

## Article

# The Impact of Empowerment Practice on the Rural Collective Economy: Empirical Evidence from Rural Communities in China

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**Abstract:** As a vivid practice of urban-rural interaction, empowerment is playing an increasingly salient role in rural revitalization around the world. Yet, existing studies on empowerment practices are still insufficient. This paper examines how empowerment practices affect the economic development of rural communities in China. This study constructs an integrated variable to measure the practice of rural empowerment in China. Data for this study were obtained from the community data of the China Rural Household Panel Survey (CRHPS) in 2017 to empirically verify the impact of empowerment practices on the rural collective economy. The results indicate that empowerment practice has a significant role in promoting the economic development of rural communities. Regarding the heterogeneity of the number of leaders, the fewer rural community leaders there are, the less empowered a village will be. For the heterogeneity of the income of the rural collective economy, the higher the income is, the more significant the promoting effect of empowerment on rural communities will be.

**Keywords:** empowerment; rural collective economy; principal component analysis; variable substitution; empirical research; urban-rural interaction



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## 1. Introduction

With the transformation of human society from an agricultural economy to an industrial economy, rural decline has become an inevitable process [1]. As early as the 1960s, the United States expressed its concern about rural revival. Then, similar expressions, such as rural decay, community destruction, “dying” rural communities, marginal communities and rural “hollowing out”, were articulated one after another to describe the spiraling decline of rural employment reduction, population decline, economic depression and deterioration of quality of life [2–6]. “Counter urbanization”, a “rural renaissance”, was noted in many developed economies in the 1970s [7], and the trend has also been visible since then in certain periods and areas [6]. Countries that experienced this trend include the United Kingdom [8], Australia [9], New Zealand [10] and Sweden [6,11]. Compared with developed countries, the problem of rural decline and “hollowing out” in many developing countries is more serious [5]. In China, which is the largest developing country in the world, an important way to prevent rural decline is to develop the rural collective economy. China realizes the integrated development of the scale economy and industry through the overall management of rural resources to improve the industrial profits of rural communities. The realization of industrial development in rural communities will lead to the revitalization of rural ecology, culture and society. If we want rural communities to escape the historical law of rural decline and change from gradual decline to gradual revival, we need to empower the members of rural communities and enhance their internal development momentum. At present, the rural collective economy in China has made some achievements. Therefore, in research on ways to prevent rural decline in China, the rural collective economy in China

can serve as a reference for other countries, especially developing countries, to solve the problem of rural decline.

On the basis of the collective ownership of rural land, the rural collective economy is an economic form in which farmers join collective economic organizations based on the principles of voluntariness and mutual benefit, and the collective members share interests in the process of operating collective assets. Related research on the rural collective economy has shown an explosive trend since 2018 and peaked in 2021. It has been found that the development of the rural collective economy has a positive impact on green rural tourism [12], centralized land use [13] and improvement in farmers' well-being [13]. Thus, to develop the rural collective economy, what kinds of ways or means can promote the development of the rural collective economy? Relevant studies have found that building a property rights market [14], promoting labor circulation [15] and developing industrial integration [16] can promote the development of rural collective economy. Wilson believes that community residents are not objects and play a key role in promoting the development of the community economy [17]. This study also believes that empowering the residents in rural communities is a fundamental and long-term way to promote the development of the rural collective economy.

To develop the rural collective economy by means of empowerment, we first need to understand what empowerment is. Empowerment is a construct shared by many disciplines and arenas: community development, psychology, education, economics and research on social movements and organizations, among others [18]. This also shows that empowerment has many attributes and rich connotations [19]. Empowerment is multi-dimensional and social, and it is a process. As a general definition, however, we suggest that empowerment is a multidimensional social process that helps people gain control over their own lives. It is a process that fosters power in people for use in their own lives, their communities and their society by acting on issues that they define as important. This definition also has important significance; that is, individuals and communities are fundamentally linked [18]. An increasing number of researchers have also realized that personal change has become a bridge between community contact and social change [17]. It is the connection between individuals and communities that makes us realize that empowerment is closely related to the development of communities.

