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Inter-embedded Community Endogenous Development Model of Agricultural Population among Various Ethnic Groups in Yunnan

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Abstract

Ethnic embeddedness in Yunnan Province is closely linked to the agricultural population and endogenous development. The embeddedness among ethnic groups promotes resource sharing and interactive exchange, positively influencing agricultural development. However, differences in cultural inheritance and organizational methods among ethnic groups pose challenges to agricultural progress. Strengthening cooperation and exchange among these groups is necessary to achieve coordination and common progress in agricultural development. This research outlines the methods and materials required, including an analysis of Yunnan's agricultural population, ethnic embeddedness theory, and endogenous development theory. By integrating sustainable development theory, a coordinated development coupling analysis is conducted. Building on existing endogenous development models, a targeted embedded community endogenous development model for Yunnan is established. The model is evaluated, and its predictive results are examined. Findings indicate that the model promotes resource sharing and interaction, enhancing agricultural productivity, economic cooperation, and cultural inheritance. Ethnic cooperation improves agricultural efficiency and community economic development. Additionally, the model supports the preservation and development of ethnic culture, with cultural exchanges enriching Yunnan's ethnic resources and fostering community identity and cohesion.

Keywords

Yunnan Province, China; The current situation of ethnic population; Embedded communities; Endogenous development model.

1. Introduction

Yunnan, as a multi-ethnic region in China, has rich natural resources and diverse cultural heritage. Among them, agriculture plays an important role in the economic development of Yunnan, and the research on the inter embedded community endogenous development model of ethnic agriculture is to explore how to achieve sustainable agricultural development and promote the common prosperity of farmers of all ethnic groups (Gu *et al*. 2012). The inter embedded community endogenous development model of ethnic agricultural population refers to the formation of a diverse and symbiotic agricultural ecosystem through the interaction, cooperation, and exchange of farmers from various ethnic groups, promoting resource sharing, technological innovation, and cultural inheritance, and achieving sustainable economic, social, and ecological development (Fu *et al*. 2011).

In this model, farmers of all ethnic groups can fully utilize their traditional experience and wisdom, jointly face the challenges of agricultural development, and promote agricultural modernization, rural economic prosperity, and improvement of farmers' lives according to local conditions (Yajuan *et al*. 2015).

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Domestic research has pointed out that the inter embedded community endogenous development model of ethnic agricultural population can promote cooperation, resource sharing, and technological exchange between different farmer groups, which helps to improve agricultural production efficiency and the sustainability of community development (Jin *et al*. 2021). Another academic study found that in multi-ethnic regions such as Yunnan, the inter embedded community endogenous development model of ethnic agricultural population can effectively promote communication and cooperation among different ethnic groups, and improve the risk resistance and sustainable development ability of rural communities (Li *et al*. 2023).

Some scholars abroad have also conducted research on it, and some foreign studies have shown that the application of the ethnic agricultural population embedded community endogenous development model in Latin America can help improve the livelihoods of farmers and community development, but it needs to adapt to regional characteristics and consider the influence of social and cultural factors (Guoqing *et al*. 2022). Other scholars have pointed out that in different countries and regions, the inter embedded community endogenous development model of ethnic agricultural population can promote agricultural diversity, ecosystem protection, and community cohesion, which is crucial for achieving sustainable agriculture and community development. This study is conducted as shown in Figure 1.

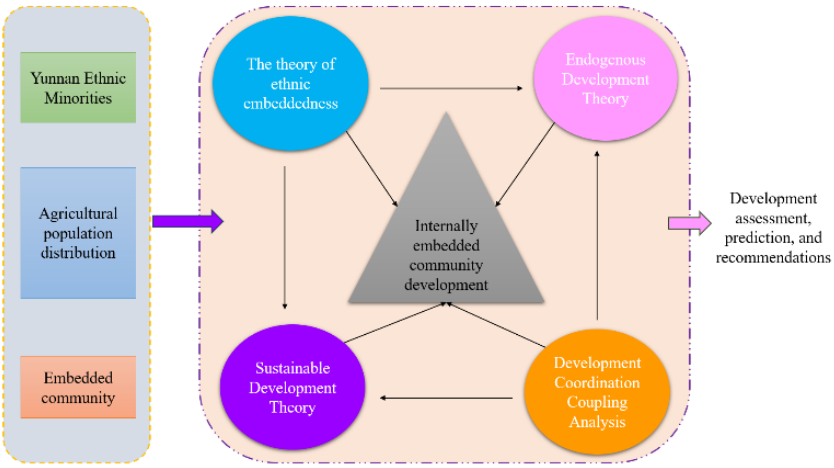

Figure 1. Relationship diagram of this study

The aim of this study is to deeply explore the inter embedded community endogenous development model of agricultural populations among various ethnic groups in Yunnan, and propose relevant strategies and measures to promote the sustainable development of agriculture in Yunnan. We will sort out the agricultural traditions and cultures of various ethnic groups in Yunnan, draw on their successful experiences and wisdom, and explore how to combine them with modern agriculture to achieve efficient and sustainable development of agriculture. Secondly, we will study the cooperation models and organizational forms of farmers from various ethnic groups, explore how to establish agricultural mutual aid organizations and cooperatives, promote resource sharing and technological innovation, and improve the socio-economic status of farmers. We will focus on the construction of agricultural ecosystems and the rational utilization of agricultural resources. Through the practice of ecological agriculture and circular agriculture, we will explore the coordinated development of agriculture and the ecological environment, achieving sustainable development and ecological protection of agriculture.

