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Research on Hollow Village Governance Based on Action Network: Mode, Mechanism and Countermeasures—Comparison of Different Patterns in Plain Agricultural Areas of China

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Abstract: With the large-scale development of urbanization in the world, phenomena such as the unbalanced allocation of various elements of the rural regional system, as well as the decline of the economic and social structure and functions in the process of urban and rural economic and social transformation and development in China, have endangered the healthy development of rural areas. The “hollowing” of rural areas is becoming more and more intense, and the governance of hollow villages has become a key link to stimulating the vitality of rural development and realizing the coordinated development of urban and rural areas. Taking a typical hollow village in Fangsi Town, Yucheng City, Shandong Province, China as an example, through the recognition method of hollow villages mode, the study adopted the in-depth interviews and questionnaires to obtain governance of hollow villages. Moreover, this study uses the actor–network theory to discuss the governance model mechanism and policy response of hollow villages, extract the applicable conditions of different hollow village governance modes, and provide the promotion of the hollow village governance mechanism. Our findings show that: (1) the governance modes of hollow villages are diverse. Under certain geographical conditions, the governance of hollow villages shows the relocation and merger–urban–rural integration mode, village integration-scale operation mode, village intensive-idle land revitalization mode, and original site optimization–sightseeing tourism development mode, along with other types. In the process of promotion and use, appropriate adjustments should be made in combination with differences and changes in system conditions, and the accurate governance of villages should be carried out. (2) The governance process of hollow villages is dynamic. The governance of hollow villages represents a heterogeneous network of actors led by key actors, which mainly realizes changes in the rural material space. With the change of development goals of the hollow village, the network of actors has been readjusted around the new OPP, and the role of the actors has changed, correspondingly showing a transition from the governance of the hollow village to the optimized development, thus further realizing the transformation of the hollow village.

Keywords: hollow village; actor–network; governance mode; operation process

1. Introduction

With the development of large-scale urbanization on a global scale, related opportunities and challenges also arise, such as the widening gap between urban and rural areas, excessive rural population loss, inefficient rural land use and continuous rural industrial outflow, etc. [1]. In the process of urbanization and industrialization, the decline of rural areas is a global problem, and developed countries have taken many measures to address this

problem. For example, Germany implemented equal treatment of urban and rural elements based on the “equivalence” theory [2]; the United Kingdom implemented a large-scale agricultural intensification reform [3]; Japan implemented the nationwide “one village, one product” campaign, etc. [4,5]. Since the reform and opening, rapid urbanization, as a new engine to create China’s economic growth, has also profoundly affected vast rural areas [6,7]. Problems such as the continuous outflow of the labor force [8,9], idle and abandoned land resources [10], weak cultural inheritance, and governance capabilities have emerged one after another [11], and the problem of “hollowing out” in rural areas has become increasingly serious.

In order to solve the increasingly hollowing out phenomenon in rural areas and seek the governance path of rural recession, the study of hollow villages has received significant attention from academic circles. The special governance stage and national conditions of development, the implementation of the “balanced occupation and compensation” of cultivated land [12], and the reconstruction of rural space and the overall development of urban and rural areas have all necessitated urgent requirements for in-depth village hollowing out renovations. In this regard, scholars in the field of rural governance have explored the concept definition, governance mode, and performance evaluation of hollow villages, which provide effective guidance and reference for this study. In terms of connotation definition, most scholars explain hollow villages from the perspectives of urban and rural element flow, land use, and village spatial planning, focusing on the spatial form of hollow villages [6,13–15]; some scholars focus on the loss of labor [16], age structure imbalance, industrial lag, etc., to determine the definition of hollow villages [17,18] and pay attention to their population distribution characteristics and economic development status [19]. In terms of governance mode, some scholars analyze it from the perspective of rural settlement planning and industrial cultivation, paying more attention to the path of village governance and carrying out multi-dimensional morphological identification and classification of governance for hollow villages [20–22]. Some scholars take the allocation of land resources as the key to governance and explore the relationship between hollow village governance and land resource utilization [23,24]. In terms of the construction of the governance evaluation index system, most scholars have constructed a macro evaluation index system of hollow village governance based on the formation mechanism and morphological characteristics of hollow villages, and on the basis of analyzing their spatial distribution and evolution process [11,25–27]. In addition, some scholars take the governance subject as the research entry point to analyzing the satisfaction of villagers [28–30] in order to reflect the governance performance level of hollow villages in the selected area or take the participation of farmers as the evaluation standard to evaluate typical hollow village governance [31].

In general, current research on the governance of hollow villages is mostly on a macro level, encompassing a static description of a single subject relationship and the intuitive evaluation of the governance effect; meanwhile, research on the dynamic process of hollow villages involves the development from governance to transformation and the relationship between participants; the governance effect of the multidimensional perspective is relatively weak. In view of this, this study utilizes the actor–network as theoretical support and Fangsi Town, Yucheng City, Shandong Province, China as the research area. Four governance cases, Fangsijie village, Xingdian village, Zhengniu village, and Weizhuang village, were selected to analyze the behavior and role orientation of human and non-human actors in the governance of hollow villages; comprehensively analyze the operation law of hollow village governance; and compare different governance modes, providing the basis for model optimization and the formulation of differentiated hollow village governance countermeasures, so as to enrich the systematic research and application practice of the hollow village governance mode, which is oriented to national strategic needs and regional development.

2. Theory and Methods

2.1. Research Ideas

Hollow village governance is a systematic process, which is an important aspect of improving the living environment, adjusting the rural spatial structure, and realizing the rural revitalization strategy. Hollow villages show different degrees of imbalance within the main structure, an idle abandonment of homesteads, a backwards industrial economy, a weak governance capacity, and a poor cultural life [32]. Essentially, there is an imbalance of population, land, industry, organization, and culture in the operation of the rural system. The interaction of various factors leads to the decline of rural life, production, ecology, organization, and culture. The governance process is also a dynamic one of mutual reorganization and connection between the governance subject and the governance object [33] and promotes the reconstruction of rural space and social relations. The actor–network theory takes each human actor and non-human actor as the research node, emphasizing that society should not be regarded as a screen that projects all actors and entities, but should be understood based on the complex and dynamic connection between them [34]. Hollow village governance refers to the interaction of a governance subject (human actor) and governance object (non-human actor), and the process is full of interaction, flow, and change. Therefore, this study intends to use the actor–network theory, focusing on process and relationship thinking as the analysis framework, to identify the composition of the actor–network of hollow village governance, analyze the interaction and connection of each actor in the process, analyze the hollow village governance process based on the actor–network theory, and deconstruct the hollow village governance model system [35]. On this basis, this study selects “two styles and four types” of typical governance models in China’s plain agricultural areas, namely, “relocation and merger” and “retention of the original site”, to explore the construction of actor–networks in different governance models and compare the different models to propose specific strategies for them (Figure 1).

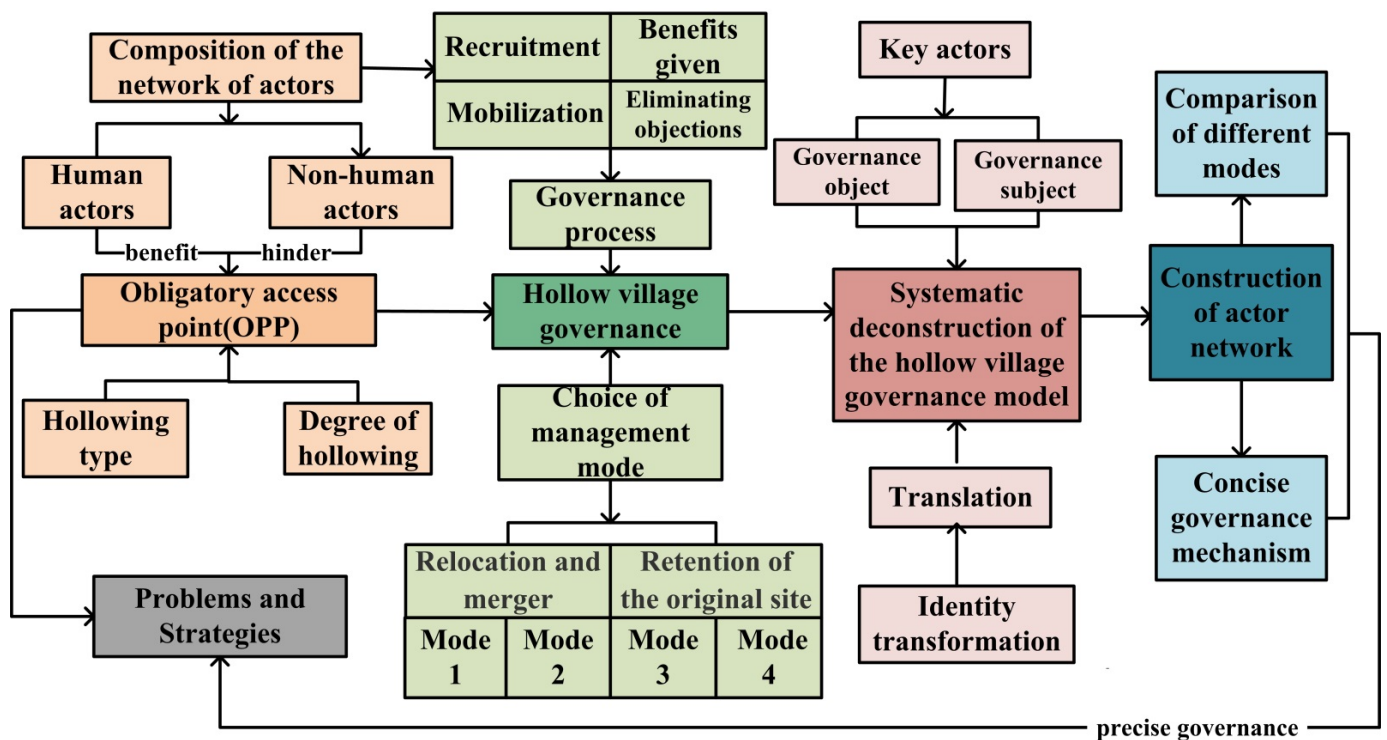


Figure 1. Research ideas of hollow village governance based on actor–network theory.

2.2. Actor-Network Theory

2.2.1. The Composition of the Actor–Network of Hollow Village Governance

The actor–network of hollow village governance is composed of governance subjects and governance objects, including municipal governments, local township governments, village collectives, villagers, outsiders, developers, land use enterprises, and other governance subjects, as well as population, land, industry, organization, culture, and other governance objects. Before translation, actors gathered their different interest goals and problems at the obligatory pass point (OPP) [36] and tried to obtain the expected relevant interests by solving problems. To solve the problems of each subject and achieve their aims, addressing the issue of village hollowing out and promoting the construction of a new countryside were finally implemented as core goals (Figure 2).

