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Rural development models in China: The participant's perspective

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ABSTRACT

This study aims to explore the feasible and sustainable rural development model in China from the perspective of participants. The paper proposed the concept of 'the community of rural development': the actors who participate in rural planning, housing and infrastructure construction, industrial development, environmental improvement and social progress, and analysed its evolutionary process from traditional to modern and social network structure characteristics. On this basis, the study proposed six models of rural development in China and selected six typical cases for detailed analysis. These models include village committee-led, peasant organization-led, township enterprise-led, government-led, external enterprise-led and NGO-led. Based on the methodology of social network analysis, the paper designed a simulated routing to analyse the network evolution characteristics of these models and elaborated four output indicators: clustering coefficient, average path length, density and degree centrality of the core actor. The results showed that the internal-actor-led model is superior to the external-actor-led model due to the close inter-relationships among the participants and the strong influence of the core actor. Finally, the paper proposed building partnerships in the community of rural development that are stable and harmonious over the long term and could promote rural development and sustainable renewal in a comprehensive way.

Contribution/ Originality: This study proposed six models of rural development in China from the perspective of participants and analysed their social network characteristics and developmental evolutionary paths. It is an important addition to the application of social network analysis to the field of rural development.

1. INTRODUCTION

In 2000, only 36.33% of China was urbanized, but by 2020 this figure had increased to 63.89%. Urbanization, stabilized by the countryside, is the engine of economic growth in China. Against this background of rapid urbanization, 500 million people still live in China's rural areas. Even if the urbanization rate reaches 70% in the future, China will still have a permanent rural population of 400 million. Since the founding of New China in 1949, and especially since the adoption of economic reform and the open-door policy in 1978, China's rural areas have experienced unprecedented development. By 2020, China had 2.86 million villages, and its construction investment in villages had reached 1150 billion CNY (Chinese Yuan). Nevertheless, the problem of uneven development between urban and rural areas is rather serious (Knight & Gunatilaka, 2010; Yang, Bao, Wang, & Liu, 2021). In pursuing its

objective of building a society that is prosperous in an all-around way, China's greatest challenge is that of rural development.

Rural development is a multi-level, multi-factor, multi-agent process that involves residents, resources, the environment, the economy and society. Moreover, rural development is an enormous social issue, and its core elements are the actors participating in it. The research on rural development models from the perspective of the participant has received much academic attention, such as community-driven development (Arnall, Thomas, Twyman, & Liverman, 2013; Bado, 2012; Nordberg, Mariussen, & Virkkala, 2020), participatory rural development (Kvartiuk & Curtiss, 2019), local action groups (LAGs)-led development (Esparcia, Escribano, & Serrano, 2015), non-governmental organization (NGO)-led development (Gupta, 2014), and rural partnerships (Erdiaw-Kwasie & Alam, 2016). Moreover, according to the characteristics of the participants, the rural development models have been categorized as bottom-up and top-down models (Murray, Greer, Houston, McKay, & Murtagh, 2009; Simms, Freshwater, & Ward, 2014), and exogenous, endogenous and neo-endogenous models (León, González, Araña, & De Leon, 2014; Petrick, 2013).

The central government introduced the 'New Countryside Construction' scheme in 2005 and 'Rural Vitalization' strategy in 2017, and China's quality supervision and standardization administrations jointly issued their 'Beautiful Countryside Construction Guidelines' in 2015, which established the requirements of rural construction and development. Adding to the complexity, regionalism and individual variation of rural development, rural development in China is usually classified into various models based on previous studies. The standards of classification include the region (Sunan model and Zhejiang model), the industry (agriculture, industry and tourism development models), the degree of development (developed, developing, and less developed models), and the driving forces (bottom-up and top-down models) (Long, Zou, & Liu, 2009; Yuan, Wei, & Chen, 2014). From the perspective of participants, relevant studies focus on the important roles of government, village collectives, enterprises, and NGOs in rural development (Pan, Wu, & Choguill, 2023; Wu & Liu, 2020; Xie, Zhu, & Benson, 2022; Zhang, Ye, & Duan, 2022). However, these studies paid less attention to the systematical study and contrastive analysis of all the types of rural development models based on the participant's perspective.

Social network analysis (SNA) is considered an effective method for analysing the actors involved in rural development. The existing research based on SNA mostly focuses on the social network structure, flows of information, roles, interactions and characteristics of actors in rural development (Furmankiewicz, Macken-Walsh, & Stefańska, 2014; Magnani & Struffi, 2009; Marquardt, Möllers, & Buchenrieder, 2012). However, few relevant studies have been conducted from the perspective of network development evolution and simulation.

Against this background, the present study proposed six rural development models from the participant's perspective, and conducted a comparative study of the network structure and evolutionary characteristics of different models by SNA, in order to exploring a suitable and sustainable development model for rural China.

2. THE COMMUNITY OF RURAL DEVELOPMENT IN CHINA

Rural development in China requires manifold interactions among various stakeholders. Drawing on the concept of 'community' proposed by Tönnies (1887), this paper defines the actors involved in rural development as 'the community of rural development'. This is a general, yet accurate, description of the actors who participate in rural planning, housing and infrastructure construction, industrial development, environmental improvement and social progress. These actors include governments, village committees, villagers, peasant organizations, township enterprises, external enterprises, NGOs, financial institutions and others.

2.1. The Evolution of the Community of Rural Development

The community of rural development is the main body and mover behind rural construction and development in China, and it has evolved from traditional to modern. Traditional rural areas in China were closed to outsiders, were

self-sufficient and were described as an 'acquaintance society' (*shurenshehui*) (Fei, 2012). 'The pattern of difference sequence' (*chaxugeju*) (Fei, 2012), consisting of consanguineous and geographical ties, was the social basis of farmers' livesand work. The traditional community of rural development is mainly composed of local actors; it is loosely organized but explicitly divided.