Finally, through on-site research and case analysis, we will propose policy recommendations and promotion strategies for the inter embedded agricultural communities of various ethnic

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groups in Yunnan, promoting the promotion and application of this model in Yunnan and other regions. Through the conduct of this study, we hope to provide theoretical support and policy guidance for the practice of the inter embedded community endogenous development model of agricultural populations among various ethnic groups in Yunnan, further promote the sustainable development of agriculture in Yunnan, promote the common prosperity of farmers of all ethnic groups, and achieve coordinated development of economy, society, and ecology. The main contributions of this study are:

1) Research can conduct quantitative research on the endogenous development model of agricultural populations embedded in communities among various ethnic groups in Yunnan, and draw objective evaluations and conclusions, providing a basis for policy formulation and decision-making;

2) Studying the inter embedded community endogenous development model of agricultural populations among various ethnic groups in Yunnan can promote communication and cooperation among different ethnic groups, help build harmonious ethnic relationships, and enhance understanding and unity;

3) Research can provide reference for the development of rural communities in Yunnan, promote innovation in community endogenous development models, and promote the improvement of agricultural production, farmers' income, and community public services.

Structure of the article: Firstly, the article elaborates on the possibility and purpose of this research, and completes the phased summary task through previous research; The second chapter of the article systematically elaborates on the research theories and materials to be used; In Chapter 3, we use relevant data for evaluation and prediction, providing a basis for providing development suggestions for county officials; The final chapter summarizes the conclusions of this study and provides optimization suggestions for the inter embedded community endogenous development model of agricultural populations among various ethnic groups in Yunnan Province, which has certain practical application value.

2. Materials And Methods

2.1. Current Situation of Agricultural Population Development in Yunnan Province

Yunnan is located in southwestern China, between 97 ° 31-106 ° 11 and 218-2915 North Latitude. The land area of the province is 394100 square kilometers, accounting for 4.19% of the national land area (Champalle *et al*. 2014). There are 8 cities under the jurisdiction of Yunnan Province, 8 ethnic autonomous prefectures, and 129 counties. According to the 2021 National Economic and Social Development Statistical Bulletin, as of the end of 2021, the province has a permanent population of 46.9 million, including 229.58 million rural residents.

The distribution of various ethnic groups is shown in Figure 2. In 2021, Yunnan Province's annual gross domestic product (GDP) was 2714.676 billion yuan, slightly lower than the average of various provinces and cities, ranking 18th from the bottom in the country. The GDP increment was 259.101 billion yuan, an increase of 7.3% compared to the previous year. In 2021, the per capita GDP of Yunnan Province was 57500 yuan, while the Ningxia Hui Autonomous Region, which is also an underdeveloped region in the western region, reached 62700 yuan, and Xinjiang reached 61700 yuan. From the perspective of regional economic development level, the problem of uneven regional development in Yunnan Province is still very serious.

In 2021, Kunming's GDP accounted for 266% of the total GDP of the province, ranking first among the 16 provinces and cities in the province (Abbas *et al*. 2020). Overall, the primary industry is mainly traditional agriculture, while the proportion of traditional industries in the

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secondary and tertiary industries is too large (Fan *et al*. 2022). The proportion of high-tech industries and modern service industries is small, and the level of economic development is not high (Tan *et al*. 2022). The processing level, added value, and technological content of most industries are not high, and the structure is single (Murowchick *et al*. 2001).

Figure 2. Ethnic Distribution in Yunnan Province

The agricultural population in Yunnan Province is relatively large, accounting for over 60% of the total population as of now. The agricultural population is mainly distributed in rural areas, with rural population accounting for the majority of the total population in the province (Aoki *et al*. 2012). The GDP and agricultural output value of Yunnan Province from 2012 to 2022 are shown in Table 1. With the improvement of education level and the advancement of urbanization process, the education level of agricultural population in rural areas of Yunnan Province is also gradually improving. Nine years of compulsory education have been popularized in rural areas, increasing the opportunities for farmers' children to receive education (Labadi *et al*. 2021).

The occupational structure of the agricultural population in Yunnan Province is relatively single, with the majority engaged in agricultural production and rural service industries (Cheng *et al*. 2022). The main occupations of farmers include planting, breeding, fishing, forestry, and agricultural product processing. However, with the development of the economy and the process of urbanization, a portion of the agricultural population has gradually engaged in non agricultural industries, such as construction, service, manufacturing, etc.

The agricultural population in rural areas of Yunnan Province generally has a significant urban-rural income gap (Wang *et al*. 2023). Due to fluctuations in agricultural product prices and market competition, the income level of farmers is relatively low. In order to improve farmers' income, the government has adopted a series of poverty alleviation policies and agricultural structural adjustment measures to promote rural economic development and increase farmers' income levels (Xiong *et al*. 2016).

2.2. The theory of ethnic embeddedness

The theory of ethnic embeddedness is a social science theory aimed at explaining and studying the interaction, exchange, and integration between different ethnic groups. This theory holds that different ethnic groups in society do not exist in isolation, but rather are nested and

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influenced by each other (HAN *et al*. 2022). The policy of embedding ethnic social spatial structure and community living environment has become an extension of the concept of ethnic integration, exchange, and communication to the practical level (Liu *et al*. 2018).

The theory of ethnic embeddedness emphasizes the existence of multiple connections and interrelationships between different ethnic groups, including geographical, economic, political, cultural, social, and other aspects. These connections and relationships are not only unidirectional, but also bidirectional and mutually influencing (Li *et al*. 2016). In a multi-ethnic society, interaction and integration between different ethnic groups are inevitable.

This theory suggests that interaction and integration between ethnic groups can bring many positive impacts. Firstly, through mutual communication and understanding, different ethnic groups can enhance mutual trust and understanding, and promote social harmony and stability. Secondly, the coexistence and integration of diverse cultures have enriched the cultural connotations of society and created more cultural innovations and expressions.

Finally, economic cooperation and exchange between different ethnic groups contribute to resource sharing, economic development, and social progress. However, ethnic embeddedness may also pose some challenges and problems (Prishchepov *et al*. 2021). For example, cultural and value differences between different ethnic groups may lead to friction and conflict. At the same time, there may be imbalances in the economic development and social status of different ethnic groups, which in turn affects social fairness and justice (Wei *et al*. 2023).