In research on empowerment practice to promote the rural collective economy, Wilson believes that participating in community economic development enhances personal ability [17]. Because personal empowerment eliminates personal isolation, the act of participation creates a sense of belonging and mutual connection, which in turn produces commitment and cooperation. At that moment, the original energy of sustainable community economic development is released—this is the largest resource that a community can control. Wilson took rural communities in South Africa as an example and found that the full use of social capital can develop a rural collective economy [20]. The task of community economic development is to produce marketable products and services by mobilizing local resources, which is inseparable from the help of social capital. Subiyakto believes that community development needs to encourage and improve empowerment activities, adhere to the independence, initiative and creativity of local communities, develop existing human resources and overcome poverty activities in various ways [21]. The EU's Links between Actions for the Development of the Rural Economy (LEADER) program for the systematic empowerment of rural areas mainly adopts the method of increasing local people's participation in various affairs of rural community development [22]. Art is used as a means of encouragement and support and citizen participation, as well as opportunities for social interaction and network connection, which are crucial for the health and well-being of residents in rural and remote areas [23]. The development of the digital economy can promote the development of rural communities, but it also increases the development gap between urban and rural communities, leaving rural communities in a digital divide. Thus, the communication technology closely related to the digital economy has become an important way to empower rural communities [24]. In summary, the mechanism of

empowering and promoting the rural collective economy is to encourage local community residents to fully participate in local development by means of art, digitalization or social capital. This participation process enhances individuals' development ability, condenses the community's collective strength and promotes the development of the rural collective economy. Developing collective economy is also an inclusive and environmentally friendly method of economic development. Previous studies have reached a consensus that empowerment practice can promote the development of the rural community's collective economy [17,25–27], and there are sufficient case studies. However, the promoting effect of empowerment on the development of the rural community collective economy has yet to be quantitatively verified. The mechanism of empowerment to rural collective economy needs to be further summarized. Furthermore, because the concept of empowerment involves the interactive process between individuals and the collective, it also brings the limitation that it is difficult to measure quantitatively.

The main objective of this study is to empirically test the promoting effect of empowerment practice on the collective economic development of rural communities in China by using data from rural communities in China. This study also provides a further scientific basis for how to promote the rural collective economy through empowerment. The specific objectives of this analysis are (1) to establish an integrated variable to measure the level of rural empowerment, (2) to analyze the influence of empowerment on the collective economy of rural communities through the regression of the integrated variable of empowerment, and (3) to propose suggestions on how to further promote the rural collective economy through empowerment.

## 2. Background and Research Hypothesis

### 2.1. Background

The rural collective economy has developed for decades in China, and there are three main forms. In the 1950s, the community economy in rural areas was a collective economy, with common production and unified distribution [28,29]. In the 1960s, the community economy in rural areas of China was transformed into a production mode with farmers' families as the basic production units [30]. Since 2016, rural areas in China have begun to develop new community collective economy based on clear property rights. The new rural collective economy mainly adopts the cooperative of shareholding economy assets, which quantify the total value of village collectives, and the shareholding land cooperative, in which farmers spontaneously invest their land [31]. The foundation of rural collective economy in China is the collective ownership of rural land, and farmers in rural communities have the right to contract and manage the land in their communities. Rural communities in China mainly rely on the collective ownership of land, an important means of production, to operate the collective industry and then develop the collective economy. Previous studies have sufficiently explored the development process [32,33], economic forms [34,35] and development dynamics [14,36] of the rural collective economy in China.