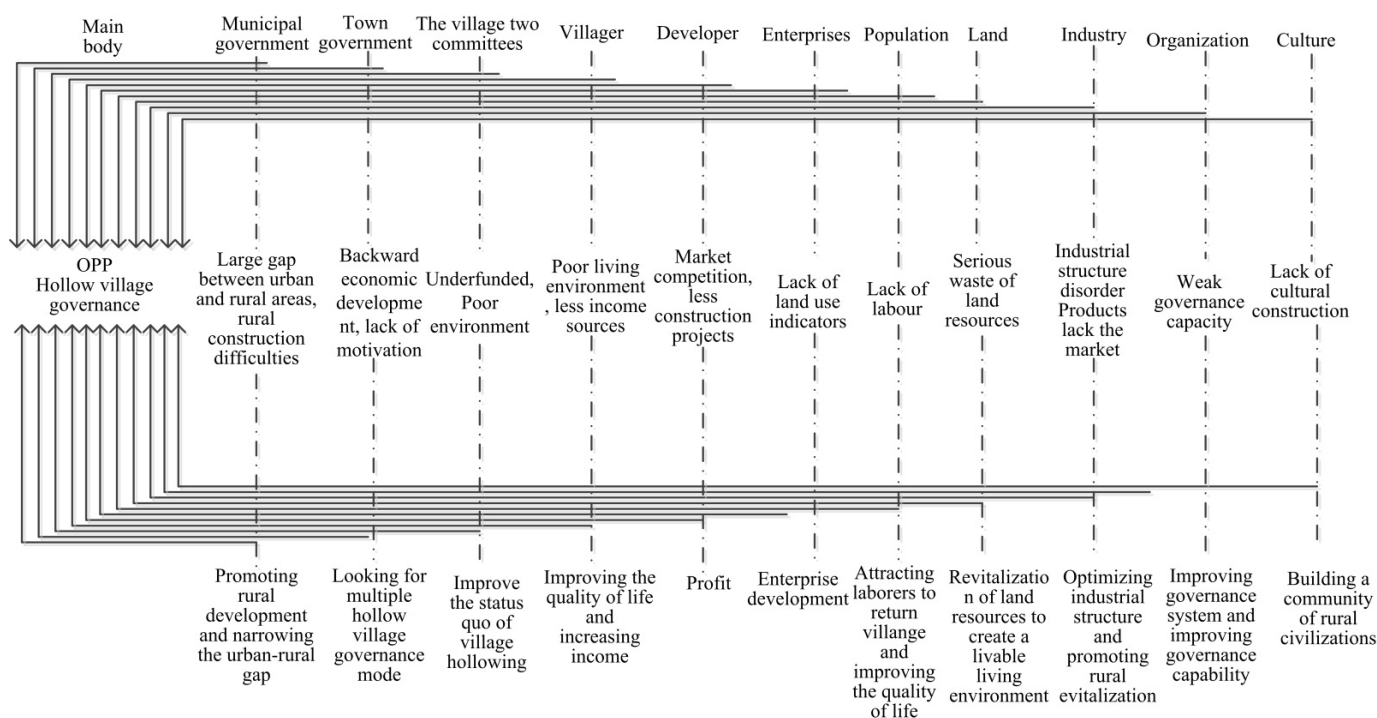


Figure 2. Actors of hollow village governance and their obligatory pass point (OPP).

2.2.2. Hollow Village Governance Process based on Actor–Network

From the perspective of the actor–network, the governance of hollow villages is a multi-level and complex process. Each actor is recruited to identify key issues, establish interest relationships, and form a translation process in a specific stage where multiple actors influence each other. Under the action of the system, a systematic governance model and an operable operating mechanism are formed [14]. The realization process of hollow village governance is reflected in several ways, as shown in Figure 3.

In terms of actor–network construction, in order to meet the goals and interests of each actor, it is necessary to implement translation in the network to eliminate action obstacles. The key actors in each mode recruit other heterogeneous actors, resulting in different modes [37]. This process predominantly includes two characteristics: organization mode and action mechanism. Organizational methods include the executive role of the two committees of the village, the leading role of the local government, the coordinating role of villagers in decision-making, the participation of social forces, the driving role of consumer consumption, etc., and different actors are interrelated and play their respective roles in the governance of hollow villages' actions. The mechanism operates to propose an integrated governance method for hollow village resources for different governance cores.

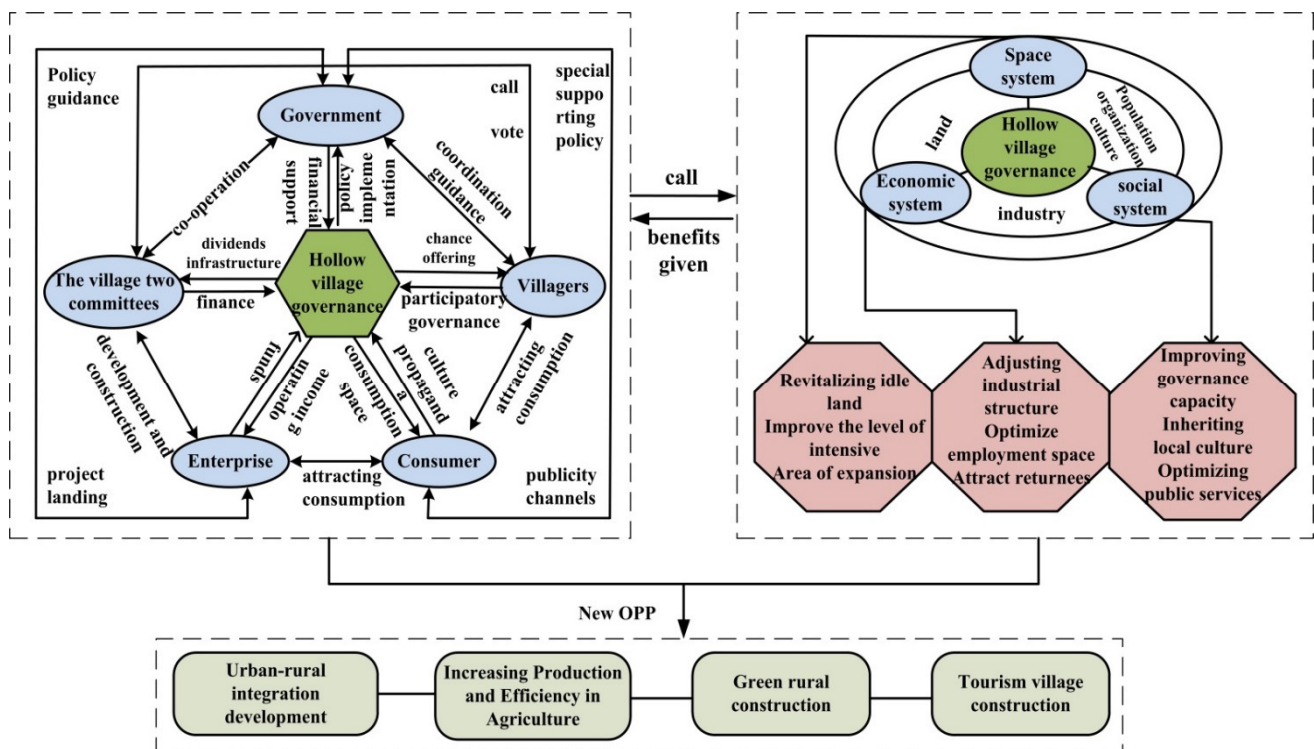


Figure 3. Hollow village governance process based on actor–network theory.

In terms of the role change of actors, with the evolution of policies and hollow villages, the actor–network will undergo dynamic adjustment, which is reflected in the impact of the entry, exit, and role change of heterogeneous actors on the network’s relationship [38]. Guided by the current national strategy, the coordinated development of urban and rural areas, increased production and efficiency of agriculture, green rural construction, and tourism village construction are taken as new OPP goals for different actors to realize the transformation from hollow village governance to optimized development.

2.3. The Recognition Method of Hollow Villages Mode

The hollow village governance model based on the actor–network theory includes five characteristics: key actors, governance subjects, governance objects, transfer, and identity conversion [39]. In different villages, according to the characteristics of rural endowments between the governance object and the governance subject, as well as a specific compulsory passage point, translation and identity conversion are carried out under the leadership of key actors; thus, different hollow village governance models are formed.

Based on the actor–network theory, the identification of the governance model of hollow villages in a typical sample area involves a complex system comprised of multiple features (Figure 4), as well as a synthesis process consisting of rural endowment characteristics, governance objects, and governance subjects and their mutual influences and interactions. Among them, the resource endowment of hollow villages is a prerequisite for the selection of the hollow village governance model [40]. The village resource endowment clarifies the external environmental characteristics of the hollow village, including the location, type, socio-economic conditions, degree of hollowing, and current policies in the region. The absence or insufficiency of resource endowment has induced the hollowing out of one or more villages. Therefore, resource endowment essentially supports the choice of the governance model. On the contrary, the choice of the hollow village governance mode must adapt to the current situation of the village [41]. The governance object reflects the problems and obstacles existing in the current hollow village, including the hollowing of the population, land, industry, organization, and culture. Based on the problems and obstacles existing in the governance object, the hollow village is divided into a single-dimensional

form and a multi-dimensional form. In the face of different types of hollow villages, the choice of the governance mode is diversified and targeted, which provides direction for the choice of hollow village mode. The main body of governance is the key to guiding the implementation of the hollow village governance model, which usually includes the government, villagers, village collectives, enterprises, and consumers. Choosing the main body of governance and determining the key actors is at the core of hollow village governance. The main body of governance plays its own role in the existing resources and problems of the hollow village, forming a regulatory force to ensure the orderly conduct of hollow village governance and promote the implementation of the hollow village governance model. The continuous coordination between the governance object and the governance subject forms the basis for translation and identity transformation in the governance mode, which promotes the continuous optimization and upgrading of the internal system of the hollow village and improves the degree of hollowing. Consequently, by understanding the resource endowments of different hollow villages, as well as the problems existing in the governance object and through the active role of the governance subject, all actors involved in the governance of hollow villages are translated. Through the interaction and mutual influence between each other, the identity transformation of participants is promoted, and different types of hollow village governance modes are formed.