Affected by geographical, economic, political, cultural, and social factors, the theory of ethnic embeddedness has its own original theoretical development that can be used to quantitatively calculate the embedding, social relationships, and cultural integration of ethnic cultures. After completing the filling of the judgment matrix, the "sum product method" is used to calculate the maximum eigenvalue max and its corresponding eigenvector w of each matrix, thereby obtaining the weight values of each element. In addition, to prevent evaluators from making basic logical judgments, it is also necessary to calculate the consistency ratio, which is the *CR* value, for consistency testing of the matrix. Normalize each column vector of matrix A to obtain $M=(m_{ij})_{n\times n}$ (Sofield *et al*. 2013):

$$m_{ij}\equiv d_{ij}+j_{ij}+z_{ij}+w_{ij}+s_{ij}/\sum_{k=1}^{n} a_{ki}(i_kj=1，2，3，…，n) \tag{1}$$

Among them, m_{ij} is the quantitative calculation result of ethnic embeddedness; D_{ij} refers to geographical factors and ethnic interdependence; J_{ij} is an economic factor with ethnic interdependence; Z_{ij} is a political factor where ethnic groups are intertwined; W_{ij} refers to the cultural factors that are intertwined with ethnic groups; S_{ij} is a social factor with ethnic interdependence; A_{ki} is the weight value of each factor, and i_{kj} is the weight adjustment value.

Add the elements of the row vectors of the normalized matrix B to obtain:

$$M_i=\sum_{j=1}^{*} b_q(i，j=1，2，⋯，n) \tag{2}$$

Normalize the vector $M=(M_1, M_2,..., M_n)$ to obtain the feature vector w:

$$W_i=\frac{M_i}{\sum_{i=1}^{n} M_j}(i=1，2，⋯，n) \tag{3}$$

Calculate the maximum eigenvalue A of the judgment matrix A, which is:

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$$\lambda=\frac{1}{n}\sum_{i=1}^{n}\ [(Aw)_i/w_i] \tag{4}$$

In the calculation formula of ethnic embedded quantification theory, communication frequency weight and communication depth weight are introduced to weight the different contributions of different types of communication activities to social connectivity. These weights can be set based on the importance and impact of different types of communication activities in the study (Leung *et al*. 2021).

2.3. Endogenous Development Theory

In recent years, the endogenous development of agriculture among various ethnic groups in Yunnan Province has attracted much attention. As a multi-ethnic region in China, Yunnan Province is famous for its unique geographical environment and diverse ethnic cultures (Luo *et al*. 2018). In Yunnan Province, farmers of all ethnic groups are committed to achieving sustainable agricultural development and promoting the improvement of farmers' living standards through measures such as optimizing land use, promoting industrial upgrading, and strengthening agricultural technology support. However, despite some achievements, there are still challenges and problems that need to be overcome (Wekesa *et al*. 2021).

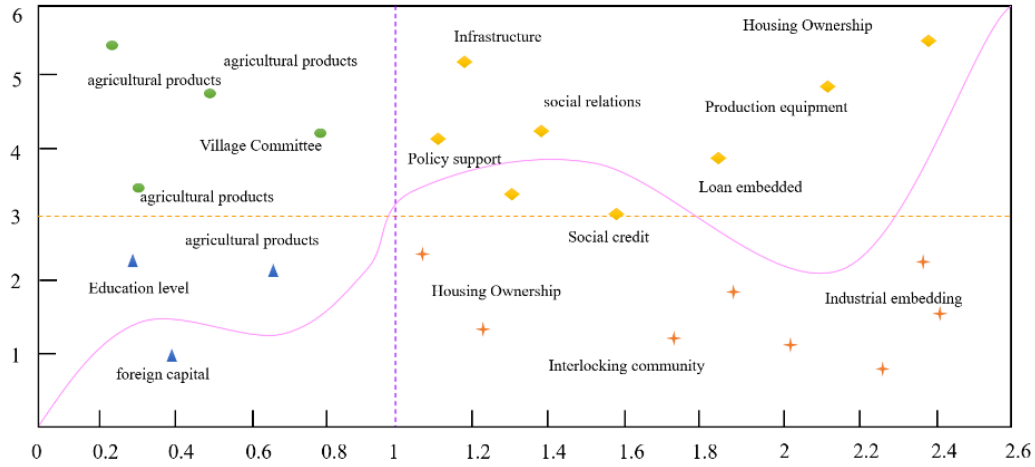

Figure 3. Satisfaction of Embedded Communities in Current Agricultural Population

The endogenous development model refers to the model in which a country or region mainly relies on internal accumulation and innovation to promote economic growth in the process of economic development. Under the endogenous development model, the economic growth of a country or region is mainly driven by its internal factors, rather than relying on external factors. The endogenous development model emphasizes promoting economic growth through internal factors such as technological innovation, human resource cultivation, and scientific research (Schooler *et al*. 2004).

This means that countries or regions invest resources and capital in areas that enhance productivity, innovation capabilities, and competitiveness, in order to achieve sustainable economic development. The endogenous development model corresponds to the exogenous development model. The advantage of the endogenous development model is that it can cultivate the independent innovation ability and competitiveness of a country or region, thereby reducing external dependence and risks. In addition, the endogenous development model can also promote technological progress and industrial upgrading, increase employment opportunities, and improve people's living standards.

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Endogenous development usually refers to the internal growth and development of an economic system, rather than relying on external factors. Although the quantitative calculation formula for endogenous development may vary depending on different research fields and methods, the following is an example of a common economic model's quantitative calculation formula (Heindl *et al*. 2021):

$$Y = A * F(K, L, H, N) \quad (5)$$

Among them, *Y* represents the gross domestic product of Yunnan Province for the year; *A* represents total factor production and *K* represents capital stock; *L* represents labor force; *H* represents human capital; *N* represents a resource. The growth rate represents the ability of an enterprise to increase its capital scale through its own profits and return on capital without borrowing external funds. The formula is as follows:

$$NS=Rat(Hl) * Rat(BL) \quad (6)$$

Among them, *NS* represents the endogenous growth rate; *Rate (Hl)* is the rate of return; *Rate (BL)* is the retained profit margin.