Since China's adoption of economic reform and the open-door policy, which have led to economic development and all-around social progress, traditional rural areas have experienced both disintegration and reconstruction and have evolved from closed to open. Agricultural production is no longer their only production mode, and farmers are not the only builders and users of villages. The community of rural development is thus becoming more complex and diverse, and the traditional community is no longer well suited to 'New Countryside Construction'. Therefore, building a modern community of rural development with Chinese characteristics is an extremely urgent need.

Against the background of modernization, globalization, marketization and urbanization, more and more organizations and individuals are involved in rural development. Together, they constitute the modern community of rural development, which is closely cooperative and interpenetrative.

2.2. The Structure of the Community of Rural Development

The community of rural development can be divided into the 'internal community' (including village committees, villagers, peasant organizations and township enterprises) and the 'external community' (including governments, external enterprises, NGOs and financial institutions), as shown in Figure 1.

Figure 1. The social network structure of the community of rural development in China.

A social network refers to a set of social actors and the relationships among them. The community of rural development is a typical social network structure and it is necessary to analyse its individual attributes and overall characteristics from a network perspective (Chaudhury, Thornton, Helfgott, Ventresca, & Sova, 2017). The characteristics of 'internal community' and 'external community' are as follows:

(1) The 'internal community' is a tight-knit group. It is the main body of rural development – the proponent, planner, implementer, manager and also the beneficiary. The internal community consists of the village committee, villagers, peasant organizations and township enterprises. These internal actors are focused on industrial development and quality-of-life improvements and participate in all aspects of rural construction and development.

In summary, the internal community is the basis and core of the community of rural development and also ensures the progress of rural development.

(2) Intervention by the 'external community' is uncertain. The external community is the promoter, mentor, supporter and investor behind rural development and is the major driver of innovation in rural development. External factors include governments, external enterprises, NGOs and financial institutions. These actors participate in rural development in various ways, and their interventions are uncertain. For instance, governments' investments in rural infrastructure and public service facilities depend on the active communication and coordination of the village committee. The technical support and guidance of NGOs must be understood and accepted by the internal actors. Investments by external enterprises depend on natural resources, the ecological environment, construction realities and other conditions of the local villages; they also require the internal actors' cooperation. Therefore, it is critical that bridges be built between the internal and external participants.

(3) The internal relationship within the 'external community' is disengaged. Rural development projects are generally small-scale and short-term. The external actors vary in their duration of involvement with the community, as governments, NGOs, enterprises, and financial institutions are usually involved in rural development independently of each other. Although they build relationships with the internal actors, they have few connections to each other, which creates problems of poor in formation flow and communication within the external community. Consequently, the external community has been the feeble portion of the community of rural development.

2.3. The Classification of Rural Development Models in China

The classification of rural development models in China is based on the concept of the community of rural development. This study proposes six models of rural development as shown in Table 1. These six models of rural development are led by different participants and also require the participation and support of other actors. During the process of rural development, the six models can evolve according to the social, economic, environmental and resource situations in different rural areas.

Table 1. Models of rural development in China.

No.	Model	Characteristics of rural development
1	Village committee-led model	The village committee leads villagers in implementing rural construction and development and actively promotes the participation of other actors. In this model, the village committee is a strong cohesive force, and the villagers demonstrate substantial enthusiasm.
2	Peasant organization-led model	The peasant organizations lead villages in developing agriculture, industries and services, which greatly accelerates rural economic development. The villagers have relatively high levels of initiative and satisfaction with regard to rural development.
3	Township enterprise-led model	The township enterprises mainly drive the development of rural economies and industries. In this model, the rural economic growth rate is usually faster than in other models.
4	Government-led model	The county government and township government promote rural construction and development using policy support, investment and guidance. Rural infrastructures and public service facilities are usually invested heavily in this model.
5	External enterprise-led model	The enterprises engage in agricultural production, processing, trade and the development of countryside tourism. In this model, the rate of rural development is rapid, but the participation of farmers is low in most instances.
6	NGO-led model	The NGOs provide ideas and technical support to the villagers and village committee and participate in various aspects of rural construction and development. This model requires the cooperation of villagers and the village committee.

3. METHODOLOGY

SNA provides a good description of the structure of relationships between participants, providing insight into individual and overall network characteristics (Scott, 2001). Complex networks focus on the statistical characteristics,

evolutionary mechanisms and dynamics of the network, such as random graphs, small-world networks (Watts & Strogatz, 1998) and scale-free networks (Barabasi & Albert, 1999).

This study selects four indexes to analyse the network characteristics of the community of rural development under different rural development models.

3.1. Clustering Coefficient

The clustering coefficient measures the degree of collectivization of the network. It reflects the degree of familiarity among the actors. The clustering coefficient of actor i describes the connections among the actors directly connected to actor i. Its calculation formula is as follows:

$$C_i = \frac{2A(i)}{K(i)[K(i)-1]} \quad (1)$$

Where $A(i)$ is the number of relations among the actors directly connected to actor i, $K(i)$ is the number of actors directly connected to actor i.

The clustering coefficient of the network is the arithmetic mean value of the clustering coefficient of all actors. In the network of the community of rural development, a higher clustering coefficient means stronger cohesion of the network.

3.2. Average Path Length

Average path length describes the average shortest distance of all the actors in the network. It reflects the degree of separation of the actors, or the size of the network. The calculation formula is as follows:

$$APL = \frac{1}{n(n-1)} \sum_{i \neq j} d_{ij} \quad (2)$$

Where d_{ij} is the length of the shortest path between actor i and j, n is the sum of the actors in the network.

In the network of the community of rural development, the average path length measures, to a large extent, the information flow efficiency of the network.

3.3. Density

Density measures the tightness of the network. It reflects the connection compactness of all the actors in the network. Its calculation formula is as follows:

$$\rho = \frac{2m}{n(n-1)} \quad (3)$$

Where m is the sum of the actual relations in the network, n is the sum of the actors in the network.