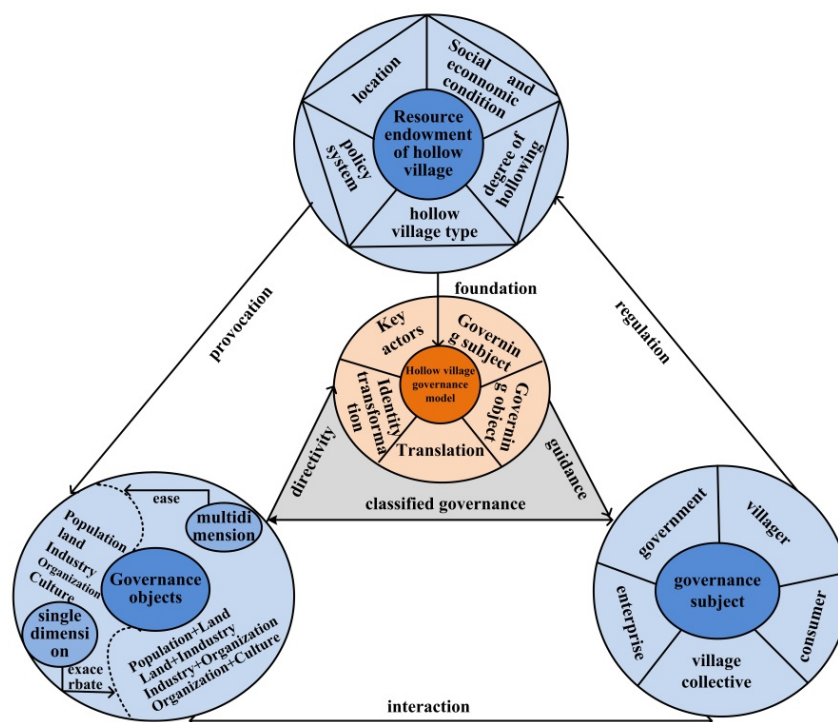


Figure 4. Deconstruction of hollow village governance mode.

3. Research Area and Data Source

3.1. Overview of the Research Area

Fangsijie Town is located in the west of Yucheng City, Shandong Province (Figure 5). It is a key township in China's "Hundred Small Towns and Demonstration Pilot Towns" and enjoys many titles such as "National Development and Reform Pilot Town" and "Provincial Rural Civilization Demonstration Town". The experience of urban brands in the implementation of hollow village governance can provide a reference for homestead management in different regions. According to the third land survey database of Fangsi Town in 2019, the total area of Fangsi Town is 14,593.96 square kilometers. Compared with the land survey data in 2006, the area of cultivated land in Fangsi Town increased by 218.08 hectares in the past 14 years; 12.65 hectares of cultivated land was occupied for construction and 219.16 hectares of cultivated land was added to land reclamation.

In general, work continues to improve but there is still a large area of idle land in the village to be reclaimed and developed. The per capita rural construction land is as high as 296 m², and the homestead is seriously empty, which has become the main restricting factor for rural revitalization and new rural construction. There are 62 administrative villages in Fangsi Town. In 2019, the total population was 74,330, the household registration population was 69,283 and the urban population was 24,000. The urbanization rate is low and migrant workers account for more than 70% of the rural population. Among the four villages studied, Fangsijie village has a registered population of 2276, and the proportion of migrant workers is as high as 50%; Xingdian village has a registered population of 2748, and the migrant worker ratio is 23.3%; Zhengniu village has a registered population of 516. The elderly, women, and children in the village account for more than 30% of the permanent resident population. The registered population of Weizhuang village is 896, and the labor force accounts for more than 60%. On the whole, there are many migrant workers in Fangsi Town, and the labor force in the village is scarce. The “369” left-behind population is the main factor affecting the sustainable development of the village.

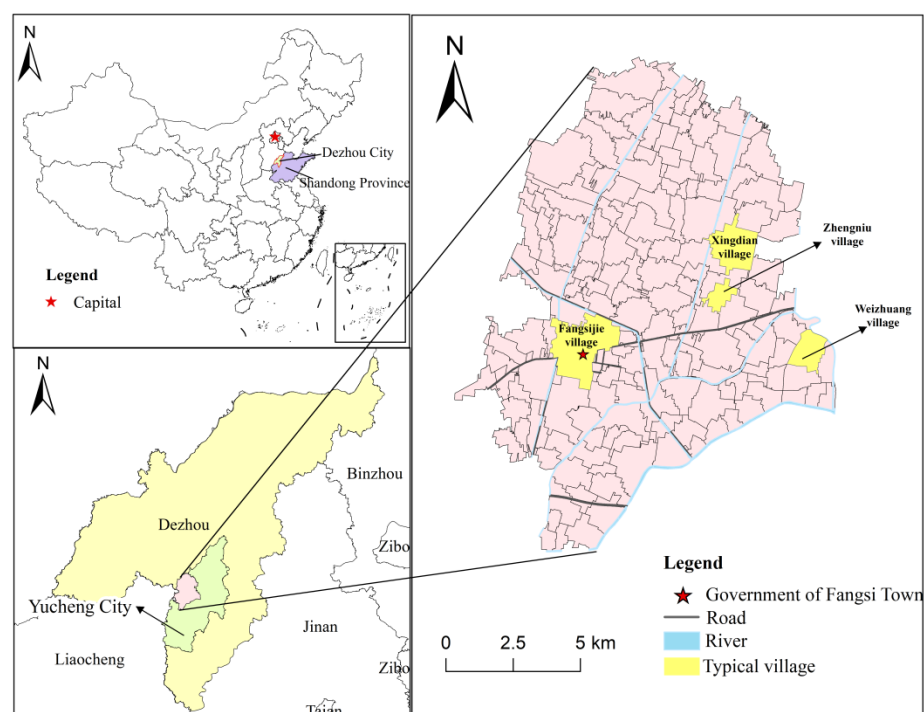


Figure 5. Research area.

According to the actor–network theory, in line with the principle of difference and comparability, the two hollow village governance categories are ‘relocation and merger’ and ‘original site retention’; the different governance subject, governance object, and translation process occur in the process of hollow village governance. This study selected four typical villages—Fangsijie village, Xingdian village, Zhengniu village, and Weizhuang village—in the town to conduct in-depth research and discuss the operation mechanism and governance effect of four hollow village governance modes.

3.2. Data Source

This study adopted the research methods of on-the-spot investigation, in-depth interview and questionnaire survey to obtain the role orientation, role change, and village governance mode operation mechanism of each actor in the governance process of the case village. Before the investigation and study, we contacted the local town government and obtained research support. On the basis of the voluntary principle of respondents, we talked with the town government personnel, the two committees of the case village,

villagers, business managers, tourists, and other actors, and filled out the questionnaire so as to obtain a series of actions, policies, and changes in the role of actors in the governance of hollow villages. The survey was conducted twice. From the first one, the general situation of village A and the basic situation of governance mode were obtained. From the second one, the operation mechanism of village hollow village governance mode was obtained, such as the process before and after governance, changes, and changes in the role of actors.

The research data mainly came from two sources: first, through an on-the-spot investigation, in-depth interviews were conducted with the local government, village committees, villagers, and other actors, with a total of 51 interviewees (Table 1). Through investigation and interviews, we sought to obtain the operation mechanism and governance of each mode in the process of transformation and understand the governance status and transformation effect of the four villages. The second source was the industrial survey report and meeting records of local government agencies or village committees on village development.

Table 1. Research objects and interview focuses.

Research Time	Interviewer	Quantity	Interview Focus
August 2020	Town government	2	1. Situation of hollow villages in towns
	Case village two committees	4	2. Hollow village governance process
	Case village villagers	16	3. Expected development direction of hollow villages
	Enterprise manager	6	4. The relationship between the actors
	tourist	5	5. The role of actors in the process of hollow village governance
November 2021	Town government	1	
	Case village two committees	4	1. Status and trends in village development
	Case village villagers	6	2. Evolution of the relationship between actors
	Enterprise manager	4	3. Satisfaction with village governance
	Tourist	3	



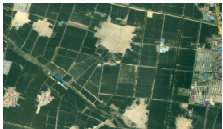


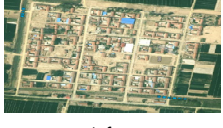
The data in the table are from interviews.

4. Results and Analysis

4.1. Mode Performance

Through interviews and on-the-spot investigations, it was found that there are human actors (governance subjects) of the municipal government, town government, village committees, villagers, developers, enterprises, and tourists in the governance process of Fangsi Town hollow village, including key actors and non-human actors (governance objects) of population, land, industry, organization, and culture. The actors and social factors involved in the process of local practice are all natural. Instead of a simple combination, actors redefine their identities and action logic through the translation process. Based on our understanding of the law of the formation and development of the hollow village, and taking full account of the morphological characteristics of the hollow village in the selected cases, we divided the data into four modes, namely, the relocation and merger–urban–rural integration mode, the village integration–scale operation mode, the village intensive–idle land revitalization mode, and the original site optimization–sightseeing tourism development mode. Different governance modes meet the goals and interests of actors in the actor–network according to local conditions and achieve translation in the network to eliminate obstacles to action. Key actors in each model summon other heterogeneous actors to generate network relations under different models. With the evolution of policies and hollow villages, the network of actors is dynamically adjusted, which shows the impact of entry, exit, and role change on the network relations of heterogeneous actors. At present, the governance of hollow villages in Fangsi Town has achieved remarkable results, and Table 2 summarizes the various typical villages and models for the governance of hollow villages in plain agricultural areas.

Table 2. Case village governance.

Mode	Case Villages	Basic Situation of Villages	Governance Content	Comparison before and after Governance
1	Fangsijie village	Located around the town, the degree of hollowing is low, as a single form of leading hollow village, farmers on agricultural income dependence are not strong, more migrant workers, the village guards weakened seriously, the villagers have a strong desire for village governance and urbanization.	The key actors of village governance are the hollow village governance group composed of the government and the village collective. The core of governance is to centralize the relocation to urban communities, transfer the village land after integration, innovate the urban–rural overall allocation and the flow mechanism of production factors, and realize the urbanization of housing and employment.	 <p>Before</p>  <p>After</p>
2	Xingdian village	Far from the urban center, the village has a high degree of aggregation and a low degree of hollowing out, which is a dual-form compound. The village land idle area is large, the village infrastructure is not perfect, farmers use farming as the main source of income, can accept a larger farming radius and intentionally improve the current living environment.	The key actor of village governance is the town government. The core of governance is to realize the scale of the operation, the centralization of living, the modernization of agriculture, and the intensification of land. The nearby villages are moved to the community, the original village land is reclaimed, and the large-scale community agricultural park is constructed.	 <p>Before</p>  <p>After</p>
3	Zhengniu village	Stay away from the central town and plan to remain a governance village. The degree of hollowing out is on the verge of moderate, belonging to the dual form compound hollow village. The village has extensive land use, poor infrastructure conditions, and farmers' migrant work and farming are the main sources of income. The seasonal idle homestead is obvious.	Villagers are the key actors in village governance. The core of governance is the intensive use of idle land such as rural corners and ponds, the planning of village boundaries, the restriction of disorderly expansion, the encouragement of villagers to withdraw more homesteads, and the use of corners to supplement village greening, infrastructure, and the development of the planting industry.	 <p>Before</p>  <p>After</p>
4	Weizhuang village	The south is adjacent to Tuhai River and the west is adjacent to Ruyi Lake Reservoir. The degree of hollowing is low, and it is a double-form compound hollow village. Villagers work outside and perform traditional agriculture for a living—there is extensive land use and the supporting facilities are not perfect.	The key actor of village governance is the government. The core is to use irrigation and transportation advantages to develop planting industry, establish cooperatives and planting bases and focus on all aspects of the village, tap the landscape potential, and develop ecological tourism.	 <p>Before</p>  <p>After</p>

Mode 1: Relocation and merger–urban–rural integration mode. Mode 2: Village integration–scale operation mode. Mode 3: Village intensive–idle land revitalization mode. Mode 4: Original site optimization–sightseeing tourism development mode. The data in the table are from interviews, questionnaires, and remote-sensing images.