Growth drivers refer to factors that have a significant impact on corporate growth. It can be used to quantify the contribution of specific factors to growth, as follows (Egreteau *et al*. 2011):

$$QD=SM(x)/(ys+sq)*100 \quad (7)$$

Among them, *QD* is the growth driving factor; *SM(x)* represents new revenue; ys is the original income; *sq* represents the previous period's income.

The endogenous development index is a method of measuring the independent innovation and development ability of enterprises. It mainly considers the innovation ability and resource utilization efficiency of the enterprise itself, as well as its adaptability to the external environment. By comprehensively evaluating the R&D investment, technological innovation, human capital, and other aspects within the enterprise, an index reflecting the level of innovation and development within the enterprise can be obtained. This index can help companies understand their innovation capabilities and development potential, providing a basis for formulating innovation strategies and decision-making (Li *et al*. 2021).

$$NZ=CX/ZT*100 \quad (8)$$

Among them, *NZ* is the endogenous development index; *CX* is an internal innovation investment; *ZT* represents the total investment.

Endogenous market share is a method of evaluating enterprise growth, focusing on the internal growth drivers and capabilities of the enterprise. It assesses the potential of a company to achieve sales growth by analyzing factors such as its own marketing efforts, product innovation, market segmentation, and customer relationship management. Endogenous market share links a company's market growth with its internal capabilities and strategies to evaluate its growth potential in the market.

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$$NW=(Bq-sq)/sq \quad (9)$$

NW represents endogenous market share; *Bq* is the current market share; The others are the same as before.

2.4. Sustainable Development Theory

Sustainable development is a global objective, and for Yunnan Province, a multi-ethnic region in China, it presents both unique opportunities and challenges. Yunnan's abundant natural resources, rich ethnic diversity, and large agricultural population make agriculture a key economic pillar of the province. In this context, exploring an endogenous development model tailored to Yunnan's agricultural population is crucial to addressing the interconnected economic, social, and environmental sustainability needs. Given Yunnan's ethnic diversity, its agricultural communities are highly interwoven, with agricultural activities forming an integral part of residents' lives.

However, the heterogeneity in cultural backgrounds, social structures, and living habits among different ethnic groups presents significant challenges for endogenous community development. Thus, studying sustainable development within the framework of Yunnan's multi-ethnic agricultural communities provides valuable insights and can offer practical references for other multi-ethnic regions aiming to achieve sustainable development.

The theory of sustainable development promotes environmentally friendly agricultural practices, such as organic and ecological farming, alongside the protection and restoration of ecosystems. In Yunnan's context, these principles can guide agricultural populations in reducing environmental impact through the use of organic fertilizers, responsible pesticide management, and practices like crop rotation and straw incorporation.

Additionally, sustainable development emphasizes social justice and inclusive growth, advocating for enhanced living standards and social welfare in rural communities. By increasing farmers' income and employment opportunities, promoting agricultural product processing, and fostering sectors like rural tourism and handicrafts, sustainable development can help diversify economic resources and improve overall community resilience.

The theory of sustainable development encourages efficient resource utilization in agricultural production, improves land use efficiency and agricultural output, while promoting product processing, rural industry upgrading, and increasing farmers' income and employment. It emphasizes social justice and inclusive development, advocating for better quality of life and welfare for farmers. In Yunnan's inter-embedded community endogenous development model, it promotes rural social development and improves infrastructure, education, medical care, and social security. Given Yunnan's fragile ecology, it stresses environmental protection and sustainable resource use, advocating renewable energy, sustainable agriculture, and ecological protection for agriculture's long-term sustainability.

2.5. Development Coordination Coupling Analysis

Endogenous development coordination coupling analysis is an analytical method for studying socio-economic phenomena, which mainly focuses on the interaction and influence between different elements or factors. This analysis method emphasizes the coordinated development and coupling degree between various elements within the system, as well as the impact of this coordinated development and coupling degree on the entire system. The analysis of endogenous development coordination coupling suggests that the socio-economic system is a complex whole, with various elements interdependent and influencing each other, and generating internal development momentum through positive and negative feedback mechanisms.

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By analyzing the interaction and mutual promotion relationship between various elements, the development trend and evolution law of the system can be revealed. The coupling degree represents the degree of interaction and influence between two or more systems. The larger the value, the stronger the interaction between the systems. The coupling degree C_1 between urban endogenous power and endogenous support force is calculated as follows (Wang *et al*. 2019):

$$C_1=\left(\frac{I_{pow}I_{sup}}{((I_{pow}+I_{sup})/2)^{\frac{1}{2}}}\right)^{\frac{1}{2}} \tag{10}$$

Among them, I_{pow} and I_{pup} represent endogenous forces and endogenous support forces, respectively. The calculation formula for the coupling degree C_2 between various subsystems of urban endogenous power is as follows (Chuenrudeemol *et al*. 2017):

$$C_2=\left(\frac{I_{hr}I_{inn}I_{ent}I_{con}}{((I_{hr}+I_{inn}+I_{ent}+I_{con})/4)^4}\right)^{\frac{1}{4}} \tag{11}$$

I_{hr}, I_{inn}, I_{ent}, and I_{con} respectively represent the four subsystems of urban endogenous power, namely human resources, innovation capability, domestic enterprise vitality, and domestic consumption capacity. The calculation formula for the coupling degree C_3 between various subsystems of urban endogenous support is as follows:

$$C_3=\left(\frac{I_{nat}I_{tec}I_{soc}}{(I_{nat}+I_{tec}+I_{soc}/3)^3}\right)^{\frac{1}{3}} \tag{12}$$

I_{nat}, I_{tec}, and I_{soc} represent the three subsystems of urban endogenous support, namely natural environmental support, technological environmental support, and social environmental support. The system coupling degree $C\in$ [0,1], when C=0, the system coupling degree is the smallest, indicating that there is no correlation between the elements of the urban endogenous development system and the overall development is in a disordered state. When C=1, the system coupling degree is the largest, indicating that the elements of the urban endogenous development system have reached a benign resonance. The coordinated coupling of urban development in daily life is shown in Figure 4.

