could be lost);

t: Dynamic time.

Refers to the sequence of the actions of the government and developers in the dynamic game, so the actions of the players can be expanded into a tree graph in turn. Game tree is an extended visual representation. It gives almost all the information for a finite game. Its basic building materials include nodes branches and information sets. The knot includes decision knot and terminal knot. The decision knot is the time point when the player takes action, and the end knot is the end point of the game action path. The first rank branch is arrow from a decision knot (the government) to its immediate successor (developers) by (α and $1-\alpha$), and each second rank branch represents an action choice for the participant (developers) by (β and $1-\beta$). Each information set is a subset of the set of decision sets, which includes all decision nodes meeting the following conditions: 1) each decision node is the decision node of the same participant; 2) the player knows a decision node of the game entering the set, but does not know which decision node is in.

Evolutionary Game Model. The expected benefits of the government from the implementation of incentive policies $E(\alpha_1)$; The expected benefits of the government from the formalism (Only for oral appeal, no action) of incentive policies $E(\alpha_2)$; The average expected benefits of the government $\bar{E}(\alpha)$:

$$\begin{cases} E(\alpha_1) = \beta(y_1 - y_3 - y_4 + y_5) + (1-\beta)(y_1 - y_3 - y_5 + y_4) \\ E(\alpha_2) = \beta(y_1 + y_2) + (1-\beta)y_1 \\ \bar{E}(\alpha) = \alpha E(\alpha_1) + (1-\alpha)E(\alpha_2) \end{cases} \quad (1)$$

The expected benefits of developers for the conservation of historic buildings $E(\beta_1)$; The expected benefits of developers for the development of new construction projects $E(\beta_2)$; The average expected benefits of developers $\bar{E}(\beta)$:

$$\begin{cases} E(\beta_1) = \alpha(x_1 - x_2 + x_3 + y_4) + (1-\alpha)(x_1 - x_2) \\ E(\beta_2) = \alpha(x_1 - x_4) + (1-\alpha)x_1 \\ \bar{E}(\beta) = \beta E(\beta_1) + (1-\beta)E(\beta_2) \end{cases} \tag{2}$$

From system Equations ((1), (2)) of government's incentive policies and developers' activated conservation of historic buildings can be obtained respectively replication dynamic equation:

$$\begin{aligned} F(\alpha) = \frac{d\alpha}{dt} &= \alpha\left[E(\alpha_1) - \bar{E}(\alpha)\right] \\ &= \alpha(1-\alpha)\left[\beta(2y_5 - y_4 - y_2 - x_4) + x_4 - y_3 - y_5\right] \end{aligned} \tag{3}$$

$$F(\beta) = \frac{d\beta}{dt} = \beta\left[E(\beta_1) - \bar{E}(\beta)\right] = \beta(1-\beta)\left[\alpha(x_3 + y_4 + x_4) - x_2\right] \tag{4}$$

If the game participants are evolutionarily stable, Equations ((3), (4)) must satisfy the following conditions:

$$\begin{cases} F(\alpha) = \frac{d\alpha}{dt} = 0 \\ F(\beta) = \frac{d\beta}{dt} = 0 \end{cases}$$

Therefore, there are five local equilibrium points in the game matrix composed of the government and developers:

$$O(0,0),\ A(0,1),\ B(1,0),\ C(1,1),\ D\left(\frac{x_2}{x_3 + y_4 + x_4}, \frac{y_3 + y_5 - x_4}{2y_5 - y_4 - y_2 - x_4}\right)$$

According to the stability principle of differential equation and the stability strategy of evolutionary game equilibrium point, when $F'(x) < 0$, it is an evolutionary stability strategy.