In the network of the community of rural development, density reflects the cohesion and connectedness of the network. The greater the communication and cooperation of actors in the community, the higher the degree of information and resource sharing in the network.

3.4. Degree Centrality of the Core Actor

Degree centrality is used to describe the number of other actors who connect directly to the core actor. Its calculation formula is as follows:

$$D_i = \sum_{i \neq j} x_{ij} \quad (4)$$

Where D_i is the degree centrality of actor i, x_{ij} is valued at 0 or 1, representing whether there is a relation between actors j and i.

In the network of the community of rural development, the core actor can be seen as the leader. This actor might have the greatest power and the highest degree centrality. During the process of network evolution, the change in the degree centrality of the core actor reflects the change in its centrality and influence.

4. CASE STUDY

4.1. Study Area

Corresponding to the six models of rural development, this study selects six typical cases in different areas of China. These cases include Yanhe Village (village committee-led model), Daizhuang Village (peasant organization-led model), Jianhua Village (township enterprise-led model), Anji County (government-led model), Luoshuai Village (external enterprise-led model), and Haotang Village (NGO-led model).

We have conducted thorough investigations in these villages from January to May 2021 and obtained a wealth of first-hand information and preliminary data. Semi-structured interviews were used as the main data collection method to investigate the rural development model in our work. The interview subjects in each village included 5 village committee members and 20 households. The interview checklist included three parts: the main participants and their behaviors in rural development; interrelationships among the participants; and the core participants and the key roles they play.

4.2. The Social Network Structure of the Community of Rural Development

4.2.1. Yanhe Village

Yanhe Village is located in Xiangyang City, Hubei Province (area: 12 km²; population: 1050). Through improvements to ecological agriculture and tourism, the economy, society and environment of the village have also developed. The per capita income of the villagers increased from 1900 CNY in 2000 to 30000 CNY in 2020. Yanhe Village has received many honours, such as 'National Ecological and Civilized Village', 'National Green and Well-off Village' and 'National Agricultural Tourism Demonstration Site'.

The village committee advocated for the establishment of village cooperative and led villagers in developing ecological agriculture and tourism. Under the guidance of NGOs, the environment for rural human settlement was greatly improved by implementing garbage classification and environmental renovation. The committee set up various incentives to encourage the villagers to participate in rural housing and infrastructure construction, environmental improvements and industrial development. In addition, the committee invited a number of enterprises, NGOs and governments to participate in rural development. All participants together constituted a community of rural development that was led by the village committee. The structure of the community is shown in Figure 2.

4.2.2. Daizhuang Village

Daizhuang Village is located in Tianwang Town, Jurong City, Jiangsu Province (area: 10.36 km²; population: 2879). In 2001, the Daizhuang Organic Agriculture Cooperative was established with the help of the agricultural specialist Mr. Zhao. Along with the development of organic agriculture, farmers' per capita income increased from 2800 CNY in 2003 to 34000 CNY in 2020. The cooperative was declared a 'National Model of Village Cooperatives'.

The village cooperative fully respected the farmers' wishes and carried out the unified planning, production, sales and management of organic agriculture. It established a profit mechanism of mutual benefits and risks and attracted 90% of the villagers to participate. All participants in rural development formed a community that was led by the village cooperative. The structure of the community is shown in Figure 3.

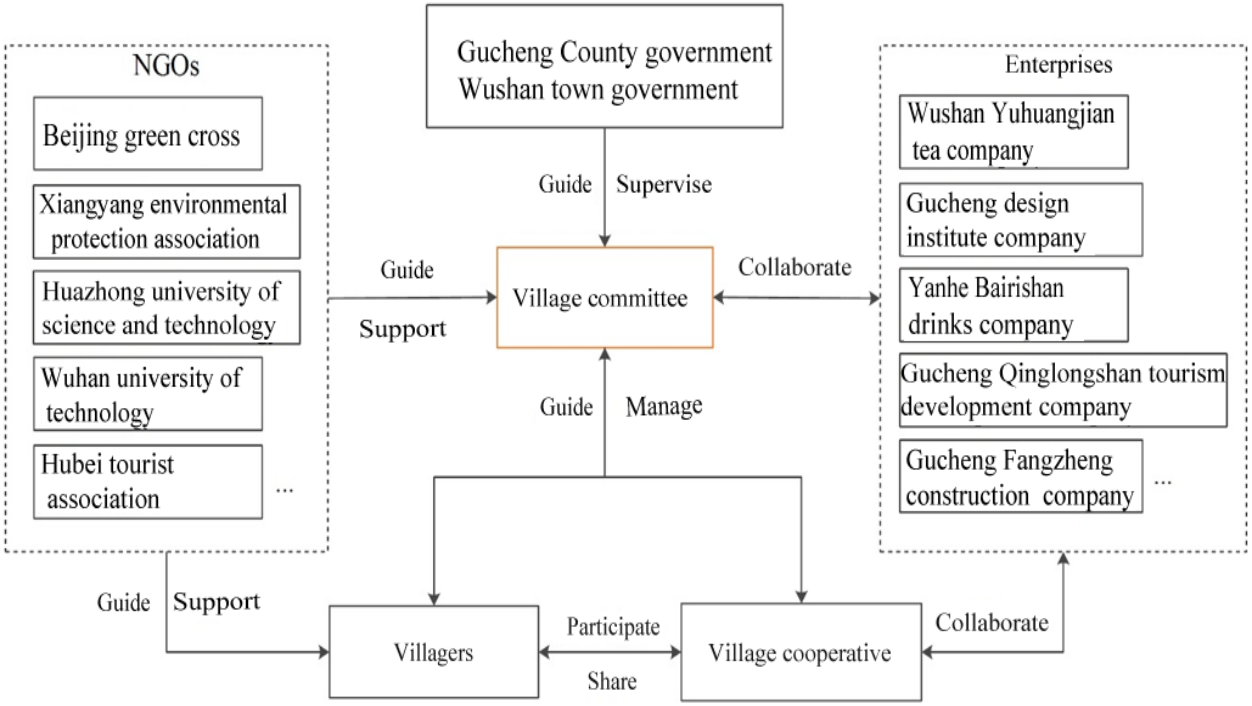

Figure 2. The structure of the community of rural development in Yanhe Village.