Figure 4. Coordinated Development in Life

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The degree of coupling can only reflect the degree of interaction between systems, but cannot measure the degree of coordination between systems. Therefore, the coupling coordination index between endogenous power and endogenous support force is constructed, and the calculation formula is as follows (Yuan *et al*. 2023):

$$T_1=\alpha_1 I_{pow}+\alpha_2 I_{sup} \tag{13}$$

$$D_1=\sqrt{C_1\times T_1} \tag{14}$$

Among them, T_1 represents the degree of development between endogenous power and endogenous support, while a_1 and a_2 represent the weights of endogenous power and endogenous support, respectively. This article believes that the two have equal status, so a_1=a_2=0.5, and D_1 represents the coupling co scheduling of endogenous power and endogenous support. Similarly, the coupling coordination degree D_2 between the subsystems of endogenous dynamics is:

$$T_2=\beta_1 I_{hr}+\beta_2 I_{inn}+\beta_3 I_{ent}+\beta_4 I_{con} \tag{15}$$

$$D_2=\sqrt{C_2\times T_2} \tag{16}$$

The coupling analysis of endogenous development coordination can be applied to various fields, such as economic development, urban planning, environmental management, etc., and can help decision-makers and researchers better understand and respond to complex socio-economic phenomena.

2.6. Interembedded community endogenous development model

The existing embedded community endogenous development models include industrial embedded development model, industrial embedded development model, agricultural embedded development model, and resource integration development model. Industrialization promotes the development of urbanization, which provides the necessary human resources and markets for industrialization. Technological innovation drives industrial upgrading, which in turn provides better application scenarios and market demands for technological innovation. The two are interdependent and promote each other. Agricultural development and rural modernization complement each other. Agricultural modernization promotes rural development, while rural modernization provides better development conditions and market demand, as shown in Figure 5. The development of resources requires educational innovation, which in turn requires fully tapping into the potential of human resources. The two promote each other and work together to promote development.

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Figure 5. Interbedded Community Endogenous Development Highlights

Yunnan is one of the multi-ethnic provinces in China, with rich ethnic culture and agricultural resources. Optimizing the inter embedded community endogenous development model of agricultural populations among various ethnic groups in Yunnan is the key to achieving sustainable development and community common prosperity.

Therefore, this study integrates several existing embedded community endogenous development models: industrial embedded development model, industrial embedded development model, agricultural embedded development model, and resource integration development model into the study of various ethnic agricultural population community endogenous development models in Yunnan.

The embedded development model of industrialization promotes the economic growth and employment opportunities of the community by introducing the industrialization process into the community. This model brings the agricultural population communities of all ethnic groups in Yunnan into the industrialization process, and improves the economic output value of the community through the development of industry and manufacturing; The industrial embedded development model organically combines community development with specific industries, enhancing the comprehensive competitiveness of communities by promoting the development and growth of characteristic industries.

For various ethnic agricultural population communities in Yunnan, the industrial embedded model means fully utilizing local agricultural resources and advantages of characteristic industries, promoting agricultural product processing and extending the agricultural industry chain, and improving the added value and market competitiveness of agricultural products; Applying the agricultural embedded model in various ethnic agricultural population communities in Yunnan can promote the transformation and improvement of agricultural production methods, promote the diversified development of rural economy, and improve agricultural production efficiency, increase agricultural product yield and quality by introducing advanced agricultural technologies, scientific management models, and modern agricultural facilities. This can achieve an increase in farmers' income and sustainable development of rural communities, The final evaluation indicators for embedded community endogenous development are shown in Table 2.

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Table 2. Evaluation indicators for the endogenous development of embedded communities

Dark influence	Dominant factor
Village Committee	Service
	Guide
	External support
Infrastructure construction	Traffic
	Water conservancy
	power
Economic organization	Village Collection Office
	Agricultural cooperation
	Foreign enterprises
External support	Government support
	Social organization
	Electronic Commerce

3. Results

This study used publicly available agricultural population economic and living conditions data from various cities, counties, villages, and brigades in Yunnan Province, China, and combined relevant literature, networks, news, and departmental information for data integration. Preliminary data analysis was completed, and predictions were made using the evaluation methods and endogenous development models shown earlier.

3.1. Evaluation of Ethnic Interbedded Communities in Yunnan Province

The purpose of evaluating ethnic interlocking communities is to understand the communication and integration between residents of various ethnic groups within the community, evaluate potential problems in community development, and propose corresponding improvement measures.

The evaluation is also to understand the population proportion and distribution of various ethnic groups in the community, determine whether they are evenly distributed in the community, study the cultural exchange between different ethnic groups, including language, religion, customs, and other aspects, evaluate the degree of communication and cultural integration, understand the economic activities and development situation of each ethnic group in the community, whether there is an economic gap between ethnic groups, and whether there are targeted development measures. Assessing ethnic interlocking communities is a complex task that requires comprehensive consideration of multiple factors through field research, data collection, and analysis. The evaluation results can provide reference for relevant departments, formulate relevant policies and measures, and promote the harmonious development of ethnic interlocking communities. The impact assessment of their interlocking community development is shown in Figure 6.