The practice of rural empowerment in China has two ways: exogenous empowerment and endogenous empowerment. Among them, the exogenous empowerment means that external subjects such as the government and enterprises input resources for the rural areas, and the endogenous empowerment means that residents in rural areas organize themselves to improve their ability to construct local communities. The land reform after the founding of New China has brought exogenous empowerment practice and empowered farmers with more rights. Because of the lack of personal means of production, farmers began to cooperate spontaneously to improve agricultural production capacity through self-organization. Considering that rural cooperative production increased grain production, the government promoted this practice nationwide. Under the condition of insufficient means of production, the advantage of rural cooperative production is that farmers can obtain higher grain output through cooperation, but the disadvantage is that farmers lack the decision-making power of agricultural production, so their enthusiasm for production was weakened. As the means of production became abundant, the government began to implement the house-

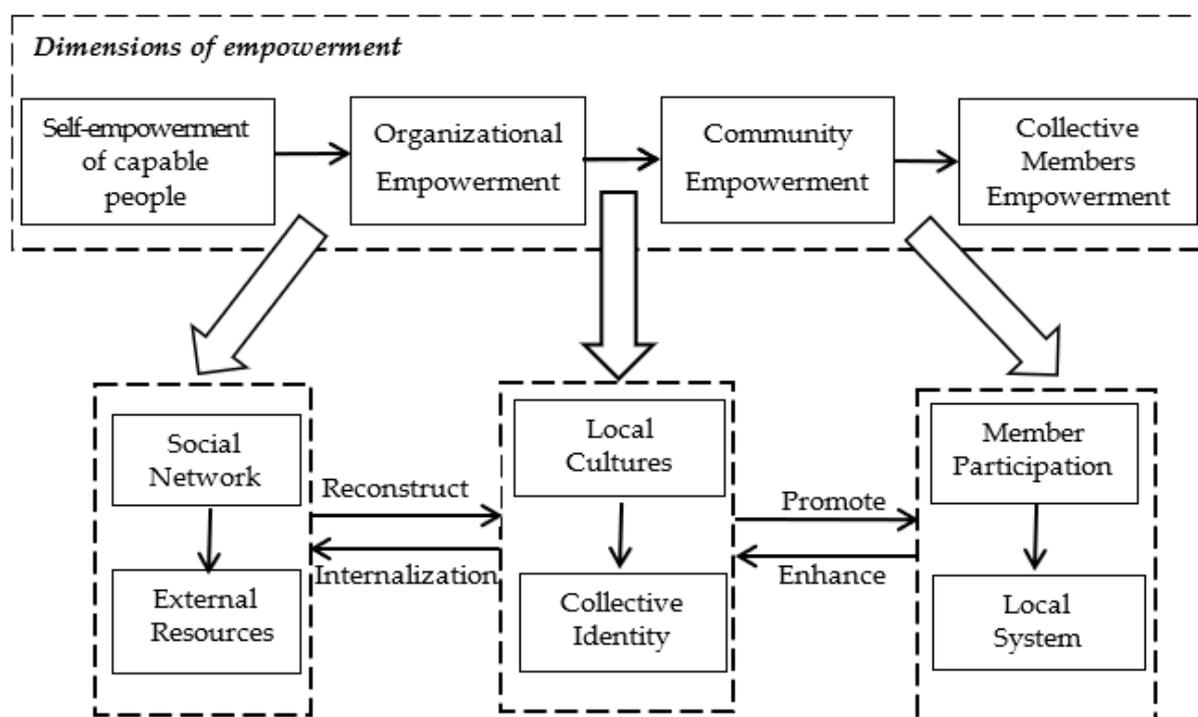
hold responsibility contract system, empowering farmers the right to make independent decisions in production. China has empowered the farmers the right to self-development through exogenous empowerment practice, such as land reform, poverty alleviation and collective property rights reform. The advantage of exogenous empowerment practice is that it can adjust the power structure of the whole society and give consideration to social fairness while promoting social development. However, the exogenous empowerment practice ignores the farmers' self-development. Taking China's rural revitalization strategy as an example, we can compare it with the Japanese rural revitalization movement and the European Union's LEADER program (See Table 1). Most countries in the world attach importance to the role of the government in the process of rural empowerment, because the initial stage of rural empowerment requires the government to provide legal and economic support. The difference of rural empowerment in different countries is mainly due to the different levels of economic development in different countries, which leads to different roles of government, market and society. At present, China mainly relies on external subjects, such as government, enterprises and research institutions, to promote rural exogenous empowerment. In contrast, Japan relies more on the forces generated in rural areas to promote rural development, and builds various social organizations, such as agricultural cooperatives and cooperatives. Europe has the richest types of subjects participating in rural empowerment, which not only attaches importance to exogenous empowerment and endogenous empowerment, but also attaches importance to the construction of industry standards. Therefore, in addition to governments, enterprises, research institutions and social organizations, there are various associations. The limitation of rural empowerment in China is that it attaches importance to the government's support and investment in rural areas, and fails to effectively organize and mobilize all kinds of resources within rural society. As a result, once the government's investment in rural areas is interrupted, rural development will easily come to a standstill, resulting in the outflow of rural resources and insufficient protection of public goods. China's rural empowerment practice is still lacking in the micro-level endogenous rural empowerment practice, which is mainly manifested in ignoring community participation and residents' willingness of self-development.