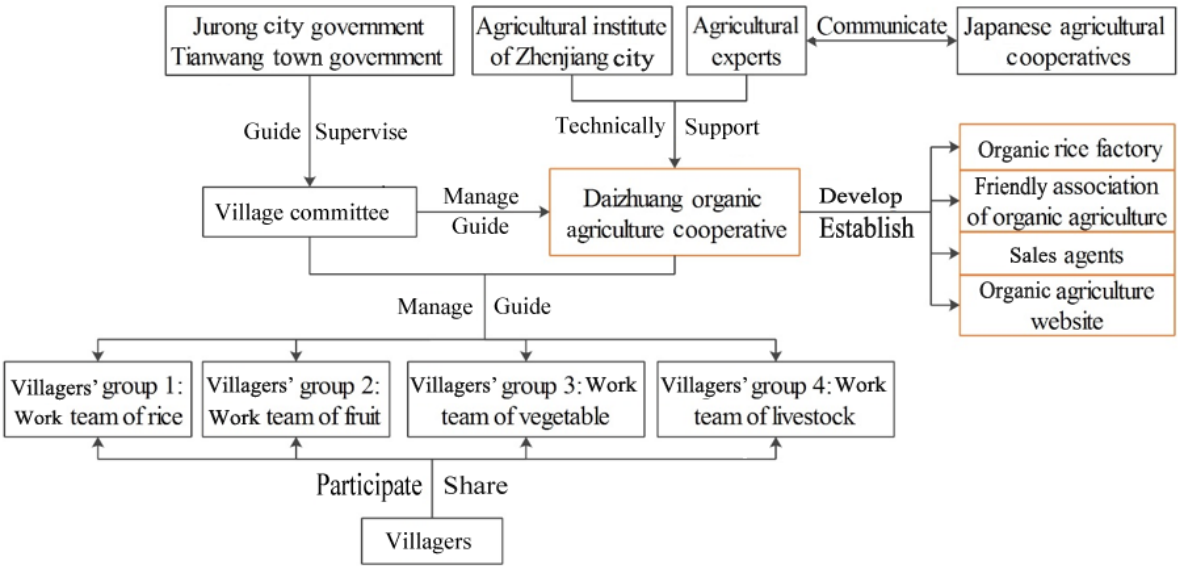

Figure 3. The structure of the community of rural development in Daizhuang Village.

4.2.3. Jianhua Village

Jianhua Village is located in Jinlin City, Jinlin Province (area: 6.4 km²; population: 4831). Led by the village enterprises, both the rural service industry and ecological agriculture developed rapidly. In 2017, the village enterprises made a profit of 28 million CNY. The village received the honours of 'National Civilized Village' and 'The Most Beautiful Village in China'.

Since 2001, the village has established several village enterprises, including a logistics company, an ecological agriculture company, a real estate company and others. These enterprises led the village's rural economic development and promoted the construction of rural housing and infrastructure. The development model of Jianhua Village can be considered a township enterprise-led model, and the structure of the rural development community is shown in Figure 4.

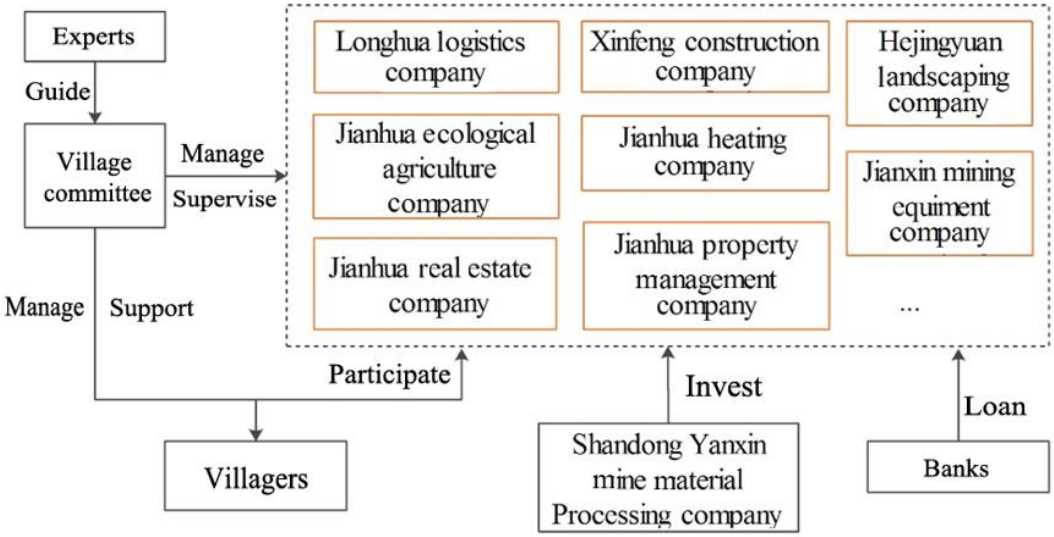

Figure 4. The structure of the community of rural development in Jianhua Village.

4.2.4. Anji County

Anji County is located in Huzhou City, Zhejiang Province and contains 187 villages. In 2008, Anji County first proposed a program of 'Beautiful Countryside Construction' in China and planned to achieve the objectives of 'beautiful scenery, industrial development, social harmony and life happiness' by improving its industry, environment, quality and service. So far, it has achieved full coverage of beautiful villages. The per capita income of the villagers reached 33488 CNY in 2019.