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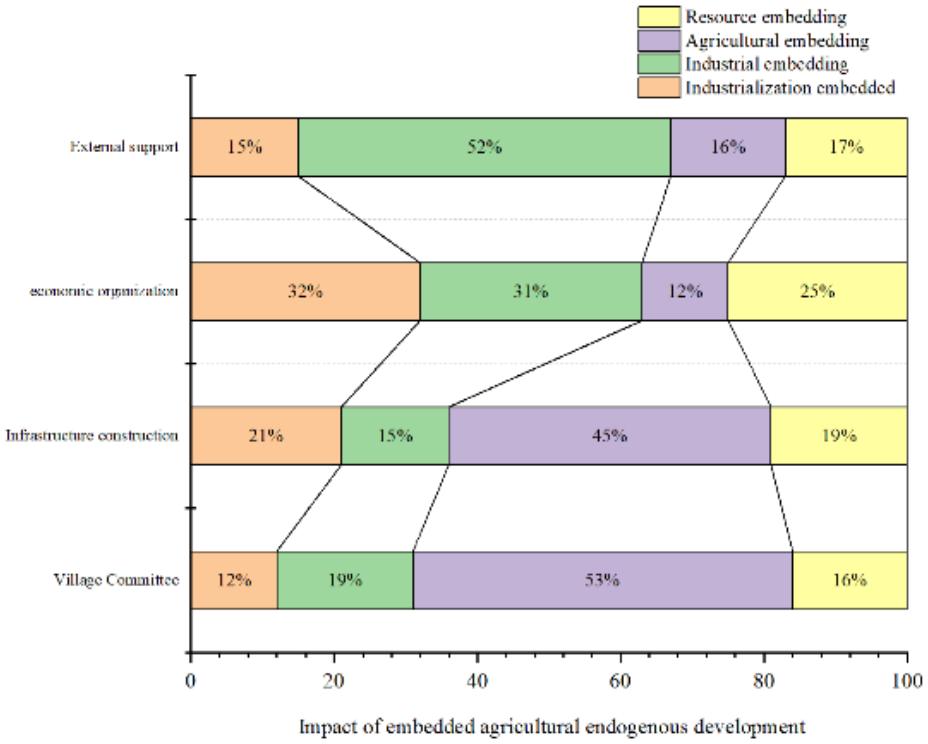

Figure 6. Assessment of the Impact of Interbedded Community Development

From Figure 6, it can be seen that the proportion of embedded development models in industrialization is only 12%, indicating that the development of village committees in industrialization is relatively weak. This may be because the economic conditions and population size of the village committee in the area limit the development of industrialization, or the village committee has insufficient investment and support in industrialization.

The proportion of industrial embedded development models is 19%, which is relatively average compared to other development models. This indicates that the village committee has made certain achievements in developing industries, but further strengthening is still needed. The proportion of agricultural embedded development model is the highest, reaching 53%. This indicates that agriculture is still the main development direction of the village committee, and the industrialization of agriculture has a high proportion.

The village committee may have abundant agricultural resources or a relatively large population of farmers, thereby promoting the development of agriculture. The proportion of resource integration development model is 16%, which is relatively low compared to other development models. The proportion of infrastructure development models is 21%, which is relatively high compared to other development models. The development model of economic organizations accounts for 32%, indicating that the village committee attaches great importance to developing economic entities and improving economic efficiency.

The external support development model accounts for 15%, indicating that village committees rely heavily on external support, which can include government funds, professional technical support, and assistance from cooperative institutions. It is incomplete to evaluate the development of an agricultural population embedded community solely based on the impact assessment of the development of the embedded community. Therefore, we conducted a coupling assessment of agricultural coordinated development for these communities, as shown in Figure 7.

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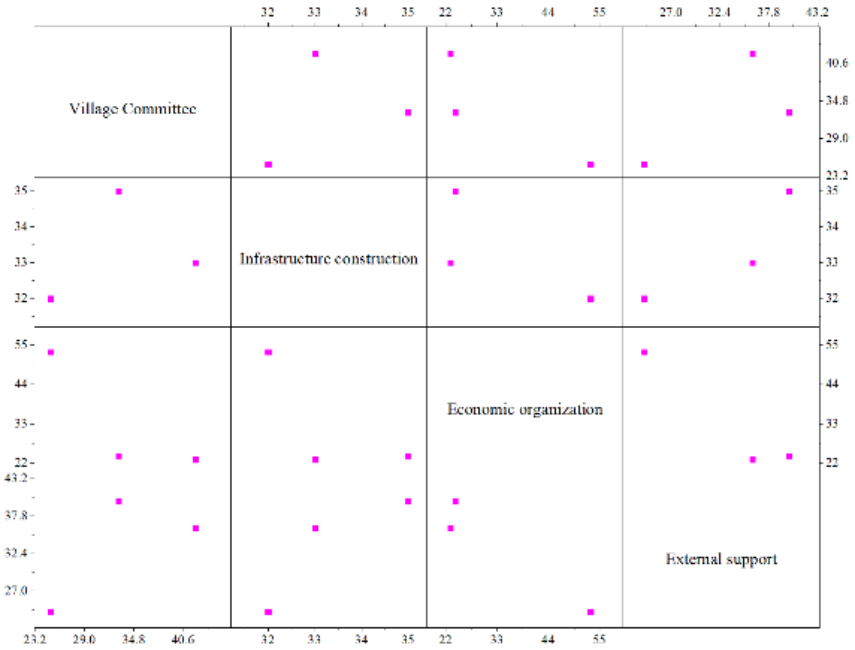

Figure 7. Coupling Assessment of Coordinated Agricultural Development

Figure 7 shows that in the industrial embedded development model, the service sector accounts for 25% of the total, and may adopt the industrial embedded development model. This indicates that the service industry focuses on improving production efficiency and quality through the introduction of advanced industrial production methods and technologies in the development process, in order to meet the growing demand; In the proportion of industrial embedded development model, the guiding field accounts for 42%, and the industrial embedded development model may be adopted.

This means promoting coordinated development between different industries through active guidance and support from government, industrial parks, and enterprises, forming the integration of industrial chains, value chains, and innovation chains, and improving overall industrial competitiveness; In the proportion of embedded development models in agriculture, village offices account for 53%, agricultural cooperation accounts for 23%, and foreign enterprises account for 24%. This indicates that different embedded development models have been adopted in the agricultural field.

Village collective organizations refer to rural collective economic organizations that engage in embedded development in agricultural production, processing, sales, and other aspects. Agricultural cooperation reflects the role of farmers' cooperatives, which engage in embedded cooperation in agricultural production and operation. Foreign enterprises participate in agricultural embedded development, possibly through cooperation with agricultural enterprises or farmers, introducing technology and funds, and improving the level of agricultural industrialization; In the proportion of resource integration development model, government support accounts for 24%, social organizations account for 36%, and e-commerce accounts for 40%.