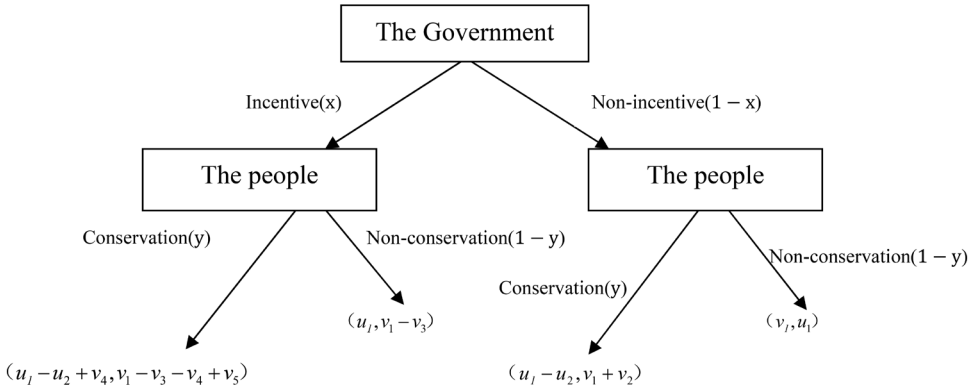
When $\beta^* = \frac{y_3 + y_5 - x_4}{2y_5 - y_4 - y_2 - x_4}$, $F(\alpha)$ always is 0. When the probability of developers for the conservation of historic buildings reaches $\beta^* = \frac{y_3 + y_5 - x_4}{2y_5 - y_4 - y_2 - x_4}$, the government's incentive policies are stable.

Similarly, when $\alpha^* = \frac{x_2}{x_3 + y_4 + x_4}$, $F(\beta)$ is always 0. That is, when the probability of government implementing incentive policies reaches $\alpha^* = \frac{x_2}{x_3 + y_4 + x_4}$, the initial proportion of developers to activate conservation historical buildings is stable.

4.2. Evolutionary Game Theory to Construct Model of the Government-the People

According to the above assumptions, the game matrix model of the government and the people. The game tree is shown in **Figure 2**.

1) The government and the people are selected as the two sides of the game, assuming that there are n peoples in the market. The people will respond to the



Source: Based on Game Equation drawn by the author.

Figure 2. The government-the people model game tree.

government's different incentive policies such as historical building conservation consciousness, activated conservation value and produce benefit.

2) The people have two kinds of building products to consume and participate: to buy new buildings and to activate conservation of historic buildings, assuming that activating conservation perfectly integrates into the model, not commercial dominant. The government formulates relevant incentive policies to promote the conservation of historic buildings, which can be divided into economic incentive policies and formalistic incentive policies according to different incentive levels.

3) Both governments and the people understand the benefits of each other's different decisions.

4) Government is the subject of completely rational decision-making, while the people are the subject of limitedly rational decision-making. Equilibrium needs to be achieved through constant imitation, learning and adjustment.

5) x: The probability of government implementing economic stimulus policy;

y: The probability of the people activating and conserving historic buildings;

u_1: Income of the people from purchasing and using new buildings;

u_2: Extra cost of the people pay to conserve historic buildings;

v_1: Income of government implementing incentive policy just as a formalization;

v_2: Additional social benefits of the people taking the initiative to activate conservation of historic buildings, under the incentive policies formalized by the government, such as obtaining government grants, enhancing regional values and cultural heritage values;

v_3: Cost of government promoting incentive policies, such as costs of field research, organizational construction, policy research, conservation publicity and implementation;

v_4: Subsidies of government paying to the people;

v_5: Long-term benefits of the people under the government implementation incentive policies, such as resource conservation, urban culture promotion, quality improvement of cultural life, efficiency growth and public credibility

improvement (but without a positive response from developers, the long-term benefits could be lost);

t: Dynamic time.