The county government was responsible for overall planning, establishing an evaluation system, and implementing guidance. The town government was responsible for the coordination of villages and provided supports of money and technology. The village committee was responsible for the specific planning and construction projects. All the participants formed a community of rural development that was led by governments at all levels. The structure of the community is shown in Figure 5.

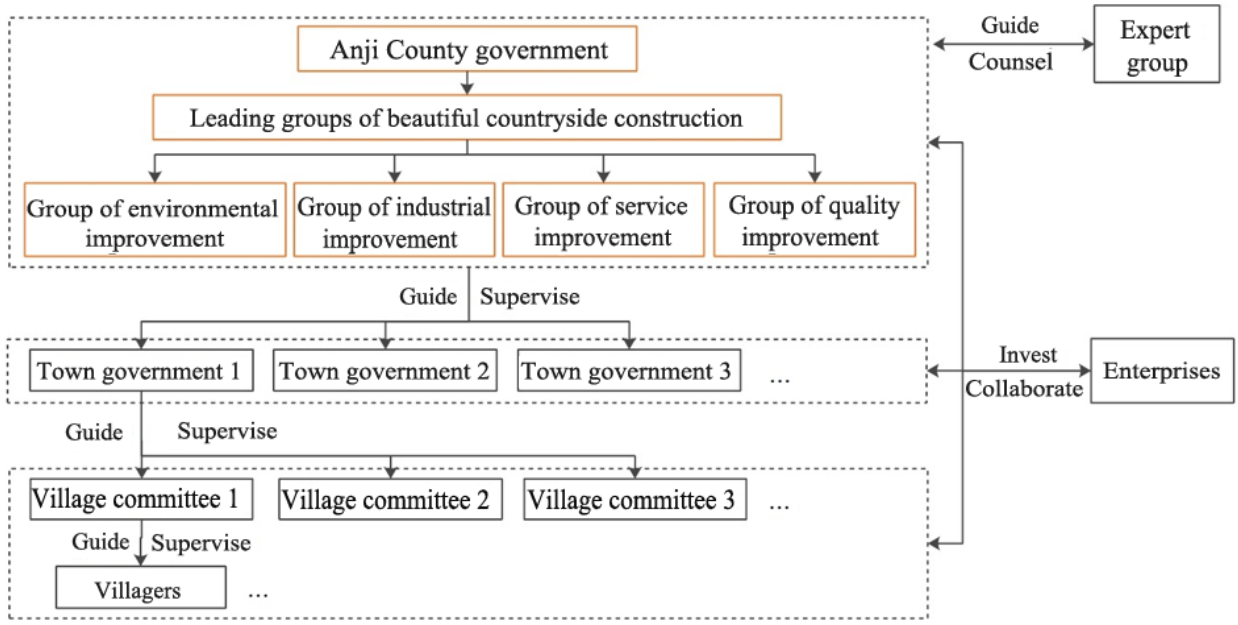

Figure 5. The structure of the community of rural development in Anji County.

4.2.5. Luoshuai Village

Luoshuai Village is located in Baisha County, Hainan Province (population: 203). In 2010, the Hainan Tianyayizhan Tourism Company developed the first tourism demonstration site in Hainan in Luoshuai Village. The rural economy grew rapidly and the farmers' living conditions improved dramatically. The farmers' per capita income increased from 2800 CNY in 2009 to 12000 CNY in 2019. The village has been awarded the national honours of 'National Civilized Village' and 'Five-Star Level Enterprise of Rural Tourism and Leisure Agriculture Development'.

With the support of the Baisha County government and the cooperation of villagers, the Tianyayizhan Tourism Company renovated the old village and built 54 new rural houses for the villagers. The company also built tourist service facilities for accommodations, catering and recreational sports. It helped the villagers operate agritainment and hired them to work in the company. The rural development of Luoshuai Village can be considered an external enterprise-led model, and the structure of the rural development community is shown in Figure 6.

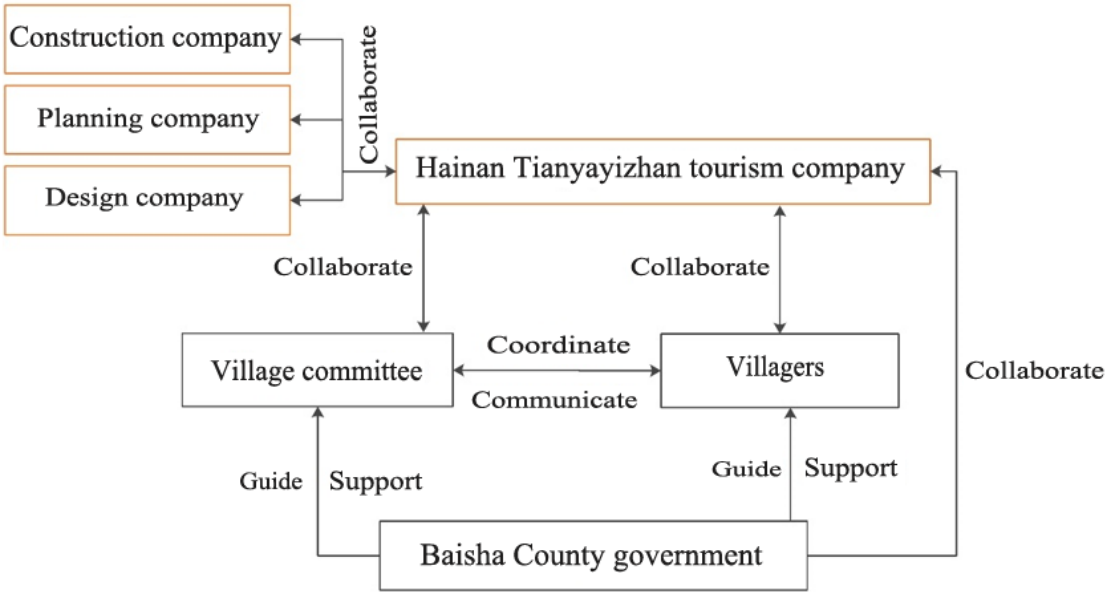

Figure 6. The structure of the community of rural development in Luoshuai Village.