4.2. Mechanism of Modes

The relocation and merger–urban–rural integration mode is one of the development modes of relocation and merger villages. This mode is people-oriented, uses policy support and village collective funds to relocate the village as a whole, re-plans the original site, and transfers rural surplus labor to the community. Through demolition compensation and housing subsidies, the government encourages villagers to voluntarily withdraw from the homestead, move into the new community with perfect supporting facilities, and reclaim and develop the homestead and the village leisure. The model is applicable to villages around the town, which are close to the town, have good transportation and an industrial base, have great governance potential and low governance cost, and can easily achieve urbanization.

4.2.1. Operating Mechanism of Relocation and Merger–Urban–Rural Integration Mode

(1) Construction of the actor–network: Fangsijie village is located around the town, with policy support to carry out new community construction. The operation mechanism of the actor–network construction process is as follows: taking the hollow village governance group composed of the Fangsi Town government and the village committees as the key actors, through top-down solicitation, the stakeholders are empowered to remove obstacles in action. ① Administrative recruitment. The government of Fangsi Town, together with surrounding villages, established a hollow village governance group, integrated multi-sectoral administrative resources, and joined the network of actors in the hollow village governance. ② Recruitment of housing and land. Set up a settlement area near the town center through the demolition compensation subsidies or housing subsidies to encourage the surrounding village’s villagers to withdraw from the homestead voluntarily. This involves the homestead and village idle land’s reclamation, taking land shares, joint development and the renovation of a joint stock system and other multiple utilization modes. ③ Recruitment of production and employment opportunities. Based on fine management, the main town is constantly building functional facilities to improve its carrying capacity and matching degree. Through the establishment of industrial zones and commercial logistics zones, the urban economy prospers, the commercial circulation and modern service industry are vigorously developed, the financing channels are innovated, the competition mechanism is properly introduced, and the investment of enterprises attracts a large number of employment opportunities for urban residents. ④ Recruitment of living environment renovation. Fangsi Town adheres to the core of “people’s urbanization” and aims to build a new livable house temple. Fangsijie village has been successfully included in the central budget investment plan to support the infrastructure construction of affordable housing projects, and CNY 17 million has been invested in the central budget. A total of CNY 26.854 million has been invested to support infrastructure projects for community reconstruction, which meets the basic demolition and resettlement support needs of 1251 residents. At the same time, it improves public services such as medicine, health, and education in the community, expands public spaces such as squares, parks, and libraries, and improves residents’ living suitability (Figure 6).

(2) The change of actors’ role: with the further integration of urban and rural factors, the OPP of the actor–network has shifted from hollow village governance to accelerating the construction of new urbanization and promoting the development of suburban integration. In the network of hollow village governance actors in Fangsijie village, the hollow village governance group plays a leading role among key actors, placing the village collective as the main body in a passive position. After the gradual relocation of villagers to urban communities, the government delegates most of its leadership to village-level actors. In the new network of actors, the government’s decision-making power gradually weakens instead of giving it the role of regulator and supervisor; the village’s two committees together constitute the community property office and gradually grasp the decision-making power of space development, supporting facilities, etc., which has become a trend among key actors. For non-human actors, the implementation of this model interconnects the

original elements of each village with cities and towns, forming a long-term urban-rural coordination mechanism. ① Urban and rural spatial coordination. After the completion of the Fangsijie community, farmers can not only obtain employment in the city but also enjoy the living environment of urbanization. The operation and management of the community are integrated with the city to build a harmonious space for urban and rural integration. ② Urban and rural economic co-ordination. Relying on industrial and commercial logistics zones to promote the free and efficient flow of land, capital, talent, technology, management, information, and other production factors between urban and rural areas, forms a standardized circulation order and creates an environment for all kinds of economic subjects to obtain equal opportunities and have equal rights. ③ Urban and rural social pooling. The combination of urban employment and residence can increase employment opportunities for villagers, attract the transfer of the surrounding agricultural population, speed up the integration of urban and rural areas, and achieve equalization from social management and public service supply.

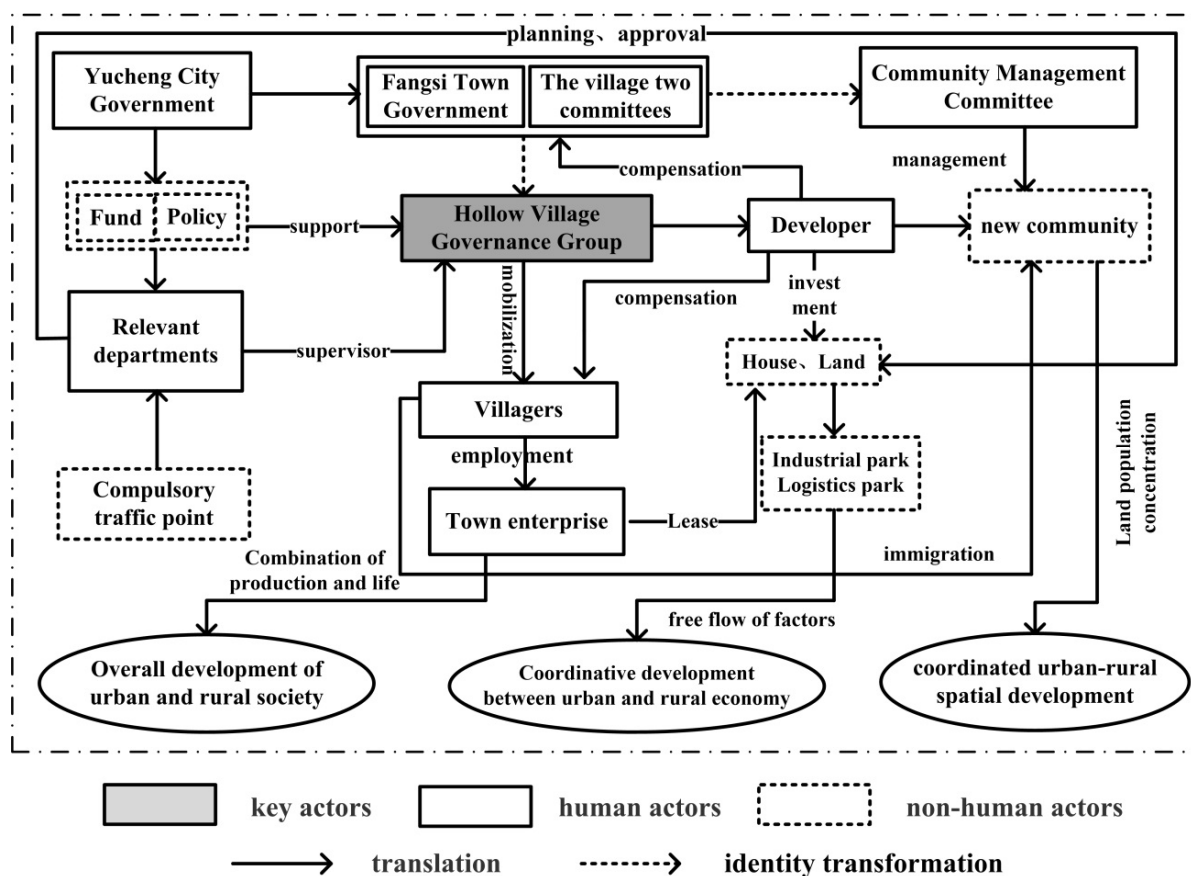


Figure 6. Action network of relocation and merger–urban–rural integration mode.

Under the top-down governance of the hollow village governance group, which is composed of the Fangsi Town government and the two committees of each village, the government formulates the governance scheme; the two committees of the village are then responsible for coordinating with farmers so that the various governance measures are carried out in a close and orderly manner. The village is based on the integration of urban and rural areas. The rural population is moved to the community near the center of the town, which promotes the integration of urban and rural populations. The population hollowing rate is reduced, the main structure of the village is improved, and the population density is increased. Moreover, under the radiation of urban enterprises, villagers have obtained a large number of jobs. While changing the traditional economic and occupational structure of the village, they also provide rich labor resources for urban

enterprises. However, due to the lack of timely reclamation and utilization of abandoned homesteads and idle land in the process of village governance, and villagers moving into urban communities and staying away from cultivated land, village land resources are extensive. In addition, it is difficult for villagers to adapt to urban life in the short term after moving into urban buildings. In the process of governance, villagers have always played the role of executors, and it is difficult to effectively participate in the process of village governance. Although the public service of the new community is constantly upgrading and the entertainment life is constantly enriched, the sense of belonging and identity is still low.

4.2.2. Operating Mechanism of Village Integration–Scale Operation Mode

The village integration–scale management model is a hollow village governance model, which aims to promote agricultural production efficiency, gather adjacent villages, plan a collective community residence, and revitalize idle land, so as to integrate the village population and land and promote agricultural modernization and land intensification. Taking Xingdian village as the center and Fangsi Town government as the key actors, the governance and rural development transformation of hollow villages is carried out. The actor–network construction and role transformation of its operation mechanism are as follows:

(1) Construction of actor–network: taking Xingdian village as the center and gathering surrounding villages, the activist network appoints the Fangsi Town government as the key actor and relies on the existing administrative network to recruit other actors.

① Administrative recruitment. The town government grasps the key links, such as policy implementation and fundraising, and supervises village collectives to lead the villagers to relocate as a whole or in stages according to the situation in the village.