At present, the rural endogenous empowerment practice in China drives the improvement of the ability of all rural community residents through a small number of capable people in rural areas. Its mechanism is "self-empowerment of capable people—organizational empowerment—community empowerment—collective members empowerment" (See Figure 1). Specifically, the self-empowerment of capable people refers to the improvement of self-ability and the establishment of social networks brought about by their personal experiences. Organizational empowerment means public participation in organizational construction, which transforms individual and spontaneous participation into organized participation. Community empowerment is the effective management of the community from the aspects of social structure and social system. Collective member empowerment means that individuals can enhance their sense of psychological gain and master enough development resources by actively participating in various community affairs. Endogenous empowerment practice is to build the rural areas through the attraction of social capital by capable people rather than relying on the external resources. The injection of external resources brings industrial projects to rural areas, and also enhances the organizational level of community residents and their participation. In the process of participation, local culture is constantly emphasized, and community residents' collective recognition of rural community development is enhanced. With a higher degree of collective identity, all residents in the community will participate in industrial projects and generate local systems. Through this endogenous empowerment mechanism, all members of rural communities can be empowered.

**Table 1.** Comparative table of rural empowerment practices.

	<b>China's Rural Revitalization Strategy</b>	<b>Japan's Rural Revitalization Movement</b>	<b>EU's LEADER Program</b>
Empowerment Subject	Government Enterprise Research Institution	Government Enterprise Research Institution Social Organization	Government Enterprise Research Institution Social Organization Association
Empowerment Object	Farmer New Agricultural Business Entity (Professional Cooperative, Family Farm, Joint-stock Economic Cooperative, etc.) Community	Farmer Farmers' Cooperative Organization (Non-governmental Organization, Agricultural Association, Forest Association, Fishing Association, etc.) Community	Farmer Local Action Group Community
Empowerment Goal	Thriving Industry Livable Ecology Civilized Atmosphere Effective Governance Prosperous Life	Revitalize Domestic Industries Promote Sustained Economic and Social Development Revitalize Declining Rural Areas	Protect Natural and Cultural Resources Create Employment Opportunities Improve Community Organization Capabilities Rebuild Rural Areas' Confidence
Empowerment Scheme	Coordinate urban and rural development, promote agricultural and rural modernization, develop and expand rural industries, build an ecologically livable beautiful countryside, prosper rural culture and improve the rural governance system	Build rural production and living infrastructure, redistribute financial institutional resources, improve rural development capacity, increase farmers' vocational training, give play to agricultural versatility, and promote the development of "six industries"	The government and local interest groups form a public-private partnership to attract local forces to participate in rural development; increase training and encourage local residents to promote collective action; excavate local culture and learn from the achievements of other regions to realize the modernization of traditional technology

Through the economic development of rural communities in China, we see that the state and farmers are mutually empowered [37]. First, the empowerment of rural areas in China is promoted from top to bottom at the national level and then empowered from bottom to top by encouraging the new collective economy to develop the abilities of rural community residents. However, empirical research on empowerment actions that affect the internal development dynamics of the rural collective economy in China is lacking. In particular, there is a lack of research on endogenous motivation and its influencing factors when the rural collective economy in China is transformed into a new collective economy. Therefore, it is necessary to conduct an empirical analysis of the influencing factors of endogenous motivation in this new development model to better understand the essence of the current rural collective economy in China.