4.2.6. Haotang Village

Haotang Village is located in Xinyang City, Henan Province (area: 20 km²; population: 2300). In 2009, Haotang Village began the construction of an experimental village showcasing sustainable development with the help of two NGOs: the China New Rural Planning and Design Institute and Beijing Green Cross. The village received the honour of 'National Liveable Demonstration Village'. Before 2011, there were more than 700 migrant workers and the per capita income of villagers was 6800 CNY. By 2018, all migrant workers had returned to the village, and the per capita income had exceeded 20000 CNY.

The director of the China New Rural Planning and Design Institute, Mr. Li, introduced the concepts of rural cooperative organization and internal financing to the village. The director of Beijing Green Cross introduced the ideas of architectural aesthetics and environmental protection to the farmers. Under the guidance of NGOs, the village cooperative, a home for the elderly, and enterprises were established, and rural ecological tourism was also developed rapidly. All the rural development participants formed a community that was led by NGOs. The structure of the community is shown in Figure 7.

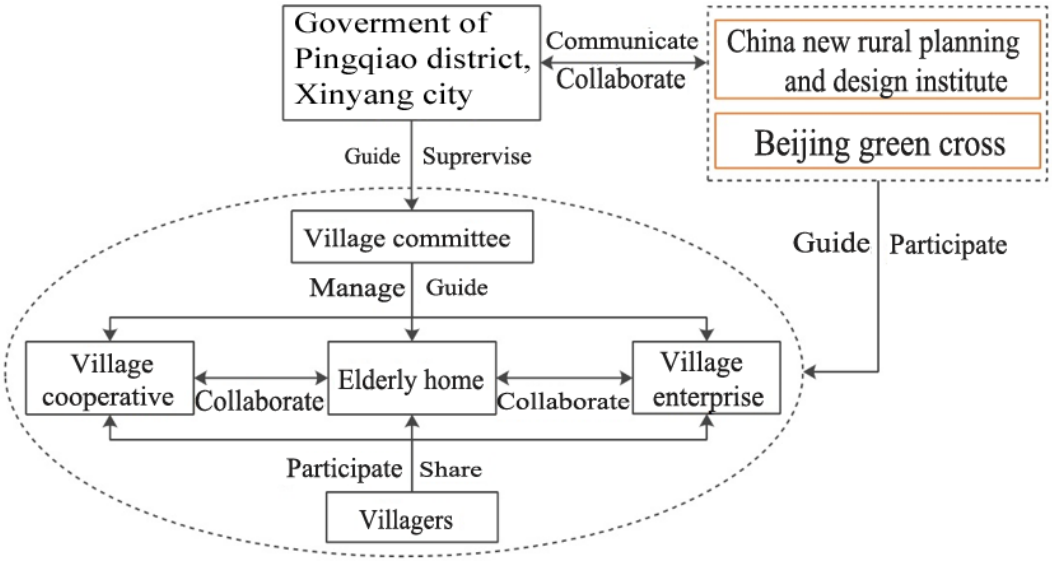

Figure 7. The structure of the community of rural development in Haotang Village.

5. NETWORK EVOLUTION SIMULATION

5.1. Network Evolutionary Characteristics

Through the elaboration of the six models of rural development, it can be proven that the community of rural development is a social network that is led by a core actor and grows constantly. The initial community network has the characteristics of a small-world network, which is characterized by a small average path length and a large clustering coefficient. As the network continues to grow and develop, its growth process displays scale-free characteristics. Although the network degree distribution does not strictly show the characteristic of power-law distribution, it also has the long tail characteristic, which means that a small number of actors have relatively large degree centrality. The concrete analysis of the network evolution is as follows.

(1) The network constantly grows by adding new actors. During the process of rural development, new actors are constantly added to the network. They may be affected by the network and volunteer to join, or the members of the community may actively establish relationships with them. The number of external enterprises and lead villagers (villagers participating in the rural development projects) increases rapidly, and the number of NGOs and governments increases slowly.

(2) There is a core actor in the network. The connections among the internal members of the community show an inhomogeneous distribution. There is always a core actor in the network, such as a government, village committee, peasant organization, enterprise or NGO. Compared with other actors, the core actor has a leadership role in the formation and evolution of the community network. The expansion of the community network occurs on the basis of the core actor's development, which requires both time and the accumulation of resources.

(3) The new actors preferentially connect to the core actor. The development of the core actor is due to the preferential connection mechanism of the network. The establishment of connections among the members is a conscious choice process; it is not random. Influenced by their preferences, the new actors tend to connect to the core actor, who has more relations, greater resource superiority and better cooperation experience; the new actors connect with the other actors more tenuously. The preferential connection mechanism can facilitate the introduction of new actors and promote the self-renewal of the network. As a result, the community of rural development can continuously develop and evolve.

5.2. Simulated Routing

According to the network evolution characterization of the community, this study refined and simplified the community network of six models. On this basis, we designed a simulated routing to analyse the characteristics of

network evolution using the SNA software UCINET (University of California at Irvine NETwork). The approach is as follows: in the initial state, every model has a minimum number of actors. Then, the quantity of external enterprises, NGOs, governments and lead villagers escalates. We designed 10 simulation experiments. In every experiment, the quantity of external enterprises and lead villagers increases by 3, and that of NGOs and governments increases by 1. The new actors connect to the core actor, and the specific circumstances of their connections are shown in Figure 8.