This indicates that the resource integration development model has played an important role in economic development; In the development models of transportation, water conservancy, and electricity, the transportation sector accounts for 32%, the water conservancy sector accounts for 33%, and the electricity sector accounts for 35%. This indicates that different development models may have been adopted in the transportation, water conservancy, and electricity sectors. The specific model may involve innovation and optimization in construction, management, and operation to meet the needs of urbanization and industrialization processes.

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3.2. Prediction of endogenous development models

The endogenous development model is a development model that comprehensively considers internal factors and external environment. Predicting the specific situation of the endogenous development model requires in-depth analysis and research. Assess the resource allocation, human capital, technological innovation capabilities, and other aspects within ethnic interlocking communities to determine their development potential and competitiveness.

Examine the overall economic development trend, policy environment, and social and cultural environment of Yunnan Province on the impact of ethnic interlocking communities. For example, the government's support for multi-ethnic regions and the development of tourism industry. Based on the analysis of internal factors and external environment, develop development plans suitable for the development of ethnic interlocking communities, including goals and measures for economic development, cultural exchange, community construction, and other aspects.

Promote cooperation and resource integration among various ethnic groups within ethnic communities, and create a shared and win-win development pattern. For example, promoting cross ethnic enterprise cooperation, social organization cooperation, etc. The prediction results of endogenous development models are influenced by multiple factors, including policy environment, economic fluctuations, and the willingness and participation of community residents. Therefore, when making predictions, it is necessary to comprehensively consider various situations. The predicted results are only for reference and should be combined with the actual situation. The impact of these factors on the endogenous development model is predicted as shown in Figure 8.

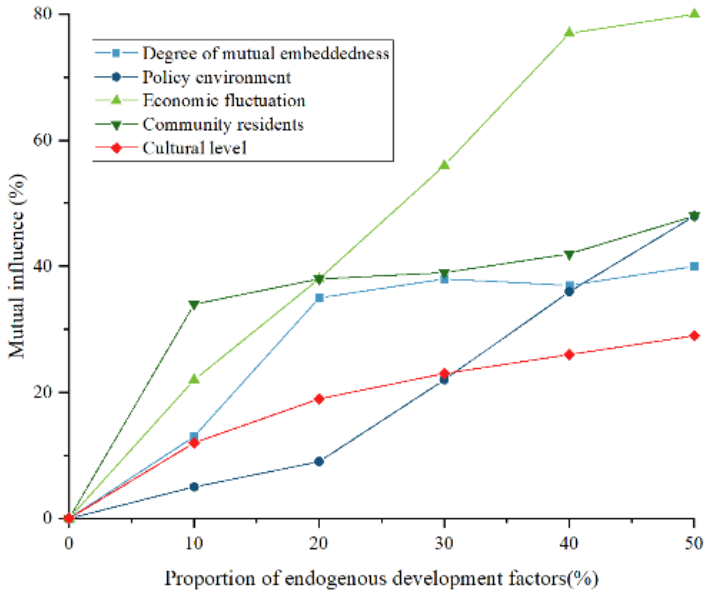

Figure 8. Prediction of the impact of endogenous development models

According to the results shown in Figure 8, the proportion of mutual embedding degree gradually increases, from the initial 13% to the highest 40%; The proportion of policy environmental impact gradually increases, from the initial 5% to the highest 48%; The proportion of economic fluctuations gradually increases, from the initial 22% to the highest 80%; The change in the proportion of community residents' influence is relatively small, rising from the initial 34% to the highest 48%; The proportion of cultural level influence is also gradually increasing, from the initial 12% to the highest 29%; This may mean that the degree of embeddedness gradually enhances the impact of this factor, and the degree of interaction

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between the community and its surrounding environment plays a key role in the impact of various factors.

The policy environment is increasingly important for the impact of various factors, and government policy measures have a significant impact on the development of the community and residents' lives. Therefore, the policy environment plays an important role in the development of the community, The impact of economic fluctuations on communities is gradually increasing. Economic prosperity or decline has a significant impact on the lives, employment opportunities, and community development of community residents. The impact of community residents on community development is relatively stable, and the needs, attitudes, and participation levels of community residents can have a significant impact on community development.

The impact of cultural level on the community is gradually increasing, The improvement of cultural level will help cultivate the values, cohesion, and cultural atmosphere of the community. The impact of five factors, namely the degree of mutual embeddedness, policy environment, economic fluctuations, community residents, and cultural level, on the community is gradually increasing, indicating that these factors have played an increasingly important role in the overall development of the community. It is recommended to fully consider these factors in the process of community planning and management, and formulate corresponding measures and policies to promote sustainable development of the community. Next, we will analyze from the perspective of predicting the degree of endogenous development, as shown in Figure 9.

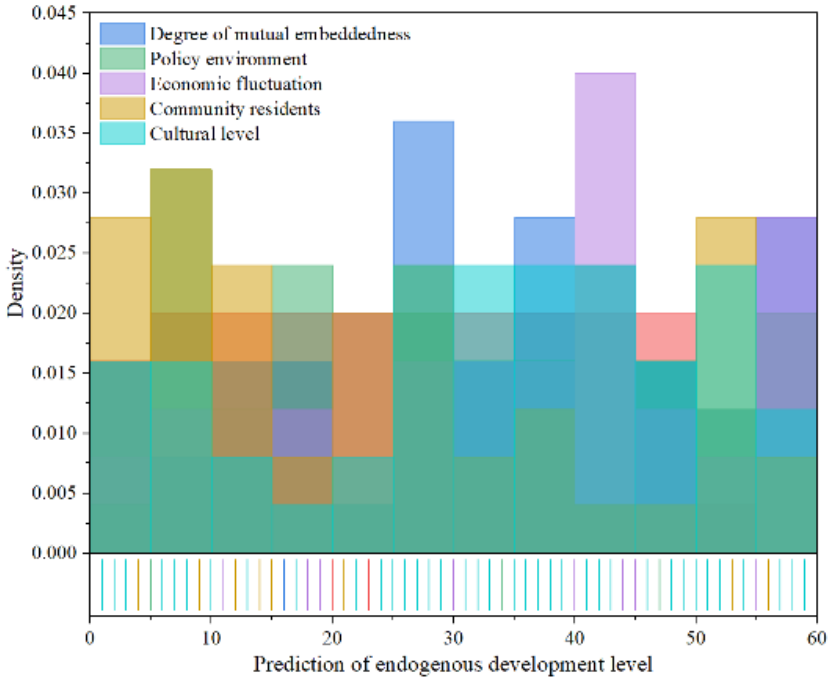

Figure 9. Prediction of Endogenous Development Degree

The data in Figure 9 is the result of sampling 50 times and performing 50 cycles of prediction, where the degree of embeddedness refers to the degree of interdependence between individuals, or can be understood as the impact they have on each other. From the data, it can be seen that the proportion of embedding degree in the sample ranges from 0 to 59, with an average value of 30.98 and a standard deviation of 18.63, indicating significant differences and dispersion in the sample data;