Figure 2 refers to the sequence of the actions of the government and the People in the dynamic game, so the actions of the players can be expanded into a tree graph in turn. Game tree is an extended visual representation. It gives almost all the information for a finite game. Its basic building materials include nodes branches and information sets. The knot includes decision knot and terminal knot. The decision knot is the time point when the player takes action, and the end knot is the end point of the game action path. The first rank branch is arrow from a decision knot(the government) to its immediate successor (the People) by (x and $1-x$), and each second rank branch represents an action choice for the participant (the People) by (y and $1-y$). All decision nodes in the game tree are divided into different information sets $((u_1-u_2+v_4, v_1-v_3-v_4+v_5)\ (u_1, v_1-v_3)\ (u_1-u_2, v_1+v_2)\ (u_1, v_1))$. Each information set is a subset of the set of decision sets, which includes all decision nodes meeting the following conditions: 1) each decision node is the decision node of the same participant; 2) the player knows a decision node of the game entering the set, but does not know which decision node is in.

Evolutionary Game Model. The expected benefits of the government from the implementation of incentive policies $E(x_1)$; The expected benefits of the government from the formalism (Only for oral appeal, no action) of incentive policies $E(x_2)$; The average expected benefits of the government $\bar{E}(x)$:

$$\begin{cases} E(x_1) = y(v_1-v_3-v_4+u_5)+(1-y)(v_1-v_3) \\ E(x_2) = y(v_1+v_2)+(1-y)v_1 \\ \bar{E}(x) = xE(x_1)+(1-x)E(x_2) \end{cases} \tag{5}$$

The expected benefits of the people for the conservation of historic buildings $E(y_1)$; The expected benefits of developers for the development of new construction projects $E(y_2)$; The average expected benefits of developers $\bar{E}(y)$:

$$\begin{cases} E(y_1) = x(u_1-u_2+v_4)+(1-x)(u_1-u_2) \\ E(y_2) = xu_1+(1-x)u_1 \\ \bar{E}(y) = yE(y_1)+(1-y)E(y_2) \end{cases} \tag{6}$$

From system Equations ((5), (6)) of government's incentive policies and the people's activated conservation of historic buildings can be obtained respectively replication dynamic equation:

$$F(x) = \frac{\mathrm{d}x}{\mathrm{d}t} = x\left[E(x_1)-\bar{E}(x)\right] = x(1-x)\left[y(v_5-v_4-v_2)-v_3\right] \tag{7}$$

$$F(y) = \frac{\mathrm{d}y}{\mathrm{d}t} = y\left[E(y_1)-\bar{E}(y)\right] = y(1-y)(xv_4-u_2) \tag{8}$$

If the game participants are evolutionarily stable, Equations ((7), (8)) must satisfy the following conditions:

$$\begin{cases} F(x) = \dfrac{\mathrm{d}x}{\mathrm{d}t} = 0 \\ F(y) = \dfrac{\mathrm{d}y}{\mathrm{d}t} = 0 \end{cases}$$

To solve it, they get:

$$\begin{cases} x = 0,\ x = 1,\ y^* = \dfrac{v_3}{v_5 - v_4 - v_2} \\ y = 0,\ y = 1,\ x^* = \dfrac{u_2}{v_4} \end{cases}$$

According to the stability principle of differential equation and the stability strategy of evolutionary game equilibrium point, when $F'(x) < 0$, it is an evolutionary stability strategy.

When $y^* = \dfrac{v_3}{v_5 - v_4 - v_2}$, then $F(x)$ always is 0. When the probability of the people for the conservation of historic buildings reaches $y^* = \dfrac{v_3}{v_5 - v_4 - v_2}$, the government's incentive policies are stable.

Similarly, when $x^* = \dfrac{u_2}{v_4}$, $F(y)$ is always 0. That is, when the probability of government implementing incentive policies reaches $x^* = \dfrac{u_2}{v_4}$, the initial proportion of the people to activate conservation historical buildings is stable.

4.3. Analysis of Evolutionary Game Results

To enable the government to implement strong incentives for developers to activated conservation historic buildings is to increase x_3, x_4, y_4, y_5 and decrease x_2, y_2, y_3. So the incentive measure like this:

It will increase incentives for the protection of historic buildings, and implement preferential policies such as direct monetary subsidies and tax breaks for responsive developers. At the same time, combined with mandatory policies, if the relevant indicators of new construction are not reached, increase the penalty loss, such as dust, noise.