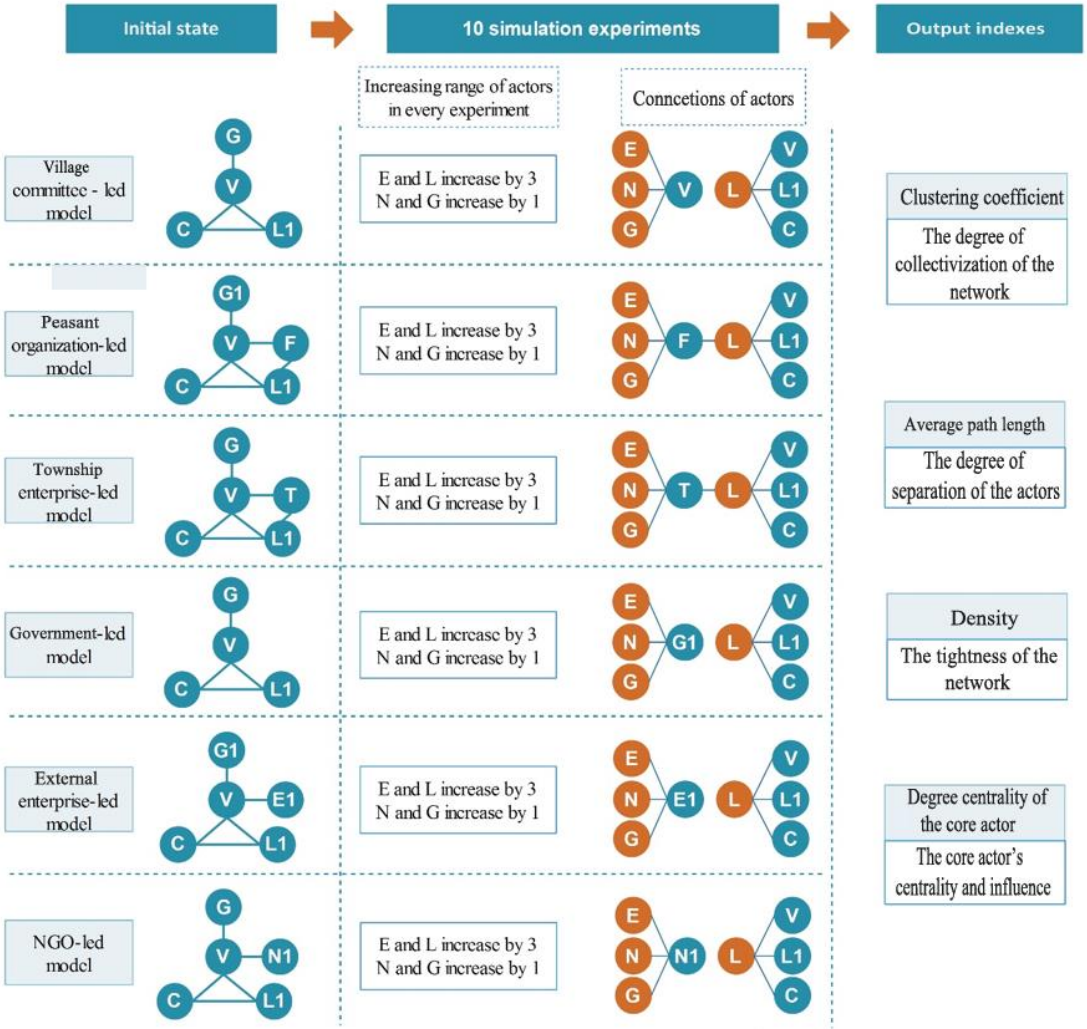

Figure 8. Network evolution simulated routing.

5.3. Results

The evolution of clustering coefficient, average path length, density and degree centrality of the core actor are shown in Figure 9.

(1) Clustering coefficient. Along with the continuous increase in the number of participants, the clustering coefficient of the network follows an increasing trend. Figure 9 shows that the clustering coefficient rises rapidly at the beginning and then tends to level off gradually. The highest is seen in the village committee-led model (from 0.778 to 0.974), followed by the township enterprise-led and peasant organization-led models (from 0.750 to 0.972), the third highest is the government-led model (from 0.778 to 0.969), and the last are the external enterprise-led and NGO-led models (from 0.722 to 0.968). It can be seen that the internal-actor-led model has a higher clustering coefficient than the external-actor-led model. In particular, the village committee-led model has the highest clustering coefficient and the strongest interdependence among the actors.

(2) Average path length. Figure 9 shows that the average path length of these six networks first grows rapidly and then quickly tends to a steady state. The lengths of the village committee-led, township enterprise-led and peasant organization-led models are shorter (final value is 1.8), and the government-led, external enterprise-led and NGO-led models are longer (final value is 2.3). It can be seen that the network of the internal-actor-led model is closer than the external-actor-led model.

(3) Density. As the number of participants increases and the size of the network continues to grow, the density of the network continually declines in these six models. The magnitude of the declines is major in the village committee-led and government-led models (from 0.667 to 0.166). The second are external enterprise-led and NGO-led models (from 0.500 to 0.166). The peasant organization-led and township enterprise-led models decline within a small range (from 0.490 to 0.377). This is because peasant organizations and township enterprises are established by the villagers and they are more closely connected to them. As the number of lead villagers continues to increase, they all have to establish ties with peasant organizations and township enterprises, thus reducing the decline in network density to some extent.

(4) Degree centrality of the core actor. In the community network of the village committee-led model, the degree centrality of the village committee (core actor) retains the highest value (final value is 100). In contrast, the degree centrality of the core actor in the other models presents an increasing trend, and the values gradually stabilize as the experiments proceed. The values of degree centrality of the peasant organization and township enterprise are higher (final value is 98.810), and the values are lower for the government, NGO and external enterprise (final value is 61.446). This is because the village committee is at the absolute center of the network and is connected to all other actors. The peasant organizations and township enterprises have relatively few ties with external actors, and the government and NGOs have relatively few ties with internal actors. What's more, the external actors have weak ties with each other.