The proportion of policy environment reflects the degree of policy attention to a certain issue, ranging from 0 to 59, with an average value of 23.36 and a standard deviation of 18.16. Similar

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to the degree of embeddedness, the proportion of policy environment also has certain differences and dispersion; The value of the proportion of economic fluctuations represents the degree of influence of economic factors on the prediction results, ranging from 6 to 56, with an average value of 35.08 and a standard deviation of 16.82. The standard deviation of the proportion of economic fluctuations is relatively small, indicating that the impact of economic fluctuations on the prediction results in the sample data is relatively stable; The proportion of community residents reflects the impact of community characteristics on the predicted results, ranging from 2 to 57, with an average value of 19.5 and a standard deviation of 15.69.

The standard deviation of the proportion of community residents is relatively large, indicating that there is a significant difference in the impact of the proportion of community residents on the predicted results in the sample data; The proportion of cultural level reflects the influence of cultural factors on the predicted results. The value range of cultural level proportion is between 1 and 59, with an average value of 34.22 and a standard deviation of 16.64. The standard deviation of cultural level proportion is relatively small, indicating that the influence of cultural level on the predicted results in the sample data is relatively stable. The impact of various factors in the sample data on the prediction results varies and disperses to a certain extent, with significant changes in the proportion of mutual embeddedness and policy environment, relatively small changes in the proportion of economic fluctuations, and differences in the proportion of community residents and cultural level.

4. Discussion

Yunnan is located on the southwestern border of China and is a province inhabited by multiple ethnic groups. Its unique geographical environment and diverse ethnic characteristics provide abundant resources and opportunities for the development of agriculture in Yunnan. This study focuses on the inter embedded community endogenous development model of agricultural population among various ethnic groups in Yunnan, aiming to explore how to promote the development of agricultural population, improve the living standards of farmers, and promote sustainable development of the community.

Research has found that multi-ethnic communities live in Yunnan region, and there is cultural, technological, and resource exchange and integration among different ethnic groups, achieving complementary advantages in agricultural production. For example, if a certain ethnic group is good at planting a certain crop while another ethnic group is good at animal husbandry, mutual assistance and cooperation can be achieved to optimize resource allocation and share experience, promoting the development of agriculture.

Yunnan has rich biodiversity and diverse climate conditions, providing conditions for the diversity of agriculture and the abundance of agricultural products. Farmers of all ethnic groups form a diversified production model of agricultural products within the community, providing a variety of rich agricultural products through planting, animal husbandry, fishing, and other methods to meet the needs of the market and residents. Farmers from various ethnic groups in Yunnan have rich agricultural experience and traditional knowledge, which have been passed down from generation to generation, forming a unique agricultural technology system. In the embedded community endogenous development model, farmers not only retain traditional agricultural technologies, but also improve agricultural production efficiency and quality through innovation and learning to introduce modern agricultural technologies.

The inter embedded community endogenous development model of agricultural populations among various ethnic groups in Yunnan can effectively promote the development of agriculture and rural communities. However, there are still some challenges and problems in the implementation process. There are differences in market demand and sales channels for agricultural products from different ethnic groups. It is necessary to strengthen the collection

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and analysis of market information, promote effective integration between agricultural products and the market, improve the smoothness of sales channels, and increase the added value of agricultural products.

The innovation and inheritance of agricultural technology require the cooperation of education and technical support. Relevant departments should strengthen agricultural technology training and support for farmers, improve their professional level and innovation ability. The ecological environment in Yunnan region needs to be effectively protected to ensure the sustainable development of agriculture. Relevant departments should strengthen the formulation and implementation of environmental protection policies and measures to promote the ecological friendly development of agriculture.

The problems faced by the reconstruction of multi-ethnic agricultural communities in Yunnan Province may involve the following aspects: inadequate infrastructure, unfair resource allocation, difficulty in integrating cultural differences, and lagging agricultural production methods.

To address these issues, the following solutions can be considered: increasing investment in infrastructure in rural areas of Yunnan Province, including the construction of roads, bridges, water supply, power supply, and other facilities, to improve transportation and communication convenience in rural areas; Develop relevant policies to ensure fair allocation of resources, prioritize support for agricultural development in remote areas and ethnic minority inhabited areas, and avoid unfair resource concentration in certain areas; By conducting cultural activities and establishing cultural exchange platforms, we aim to strengthen mutual understanding and integration among different ethnic groups, and enhance mutual trust and cooperation among community residents; Encourage farmers to adopt modern agricultural technologies, improve agricultural production efficiency and quality, promote large-scale and standardized agricultural management through cooperatives and other forms, and increase farmers' income levels;

Increase investment in educational resources in rural areas, provide diversified educational and training opportunities, improve the cultural quality and technical level of farmers, and provide support for them to adapt to social changes and improve production capacity; Strengthen the guidance and support of the government in the reconstruction of rural communities, establish a sound policy system, provide corresponding financial and tax support, and encourage social organizations and enterprises to participate in the reconstruction of agricultural population embedded communities in Yunnan.

These methods require the joint efforts of the government, relevant departments, social organizations, and farmers to form a multi-party cooperation situation, in order to solve the problem of multi-ethnic agricultural population embedding in community reconstruction in Yunnan Province and promote sustainable development in the region.

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