② Recruitment of house and land. In order to avoid the unfair evaluation of the rural vacated homestead, the village committee should hire a third-party company to evaluate the house price and formulate reasonable compensation and resettlement standards. Agricultural land consolidation companies and village collectives will comprehensively renovate vacated and abandoned homesteads, inefficient use of land, and idle land, and establish a mechanism for balancing the interests of arable land in the east and west of the province at a price of 170,000/mu. The city supplements the corresponding cultivated land quota for the southeast coastal cities.

③ Recruitment of agricultural transformation. With financial support from the government and the financial transfer of arable land reclamation provided by the eastern coastal cities to Yucheng, about 60 mu of land has been transferred to build community industrial parks and ecological experience parks, promote the transformation of traditional agriculture to modern agriculture, make full use of the village's labor force, and provide employment opportunities and increase residents' income (Figure 7).

(2) The change of actors' roles: after the initial completion of the Xingdian community, its development is facing a new transformation. The OPP of the actor–network has turned to promote agricultural production and efficiency, which has led to a change in the role of actors and the addition of new actors. For human actors, through village integration, originally scattered villages are gathered into resettlement areas. Under the guidance and supervision of the government, the "two committees" of the village assume the main responsibility for the transformation and development of the village. By coordinating the interest relationship between the investing enterprises, the villagers, and the village collective, the original independent economic status of each village will be broken, and a new community of interests will be formed. To a certain extent, this gives new actors an incentive to enter the network. For non-human actors, on the basis of large-scale operations, the goal of increasing agricultural production and farmers' incomes is to build a modern agricultural industry complex linked by factors, industries, and interests.

① Industrial chain. Xingdian community village collectively led the villagers to develop live pig breeding and greenhouse planting, dairy cattle and beef cattle breeding, and build a community industrial park and ecological experience through land transfer. The village

collective exerts its own functions, organizes and guides villagers to find employment in the park, actively cooperates with enterprises and attracts investment from them, expands publicity to attract consumers, builds the village brand, achieves an effective connection between agriculture and the secondary and tertiary industries, and forms a modernized agricultural industry chain. ② Element chain. Each business entity in the community industrial park establishes the buying and selling relationship of agricultural production materials and services by signing contracts, urges the close binding of business activities and continuously explores the establishment of a traceability system for the whole process of agricultural product origin, growth, production, and processing, forming a modern agricultural element chain. ③ Interest chain. Investing enterprises provide agricultural production materials to the industrial park and purchase agricultural products to solve the problem of shortage of funds. Villagers invest in labor to solve the problem of the labor shortage. The village collective coordinates agricultural professional enterprises to solve the problem of backward technology. Each subject exerts its respective advantages to ensure the rational operation of the industrial park, so as to obtain stable profits and form a chain of interests.

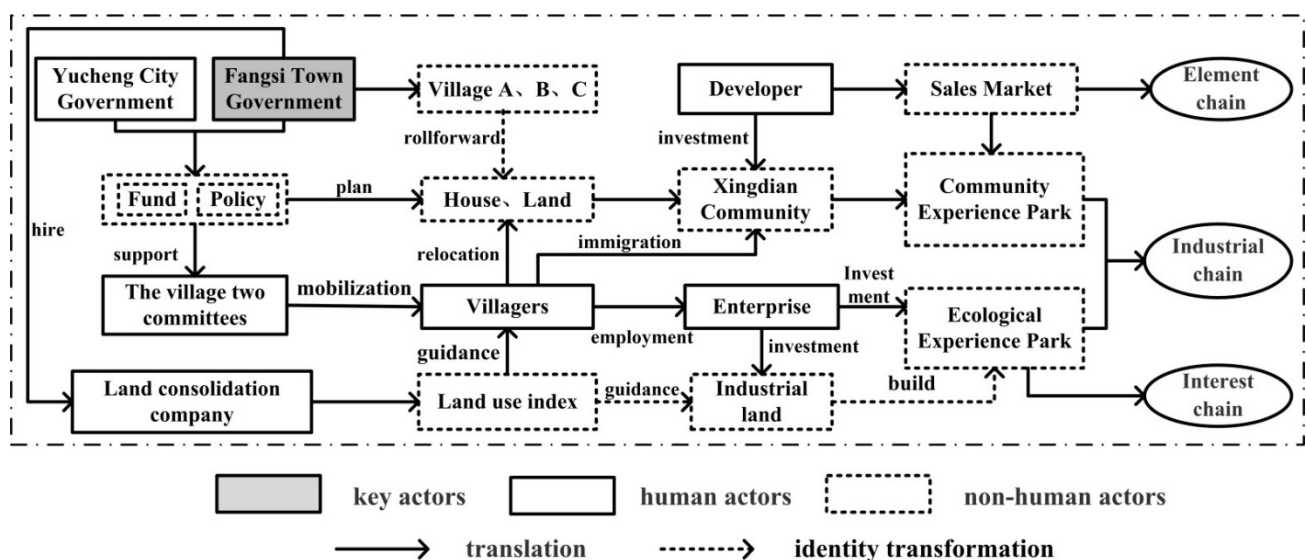


Figure 7. Action network of village integration-scale operation mode.

As a result of the translation of the network of actors, various actors promote the organic integration of new subjects, new industries, and new layouts in Xingdian village. With the support of policies, engineering construction and the participation of villagers, Xingdian village, based on village integration, gathers the originally scattered villages into the central village and conducts professional and comprehensive renovations of vacated land, homesteads, and idle land. Using the policy of linking increase and decrease to obtain financial funds, the village has realized the large-scale operation of the community, which not only effectively reduces the rate of homesteads, construction land, and abandoned cultivated land, but also builds an agricultural industry complex, changes the economic structure, and provides local employment for villagers. Large-scale management not only improves the efficiency of land use but also forms the industrial chain to enhance the collective economic benefits of the village. The increase in income is conducive to attracting the local population to return home for employment and the foreign population and enterprises to invest in suitable industries. Economic construction has also led to positive spiritual civilization and construction. Population, land, industry, organization, and culture form a positive interaction. The degree of hollowing out of the village is reduced and the transformation from a hollow village to a solid village is gradually realized. However, in village governance, it is difficult for farmers and village collectives to play a dominant role. On the one hand, in the early stages of village governance, village collectives and

farmers are passive recipients of various measures. On the other hand, after the merger of villages, due to the increased community population, follow-up management and supporting facilities are not timely in place, the grassroots management is unstable, and the satisfaction of the masses is reduced to a certain extent.

4.2.3. Operating Mechanism of Village Intensive–Idle Land Revitalization Mode

The intensive and idle land revitalization mode in the village is a hollow village governance model that retains governance. That is, based on the original village site, through the repair of the original houses and infrastructure, the idle land is sorted out, and the integrated land is transferred to improve land-use efficiency and develop the collective economy. It applies to villages far from towns. With the support of the two committees and policies of the village, Zhengniu village carries out the hollow village governance action of idle land revitalization in the village intensive mode. The actor–network construction and role transformation are as follows:

(1) Construction of the network of actors: the network of actors under this mode recruits other actors with the two committees of Zhengniu village as key actors. ① Administrative recruitment. According to the various standards specified by the Yucheng City government and the Fangsi Town government, villagers are encouraged to participate in the integration of existing resources of the village and attract enterprises to join the actor–network by attracting investment. ② Recruitment of housing and land. Zhengniu village introduced construction companies through bidding to repair the houses in the village. The compensation standard of CNY 200 per house encourages villagers to withdraw from more homesteads and arrange 100 mu of idle land and formulate reasonable land transfer and reuse schemes. The land was registered for confirmation and contracted to villagers through cooperatives, and the villagers were encouraged to work independently. ③ Recruitment of industrial development. Zhengniu village, around the town’s construction of the economic forest belt and high-quality line work deployment, made full use of the reclaimed land by planting 5000 persimmon and peach trees to create the ‘Wanshiruyi Zhengniu village’ brand. ④ Recruitment of environmental remediation. The village uses the special governance funds allocated to harden village roads, construct basic societal needs such as domestic garbage and sewage treatment equipment, configure public service facilities such as health and entertainment, and plant 3000 green seedlings such as cherry trees, crabapples, and holly to improve the natural environment and living environment of the village (Figure 8).

(2) The change of actors’ roles: with the implementation and preliminary completion of the mode, the OPP of the actor–network turned to the development of farming and the construction of green villages. In the actor–network, the village collective, as the leader, cultivates the characteristic planting industry through the transformation of the old village. After the economic trees show benefits, the village collective and the villagers are distributed in proportion. For non-human actors, tomato planting is used as a means to establish an industrialization development model to build a green countryside. ① Product ecosphere. With villagers as the main body, the village takes the development of green agricultural product brands as the center, actively explores the management mode of ‘village collective + farmers + market’, gives full play to the role of village collective bridges, and links and vigorously promotes the unified purchase, planting, management, sales, and other ‘four unified’ planting modes to realize standardized planting. ② Village ecosphere. Through animal and plant production and microbial transformation, the balanced ecosystem can be restored, the small ecological cycle within the village area can be realized, the carrying capacity of the rural ecological environment can be improved, and the foundation for building ecological sightseeing agriculture in the future can be laid.

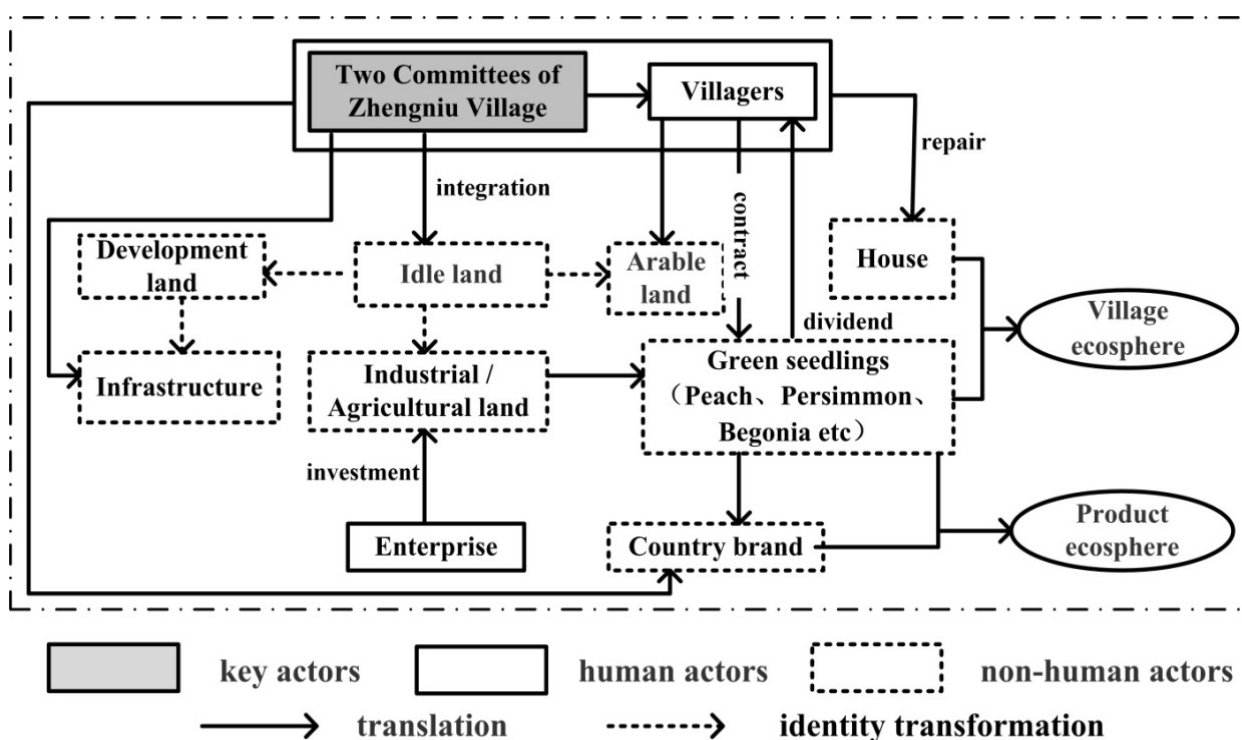


Figure 8. Action network of village intensive-idle land revitalization mode.