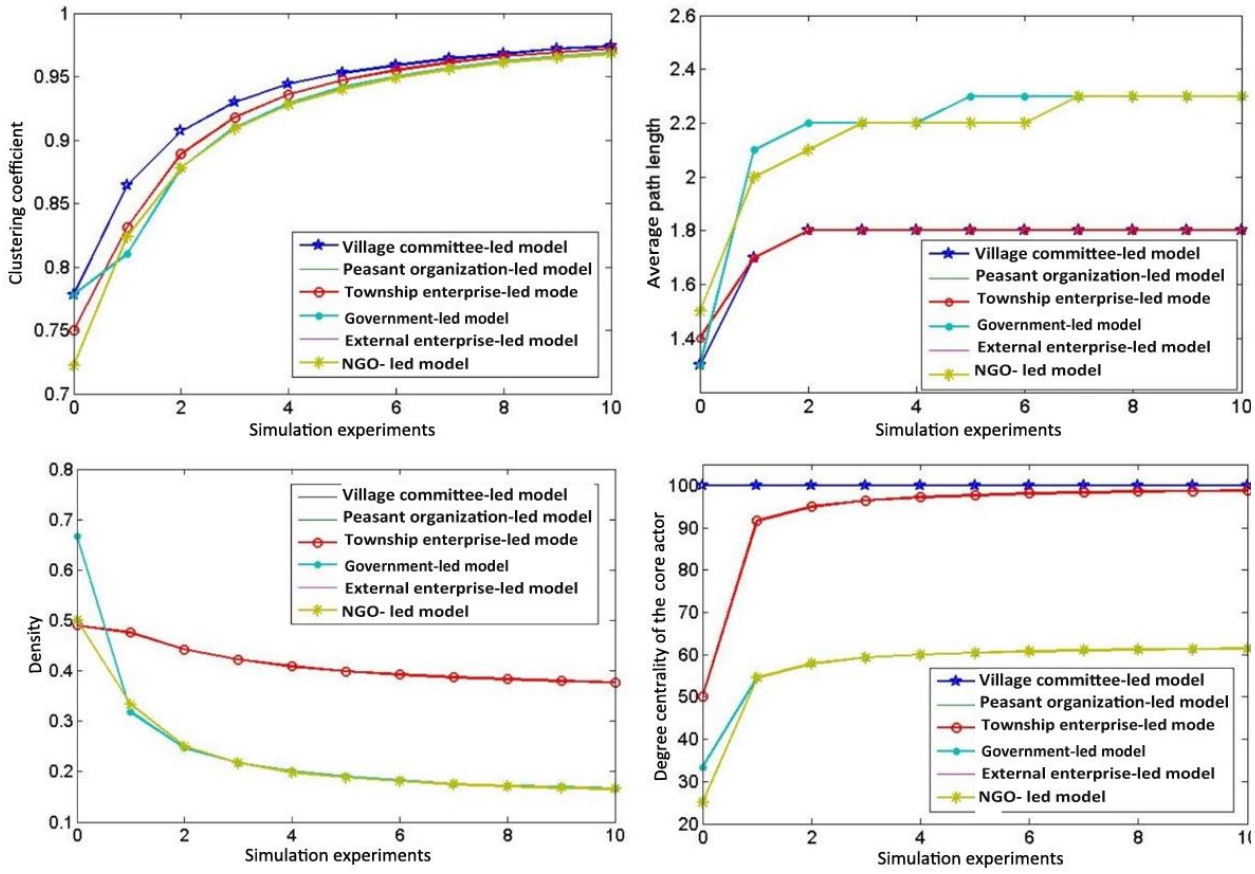

Figure 9. The results of network evolution simulation.

6. CONCLUSIONS

According to the simulation results, the village committee-led, peasant organization-led and township enterprise-led models had higher clustering coefficients and lower average path lengths, and their core actors' degree centrality was higher. This shows that the internal-actor-led model is superior to the external-actor-led model. In the three internal-actor-led models, the inter-relationships among the participants are close, and the core actor has a strong influence. The whole network is agglomerated and stabilized. The results show that the network density of the village committee-led model is lower than that of the peasant organization-led and township enterprise-led models. This reflects that the peasant organization and township enterprise have stronger cohesive force, which can help spur the villagers' participation.

The internal community is the core of and key to rural development. The internal actor-led model of rural development is more sustainable, which can help it to best serve the production and household needs of the villages (Petrick, 2013). In contrast, due to the no determinacy of the participation of the external community, the external-led model of rural development is less stabilized and more susceptible to external influences. Nevertheless, China has a vast amount of territory, and the geographical, economic, social, environmental and resource conditions of its many rural areas are differentiated, making it difficult to build a unified model that is suitable for all villages. Therefore, it is essential to develop rural development models according to local conditions.

The community of rural development is the main body and essential core element of rural development. It is important to build partnership in the community that is harmonious and stable over the long-term (Erdiaw-Kwasie & Alam, 2016; Marquardt & Pappalardo, 2014). The formation of the partnership requires long-term evolution and gradual progress. As the simulation results show, the internal-actor-led model is better than the external-actor-led model. However, the participation of the external actors is an important driver and an inevitable stage of rural development. To build the harmonious partnership, it is necessary to follow a long-term developmental process of 'internal-external-internal'. First, the external actors become involved in rural development, which ends the closed state of the traditional community. Then, the external community continuously integrates and optimizes to promote integrated rural development, and it might actually be the leader of rural development during this period. At the same time, the internal community constantly grows under the guidance of the external community. On this basis, the internal community gradually develops, with increasing capacity, into the core of its own rural development, which can promote rural development and sustainable renewal in a comprehensive way. This study may contribute to the optimization of rural development model from the participant networks perspective. It is evident from the comparison that the internal community-led model can better integrate rural resources effectively. Meanwhile, the external community also play an indispensable role in promoting rural development. However, the quantitative study of the cases in this paper is insufficient. It is necessary to continue to carry out research on different types of case studies and dig deeper into the data related to social networks, and then further clarify and optimize the six rural development models proposed in this paper through in-depth analysis and synthesis.

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