It should make the government more rational, avoid shortsightedness in its decision-making, and give top priority to the long-term benefits of resources, the environment, public trust and comprehensive benefits. On the one hand, it will accelerate the activated conservation of historic buildings to highlight their advantages and increase the long-term benefits. On the other hand, reduce the expectation of developers to actively develop historic buildings.

Accelerate the conservation of historic buildings standardization system, actively train developers and construction units on construction techniques of new construction methods, and reduce development cost by means of standardization and efficiency improvement.

According to market feedback, timely adjust the way and intensity of incen-

tive policies, and make good use of the invisible "hand" of market mechanism. When the proportion of historical buildings protected accounts for a large proportion of new buildings, the implementation cost of policy research, publicity and other policies can be greatly reduced.

Strengthen the publicity of the protection of historical buildings and government policies, make developers fully understand the preferential policies and foresight, and make the public recognize the value of activating the protection of historical buildings in terms of culture, history, environmental protection and value. Therefore, developers will gain a good reputation after the conservation of historic buildings is publicized.

To enable the government to implement strong incentives for the people to accept and activated conservation historic buildings is to increase u_4, v_5 and decrease u_2, v_2, v_3, Specific measures are as follows:

To increase incentives for the activated conservation of historic buildings. Implement preferential policies such as direct monetary subsidies and deed tax exemption and reduction for people who buy historic buildings into the protection.

The way is to make the government more rational, strengthen its foresight in decision-making, and give top priority to the long-term benefits of resources, the environment, public trust and comprehensive benefits. On the one hand, research on conservation historic buildings technology system, construction technology and energy saving and consumption reduction should be strengthened to give full play to its advantages and increase the long-term benefits. On the other hand, the expectation of the people to actively accept new products is reduced.

To strengthen the systemization of laws and regulations on the protection of historic buildings, increase the efforts of protection pilot programs, and address the incremental cost of protection by taking appropriate measures to reduce the cost of people's acceptance of the life of historic buildings.

According to the market feedback, timely adjust the way and intensity of incentive policies, and make good use of the invisible "hand" of market mechanism. When in the number of the proportion of historic buildings conservation is larger than new buildings, the implementation cost of policy research, publicity and other policies can be greatly reduced.

5. Discussion

This paper interprets the activated conservation of historic buildings from the perspective of game theory. In essence, it is also a process of interest coordination and reorganization. Different interest groups uphold their different intention objectives, such as maximizing economic value and reshaping urban characteristics. Therefore, the introduction of game theory is actually the most direct and effective way to solve the multiple game process of activated conservation of historic buildings. Most of the problems of historic buildings are complicated.

Therefore, this paper introduces the research method of game theory, which

has the following advantages. The introduction of game theory analysis can more clearly and intuitively show the interest conflicts and behavioral relations of all participants in the activated conservation of historic buildings. The contradictory relations in the activated conservation process of historic buildings are clarified on a macro level. At the same time, the core contradictions of different historic buildings can be found from the analysis of game relations. Therefore, we can understand the core game for the conservation of specific historic buildings by analyzing the game relationship. The purpose of devising a game model is to get a game result. This result not only contains the ultimate benefits of all parties' win-win interests, but also contains the choice of how to achieve the balanced renewal action. Therefore, the combination of activated conservation of historic buildings and game theory is a rational and practical research method.

In this research, the introduction and research of game theory are still at the stage of simple theoretical analysis. The research on many aspects of the actually activated conservation of historic buildings is not enough. Therefore, the model has certain limitations. In addition, considering the game between management group, investment and the people in the process of conservation, there are not only these two players in the game process. The entanglements of different interests of many participants in the actual historic buildings conservation project need more in-depth game decomposition and analysis, and its practical significance will be more clear.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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