In order to retain governance within the village as the foundation, after finishing the homestead and village idle land, Zhengniu village was contracted to the villagers. Through the joint participation of the villagers, the abandoned homestead, idle construction land, and cultivated land in the village are effectively utilized; the main role of the village collective and the villagers' rural construction is also fully exerted and the endogenous power is actively exerted to promote the structural balance and quality improvement of the village population. At the same time, revitalizing idle land has improved land use efficiency, developed characteristic agriculture, and cultivated economic trees to improve industrial efficiency. This model also continues the village culture, repaired houses, and construction of an ecological livable governance system and cultural environment. The quality improvement and efficient utilization of land resources affect the scale of agricultural farming and the ecological environment, providing conditions for agricultural production and creating a livable living environment for villagers. The increase in production and efficiency, the improvement of the chain, and the optimization of the industrial structure have improved the level of collective economy and land value, attracting the return of the migrant population and external capital investment and helping to achieve rural revitalization. However, due to the village supporting infrastructure and public services still having room for improvement, the effect of attracting migrant workers to return home is general. At the same time, the lack of young talent in the construction of grassroots organizations also makes grassroots governance lax with a lack of innovation, and it is difficult to support the follow-up optimization operation of the industry, which severely strains the overall development of the village in the future.

4.2.4. Operating Mechanism of Original Site Optimization–Sightseeing Tourism Development Mode

The original site optimization–sightseeing tourism development mode seeks to fully tap the village landscape resources, carry out rural tourism, improve supporting facilities, support agriculture by tourism, optimize the income structure of villagers, attract the return of migrant workers, introduce enterprises and excellent talents, and inject new vitality into rural development. Relying on tourism endowments, Weizhuang village

develops landscape resources and tourism villages. The network construction and role transformation of its operational mechanism actors are as follows:

(1) Construction of the actor–network: the network of actors under this mode takes local governments as key actors and recruits other actors from bottom to top. ① Administrative recruitment. Based on the preferential policies and financial support designated by Yucheng City, the Fangsi Town government actively joins relevant departments, including tourism departments and village collectives, as well as the network of actors, and undertakes corresponding responsibilities. ② Recruitment of housing and land. Integration of the construction land in the village; the villagers, according to their own wishes to repair the house, run the farmhouse, homestay and conduct other tourism services, and improve the beauty of the village while increasing income sources; there is also the large-scale management of land in the village, the introduction of high-yield varieties of pears, and the establishment of a planting base. ③ Recruitment of environmental remediation. Through discussion with the Weizhuang tourism management office, a comprehensive environmental improvement scheme was determined and the water quality, roads, and public places in the village were comprehensively developed. Roads were hardened, sewage treatment stations and squares were established, and public space was increased. ④ Recruitment of landscape resources. The environmental planning company is invited to redesign landscape resources such as village buildings, optimize the landscape layout, and develop the value of the human landscape. Through offline activities such as pear garden sketching, the media of the Yucheng newspaper, and the enthusiastic attention of the Yucheng Photographers Association, there is attraction in promoting the construction of rural brands. At the same time, entertainment, accommodation, catering, and other services are gradually improved to provide employment opportunities for returning people and villagers (Figure 9).

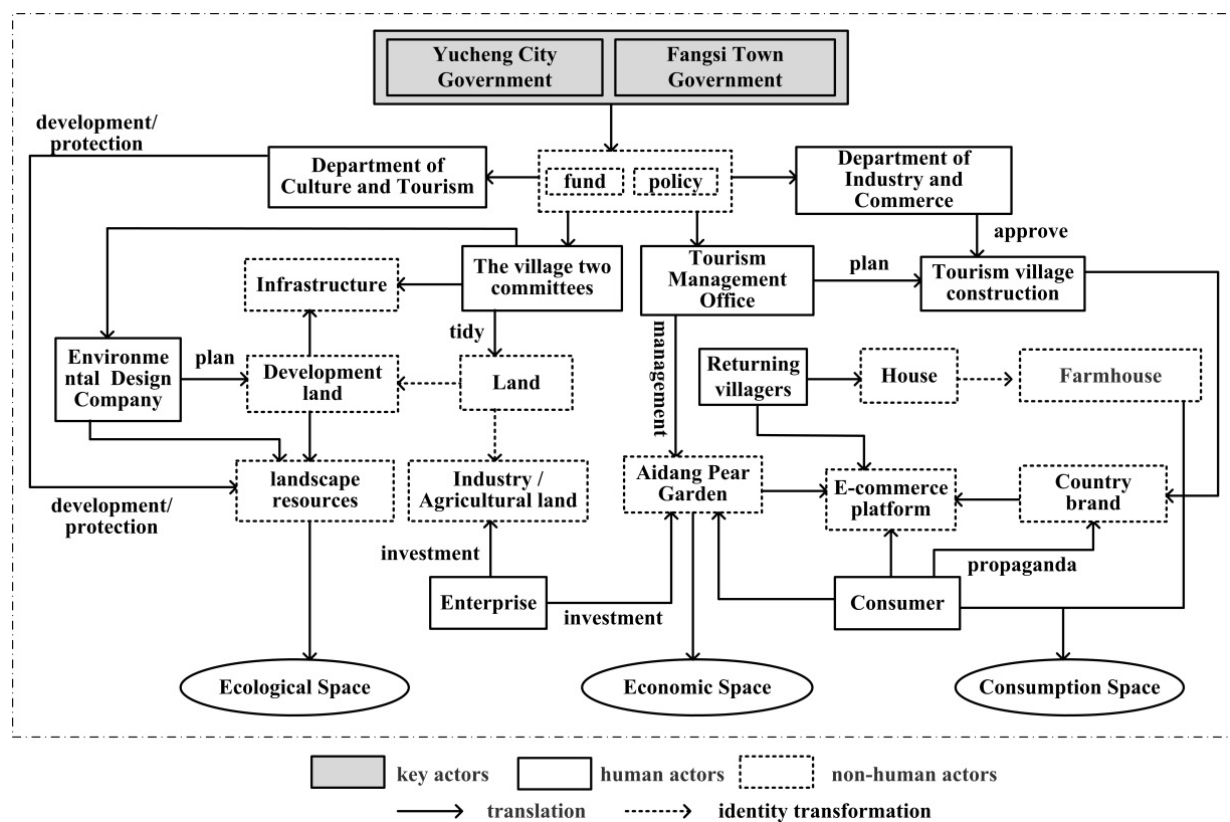


Figure 9. Action network of the original site optimization–sightseeing tourism development mode.

(2) The change of actors' roles: with the implementation and preliminary completion of this model, the actor–network OPP has transformed into the construction of tourism villages, and new actors have entered the actor–network of tourism village construction

under the influence of rural governance and operation concept renewal. For human actors, the government has become the supporter, followed by the original leader, giving preferential policies and publicity channels to rural areas. Low-level subjects such as tourism management offices and villagers, which were originally in a passive position, have gradually mastered the decision-making power of rural operations. The trend of rural development has attracted heterogeneous actors such as returnees and consumers to join the network. At the same time, due to the exclusion of the network itself, the old actors may withdraw from the network because of objections, such as some enterprises withdrawing from investment and a commodity exit from operations. For non-human actors, through the repair of the original houses in the village and the brand promotion of the Aidan pear garden, a cluster of ornamental consumer goods is formed. With the construction of tourism villages, the consumption space, which includes picking gardens, pear gardens, catering, and accommodation, is integrated into the characteristics of rural customs, which is endowed with more consumption characteristics.

Under the guidance of the key actors of the Yucheng City government and Fangsi Town government, the governance of the Weizhuang hollow village is based on the development of tourism, making full use of the internal landscape resources and cultural resources of the village, giving full play to the charm of rural traditional culture in order to attract tourists and enterprises, and making comprehensive use of the village land to take large-scale operations, so as to improve the efficiency of village land use, adjust the economic structure of the village, and greatly promote the diversified development of the village industry. Enterprises, as the main force in the construction of tourism villages, run through the investment, construction, and operation of villages, while villagers have the dual identity of participants and operators. They have more discourse power in the process of village governance and provide suggestions for the development of villages according to their own business conditions. Participation is high, which greatly increases the recognition and satisfaction of the masses with village governance, so as to extend the improvement of villagers' identity, sense of belonging, and satisfaction with rural culture. However, the development of tourism in the village lacks innovation and the lack of talent and villagers' professional knowledge makes it difficult to participate in the decision-making of village development. Farmers' self-management makes the role of village collectives in the distribution of decision-making interests weak; grass-roots organizations copy the experience of the construction of tourism villages with a lack of characteristics, coupled with the complex elements involved in tourism villages; it is difficult to achieve the expectations of village collective governance capacity in a short time, resulting in defects in the village tourism environment and services.

4.3. Policy Implications

Through the above analysis of the construction process and operation mechanism of the network of actors in different governance modes of hollow villages, we find that the governance of hollow villages does not refer to single governance on a certain aspect, but a comprehensive project with a comprehensive nature, which is continuously promoted in the interaction between the governance subject and the governance object. The supply of natural resources and village location conditions are important factors affecting the development direction of the village. The diversity and complexity of governance make it necessary to consume more material resources and time, which requires policymakers and key actors to comprehensively consider the existing resources and conditions of the village and the problems faced in the process of village governance when making governance decisions.

(1) In terms of governance objects, governments should first improve the financial system of village governance to meet their long-term capital needs. On the one hand, villages should be clear about the use of special funds approved by the state finance for the governance of hollow villages, establish a strong supervision mechanism for the use of the funds and record and disclose the funds needed by all parties involved in the

governance of hollow villages, so as to fundamentally eliminate their misuse. At the same time, the governance subjects should actively carry out market-oriented operations, encourage multi-party forces to participate in investment, continuously strengthen the construction of the village's collective economy, expand the rural business market, fully tap the rural resources and potential resources, and accumulate, restructure, and operate the assets of hollow villages, so as to obtain benefits, realize the self-accumulation and self-development of villages, and provide strong support for the development of hollow villages. Secondly, it is necessary to establish a long-term security and management mechanism, carry out long-term management and protection for the development of hollow villages, and formulate rules, regulations, and supervision systems for environmental protection and public facilities maintenance so as to protect the improvement of the production and living environment of the village and strengthen the operation mechanism of labor security, especially the problem of land loss and unemployment of some villagers in the relocation and merger management mode. The government should strengthen employment training for villagers so that they can find their own employment. Finally, it is important to pay attention to the construction of the rural public cultural service system. In the process of hollow village governance, it is necessary to clarify whether the improvement of material life or the enrichment of spiritual life is an indispensable part of hollow village governance. It is necessary to pay attention to the development of the economy and not neglect the construction of culture. The main body involved in the governance of hollow villages should clarify the rich connotation of rural culture. On the one hand, it includes landscape resources, spatial texture, village buildings, production tools, and other material aspects of culture, but also includes folk customs, traditional crafts and arts, and village regulations and conventions, especially values, moral values, and simple rural customs. On the other hand, it is necessary to innovate new ideas of cultural construction and reshape rural public cultural service projects and public cultural service spaces by means of digitalization and networking, especially for the relocation of merged villages. It is necessary to enrich the cultural atmosphere of villages through cloud libraries, online cultural lectures, and other information technologies, and improve villagers' sense of belonging and identity.

(2) In terms of governance subjects, first of all, villagers are the owners and participants of the governance results of the hollow village. Therefore, in the governance of the hollow village, governments should adhere to a people-oriented principle. Whether it is the village merger or village planning, it should respect the wishes of farmers, effectively protect their vital interests, and give them enough time to understand the relevant policies and regulations and respect their choices in line with their own interests. In addition, encouraging migrant farmers to return home and start a business is an important way to give full play to the dominant position of villagers in the governance of hollow villages. Encouraging them to participate in the governance of hollow villages can enhance villagers' recognition. In terms of governance methods, the government should choose the way that is suitable for the current situation of the village, try to achieve democratization and diversification, highlight the main feelings of the masses in participating in the governance of hollow villages, and expand the main force of rural governance. Secondly, governments should improve the governance level of village cadres, strengthen the construction of the talent team in rural grassroots organizations, broaden the way of selecting village officials, and encourage college students and migrant workers with abilities and good management to join the village cadres. Innovation of grassroots governance, through the Internet and other technical means to open rural affairs, takes initiative to accept the supervision of villagers and large numbers of migrant workers; it is difficult to participate in village-level activities and villagers' meetings in a timely manner so that villagers have a convenient understanding of grassroots governance and their sense of identity and trust in grassroots organizations is enhanced. Finally, according to the actor-network theory, the government, villagers, enterprises, and other social forces should play their own advantages in accordance with the law and communicate, coordinate, and cooperate with each other in order to achieve the goal of hollow village governance, which requires a

variety of ways to stimulate the initiative of the governance subject and give full play to the resultant force between the various subjects. In the process of governance, governments should pay full attention to the interests of all parties, minimize the damage to interests as much as possible, and fully mobilize the initiative of multiple governance subjects. In particular, villages should use multiple methods, such as introducing preferential policies and reducing loan interest rates, to encourage enterprises to play an economic leading role in rural construction. Governments should use enterprise projects to expand industries and improve villagers' incomes by providing jobs, village-enterprise cooperation, and land transfer. At the same time, governments can learn from the combination of urban management and methods with the development path of hollow villages, so that enterprises can promote their governance while simultaneously ensuring their economic benefits and enhancing the motivation of enterprises to participate in investment and governance.

5. Discussion

5.1. Hollow Village Governance Mechanism

Hollow villages exist in the complex rural internal and external environment and socio-economic network. The governance of hollow villages is rooted in the constraint framework of behavioral objects such as rural internal space, economy, and society, and embodies the game, competition, and cooperation relations among stakeholders such as the government, enterprises, and village collectives.

In terms of governance object, the economic, spatial, and social subsystems in the village's internal system constitute the behavior object of hollow village governance. The interaction of each subsystem and its elements shapes the single-dimensional and multi-dimensional appearance and morphological characteristics of the hollow village and exerts an important influence on the governance mode, operation mode, and actor input of hollow village governance. The formation process of hollow villages is a phased process in which low-quality solid villages finally form hollow villages. The formation of hollow villages can be seen as the current conditions and development level of villages that find it difficult to meet the needs of farmers for living conditions and quality. Farmers leave the village to seek a better life, or the material and spiritual needs that can be provided within the village continue to decrease, leading to the decline of the village. According to the influencing factors on the formation of hollow village force direction, it is divided into a core driving force and a foreign aid pulling force. On the one hand, in the core system of rural areas, the changes in agricultural production development, social and cultural changes, public service facilities, road construction, and the diversified transformation of farmers' livelihoods affect the adjustment and change of the rural economy, space, and ecology, and play a fundamental and endogenous role in promoting the evolution and development of rural hollowing. In particular, due to factors such as regional position and the natural conditions of some rural areas, the poor conditions and economic benefits are low. Under the influence of factors such as the lack of employment opportunities, low income levels, and low quality of education, farmers will have the psychological orientation of separating from rural areas and integrating into urban and non-agricultural industries. On the other hand, during the accelerated development of industrialization and urbanization, the pulling force of the rural foreign aid system is the dominant driving force for the formation of hollow villages. The main performance is industrialization, and the urbanization process of the modern agricultural industry is to replace agricultural labor and land investment; the attraction of urban rich jobs provides a driving force for the transfer of the rural population, as well as to meet the farmers' access to quality education, public service resources, and improve the quality of life needs, fundamentally making the rural population hollow. The reform and innovation of the land-use system have brought about a change in land management mode and an increase in farmers' income, and the lag of land management policy, social and cultural changes, and inheritance have jointly promoted the hollowization of rural land. In addition, the urban bias of the national policy system and the allocation of funds have long ignored the development of rural areas, blocked the flow of urban and rural

factors and the lack of physical, human, and technical capital to promote rural development, resulting in insufficient internal development momentum in rural areas, weak governance capacity, backward cultural technology, a short industrial chain, and low added value; as a consequence, rural industry, organization, and culture hollow out. At the same time, in the process of the evolution of the rural regional system, the whole rural system will deviate from the evolution track if it encounters unexpected or unpredictable events or phenomena, such as floods, geological and other natural disasters, or major project construction, major pollution, and other human events, which is manifested as the rapid development of village hollowing or from hollowing to solidifying.

In terms of the main body of village governance, areas with a high level of non-agriculturalization or rich resource endowments have strong demand for construction land, relatively open ideas of farmers and a strong driving force for the implementation of hollow village governance. In regions with a low level of non-agriculturalization, there is a single industrial type; the income source of farmers is mainly agriculture, farmers are highly dependent on land and the driving force of hollow village governance is insufficient. In addition, the comprehensive effects of village location conditions, development orientation, information level, and other factors also affect the choice of the hollow village governance mode, such as convenient transportation, small and agglomeration villages, large idle land areas, and agriculture-based industrial structure villages. It is suitable to adopt an integrated village model to realize the integration of the population and residents through the relocation of scattered villages and the construction of new communities. Located in the urban fringe area or around the central town, the livelihood of farmers is mainly reliant on the villages that work outside. It is suitable to adopt the urbanization-led model, and the focus of governance is to solve the matching problem between employment and housing in rural towns. At the same time, the internal and external environments of the village have a great influence on the operation mode of the governance organization of the hollow village. For example, the villages around the town or with a high non-agricultural output value will obtain higher economic benefits through rural governance. The enthusiasm of enterprises to participate in governance is high, and multiple financing mechanisms and organizational operation modes are formed. The hollow villages with a single industry, which are far away from the central town, are dominated by the government and the village committees. Hollow village governance involves local government and relevant departments, developers, construction or investment enterprises, villagers' committees, farmers, and other stakeholders. Each group has different goals and interests and forms a hollow village governance action subject system through communication and coordination. The power operation of the government, the capital operation and development behavior of enterprises, the coordination behavior of the two committees of the village, the individual willingness of farmers, and the game and cooperation among various stakeholders jointly affect the governance mode of hollow villages and promote the change of land and space of hollow villages.

To sum up, the external environment derived from urban and rural development in the process of urbanization, such as technological progress, policy change systems, and development planning and positioning, provides the necessity and possibility for the governance of hollow villages. At the same time, the internal population–land–industry–organization–culture and other morphological representations of hollow villages provide the basis for their classified governance. Hollow village governance refers to the process of intervention and adjustment of the behavior object based on the planning and design, financing, organization, and implementation of the governance model after the comprehensive evaluation of the internal and external environment of the village by the behavior subject, so as to achieve the goal of rural industry prosperity, affluent life, ecological livability, rural civilization, and effective governance (Figure 10).

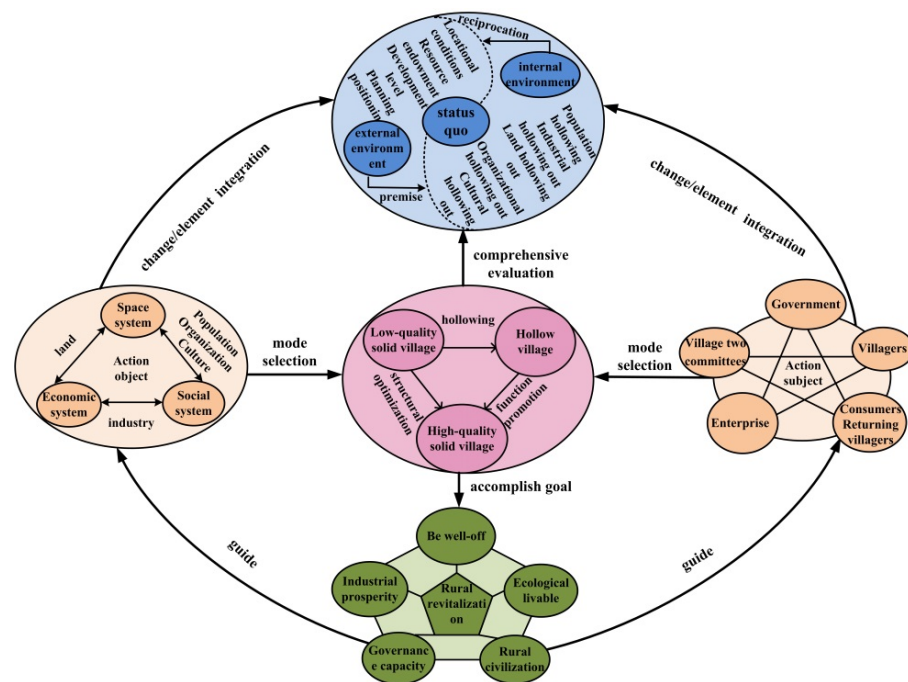


Figure 10. Governance mechanism of a hollow village based on action network.

5.2. Different Hollow Village Governance Mode Applicable Conditions

According to ‘relocation and merger’ and ‘retention of the original site’, which are two categories of hollow village governance based on the four types of suburban integration, relocation and merger, agglomeration promotion, and characteristic protection village classification and development, we selected Fangsi Town village (suburban integration type), Xingdian village (relocation and merger type), Zhengniu village (agglomeration promotion type) and Weizhuang village (characteristic protection type) as typical hollow village governance cases in plain agricultural areas, and explored the governance mechanisms of different modes on the basis of the actor–network theory. We found that, due to the different supply conditions and economic development needs of villages, there are differences in the spatial characteristics, driving mechanisms, development goals, and suitable locations of different governance categories and different development types of hollow villages under the same category, which have certain applicable conditions (Table 3).

Table 3. Applicable conditions of different hollow village governance modes.

Mode	Spatial Features	Drive Mechanism	Target	Key Actors	Operating Features	Appropriate Types
1	Relocation and withdrawal	Foreign aid	Suburban integration and overall development	Town Government and Village Committees	Interest coordination among multiple subjects	Villagers are less dependent on agricultural income in suburban towns
2	Relocation and withdrawal	Foreign aid	Residential concentration, land concentration, large-scale operation	Town government	High administrative dependence and industrial chain construction mechanism	Far from town, village gathering high, production and living layout chaos
3	Original site reservation	Inside core	Improving land use efficiency and developing collective economy	The village two committees	Flexible forms, strong participation of villagers	Production and living function foundation is good, villagers to agricultural income dependence degree is high
4	Original site reservation	Inside core	Building rural brand by traveling agriculture	Local and town governments	High dependence on enterprises and strong consumption characteristics	Good tourism resources and convenient transportation

Mode 1: Relocation and merger–urban–rural integration mode. Mode 2: Village integration–scale operation mode. Mode 3: Village intensive–idle land revitalization model. Mode 4: Original site optimization–sightseeing tourism development mode.

Specifically, in different types of modes, in terms of spatial characteristics, the ‘relocation and merger’ type of hollow village governance mode is usually intended to renovate several adjacent hollow villages; the key actors mobilize and recruit the villagers, and the villagers exit the homestead in an orderly way and move into the centralized resettlement area. Human actors reclaim the homestead and idle land in the village and adopt a variety of methods, such as land equity or farmland balance, to centralize the planning and utilization of reclaimed land, so as to achieve population and land centralization. However, the “retention of the original site” model in relation to hollow villages refers to managing the village on its original site. Through housing, environmental remediation, and other projects, the living environment of the village is improved. Relying on the natural endowment of the village, the idle land is revitalized and landscape resources are developed to realize the characteristic agricultural production or ecological sightseeing agriculture. In the driving mechanism, under the ‘relocation and merger’ type of hollow village governance mode, villagers are mainly guided by the policy; they are moved to the centralized resettlement area under the government policy, the land is transferred, and the former detainees and some migrant workers become employees of the enterprises and the social security and infrastructure construction rely on the government policy, which is the hollow village governance mode under the influence of foreign aid. However, under the ‘retention of the original site’ mode, the improvement of farmers’ living standards is in great contrast with the current living conditions and living environment expectations, and the inherent willingness of farmers to renovate is strong, but it is difficult to rely solely on the strength of farmers themselves. Support from government policies and funds is needed to improve village conditions or develop village-specific resources, so ‘address retention’ is a ‘village self-renewal’ method driven by the internal core.

In the same category as the hollow village governance mode, other mode types are also different. In the governance model of “relocation and merger,” the key actors of the relocation and merger–urban and rural integration model are the Fangsi Town government and the two committees of each village. Each village organizes housing and land, and the villagers move into the community, supporting a series of housing security policies, establishing industrial zones and commercial and trade logistics zones, providing jobs, and promoting suburban integration. Its goal is to achieve urban and rural spatial integration, social integration and economic integration, realize the construction of new urbanization, and promote the development of suburban integration. This is suitable for villages close to cities and less dependent on agricultural income. The key actor of the village integration–scale operation model is the Fangsi Town government. Xingdian village merges and integrates with the nearby villages, takes off homesteads, reclaims land, comprehensively renovates inefficient land use and idle land, and builds modern community industrial parks and ecological experience parks. Its goal is to achieve residential centralization and land centralization, realize scale operations, and promote agricultural production efficiency. It is suitable for villages far away from towns with a high village aggregation, high rate of idle land, and a chaotic layout of village construction and agricultural production. In the ‘retention governance’ mode, the key actors of the intensive and idle land revitalization mode in the village are the two ‘village committees’ of Zhengniu village. Through housing and environmental renovation projects, Zhengniu village withdraws from multiple homesteads, carries out land circulation and idle land revitalization, and develops characteristic agricultural planting. Its goal is to improve land-use efficiency, develop the collective economy and improve villagers’ income. This is suitable for villages with good production and living functions and a high farmers’ dependence on agricultural income. The governance mode can be replicated. The key actors of the site optimization–sightseeing tourism development model are the Yucheng City government and the Fangsi Town government. Relying on tourism resources endowment, Weizhuang simultaneously develops and protects, builds tourism villages, landscape construction, agritainment business management, and characteristic fruit tree planting. Its goal is to support agriculture through tourism, so as to attract the return of the village

population and foreign population, manifest ecological value, and build characteristic rural brands. It is suitable for villages with distinctive landscape tourism resources or rich historical and cultural resources.

5.3. *Insufficient Research and Prospects*

To study the governance mode of hollow villages from the perspective of the actor–network, the subject and the object are actors with the same status. They form a close interactive network and jointly deduce the governance mode of hollow villages. However, due to the limitation of research scale and information availability, this study only analyzes the governance mode of typical hollow villages in China’s plain agricultural areas, and the understanding of the complex morphology of hollow villages needs to be deepened. Moreover, the governance mode of typical hollow villages may not be applicable to villages that are biased towards mountains or with complex topography and geology. In addition, in the context of rural revitalization, the governance of hollow villages should follow the path of development according to local conditions. Therefore, the governance mode of hollow villages such as Taobao Village, Logistics Village, and Industrial Village should be further studied.

In future research, we will describe the spatial pattern of rural hollowing according to the manifestations and types of hollow villages in different geographical environments, and systematically analyze the governance mode of typical hollow villages in the region from the perspective of regional differences, revealing the integrated operation mechanism of hollow village governance and rural revitalization, and forming “appearance–form–type–pattern–mode–mechanism”, which is a complete research system of hollow village governance mechanism under the guidance of rural revitalization.

6. Conclusions

Based on differences in the natural environment, social and economic development, and village governance modes of administrative villages, this study selected four case villages in Yucheng City, Shandong Province, namely, Fangsijie village, Xingdian village, Zhengniu village, and Weizhuang village. Based on the actor–network theory, this study analyzes the operation process and effect of typical governance modes, compares different hollow village governance modes, reveals their mechanisms from the perspective of governance subject and governance object, and puts forward targeted suggestions for the problems existing in the process of hollow village governance from the perspective of governance subject and governance object. The main conclusions are as follows:

- (1) In the case of the hollow village governance model, Fangsijie village adopts the relocation and merger–urban–rural integration mode with the hollow village governance group as the key actor, and the core is concentrated on relocation to urban communities to solve the matching problem of non-agricultural employment and living space of farmers, and to realize the urbanization of living and employment; Xingdian village takes the Fangsi Town government as the key actor of the village integration–scale operation mode and the core realization of large-scale management, centralized living, agricultural modernization and intensive land, and the centralized construction of a large-scale community agricultural park; Zhengniu village adopts the village intensive–idle land revitalization mode with the two committees of the village as the key actors, focusing on the intensive utilization of rural idle land and the development of the planting industry; Weizhuang village adopts the original site optimization–sightseeing tourism development mode with the Fangsi Town government as the key actor. The core aim is to use irrigation and transportation advantages to develop the planting industry, tap resource potential and landscape value and develop ecological tourism. Four cases of hollow village governance have achieved good results; the governance work carried out is orderly, but there are also some problems to be improved.

- (2) The hollow village governance mode based on the actor–network theory includes five aspects: key actors, governance subject, governance object, transfer, and identity transformation. In essence, the process of hollow village governance can be regarded as an actor–network space, which is dominated by key actors and promoted by various networks. In the process of governance, the organization mode and action mechanism of the governance subject act on the governance object and the network of actors is dynamically adjusted, which is manifested as the influence of the entry, exit, and role change of heterogeneous actors on the network relationship; this leads to the transformation of rural production and living space and realizes the transformation from hollow village to solid village. At the same time, due to differences in natural resource endowment, development degree, and development goals, as well as the influencing factors and governance requirements of the formation process of hollow villages, there are differences in the governance mode and operation process of hollow villages with different governance types and different development types under the same category. Relocation and merger–urban–rural integration mode applies to suburban villages with low dependence on agricultural income; village integration–scale operation mode is applicable to villages far from town, high village aggregation, production, and living layout confusion; village intensive–idle land revitalization mode is suitable for villages with good production and living functions and high dependence on agricultural income; the original site optimization–sightseeing tourism development mode is suitable for the villages with excellent tourism resources and convenient transportation. Within the general scope of towns in plain agricultural areas of China, the natural and geographical conditions of the same type of villages are basically the same. The favorable conditions derived from urban and rural development in the process of urbanization provide the necessity and possibility for the governance of hollow villages. The morphological representation of the governance object of hollow villages provides the basis for their classified governance. The four governance models provide experience for the precise governance of similar hollow villages in plain agricultural areas of China and the governance mechanism of hollow villages revealed in this study can be used for reference. This provides practical governance ideas for policymakers and key actors when making governance decisions.

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