**Figure 1.** China's rural endogenous empowerment mechanism.

## 2.2. Research Hypotheses

Empowerment was first defined as educators making oppressed individuals reflect on their own situation by questioning education to realize the educational goal of awakening the consciousness and personal liberation of oppressed individuals [38]. The concept of empowerment was first applied in fields such as psychology, medicine, education and social work, paying attention to how disadvantaged groups, such as black people and women, can reduce their psychological powerlessness and ability obstacles. Subsequently, this concept was extended to the fields of public and private governance, such as enterprise management, community governance and policy design. Early psychological research posited that empowerment aims to increase the psychological power perception of powerless or weakly empowered subjects. Riger expanded this connotation and thought that empowerment was also related to the degree of personal control over power and resources [39]. On this basis, Chadiha et al. clearly stated that the goal of empowerment is to improve the ability of powerless individuals to improve their environment by mastering resources [40]. Empowerment is a kind of perception of power, accompanied by a series of processes of power acquisition, growth and reduction. The increase in personal power, interpersonal power and political power can prompt individuals, organizations and communities to take actions to improve their own situation, which helps individuals, organizations and communities control their own affairs [41]. If individuals want to be truly empowered, there must be a channel to connect individuals' empowerment goals with the empowerment goals of larger organizations, communities and society and to obtain professional support and encouragement from collective action [42]. Lee summarized the empowerment approach of American social work and believed that there was a path from individual action to collective action in empowerment practice [43]. That is, individuals form their feelings for the community through organizing activities, which trigger psychological empowerment at the individual level and finally integrate into the collective action of community empowerment. The development of the community collective economy needs the participation of every individual in the community. Thus, the ability improvement brought by the empowerment of every individual in the community will also lead to the development of the community collective economy. The concept of empowerment adopted in this study is not defined

in the fields of psychology and political science, but in the field of social work, which focuses on the interaction between individuals and groups. In rural areas, individuals are closely related to the development of collective economy. Therefore, this paper proposes the following hypothesis:

**Hypothesis 1 (H1).** *Empowerment has a significant and positive effect on the rural collective economy.*

The empowerment of individuals needs to be realized by integrating individuals into the collective actions of the community. However, communities with different development levels and different management models have different degrees of empowerment. Therefore, rural communities with different economic levels have different levels of empowerment to promote the rural collective economy. The economic level of rural communities is mainly measured by collective income indicators. Rural collective income includes the government's policy funds to support rural development, the income from contracted land belonging to village collectives, the income from the establishment of village collective enterprises or cooperatives, donations from outside for village collectives and other income belonging to all rural residents. Moreover, social capital plays an important role in empowerment practice. Rural communities with more social capital are more likely to obtain more external resources and help the development of the rural collective economy. The social capital of the community is brought by the important leaders in the community. Since 2018, China has implemented a centralized policy around the grassroots governance of rural communities. This centralized policy means that the rural community has changed from power sharing involving two leaders in the past to power centralization in one leader. The advantage of this policy is that it can improve the efficiency of collective decision making. However, it will also reduce the scale of rural social capital, lead to a decrease in resource injection and lower the level of rural empowerment. In particular, one leader has a great influence on the empowerment process; thus, the number of rural community leaders also affects the level of empowerment to promote the development of the community collective economy. Therefore, this paper proposes the following hypothesis:

**Hypothesis 2 (H2).** *Empowerment has different effects on the rural collective economy under different rural collective incomes and numbers of leaders.*

### 3. Materials and Methods

#### 3.1. Data

The data used in this study come from the community data of the China Rural Household Panel Survey (CRHPS) in 2017, which is the latest and most comprehensive rural community database in China. The overall sampling scheme of the household survey project in China adopts a stratified, three-stage proportional to scale sampling design, and its weight is the population (or households) of the sampling unit. The project has been implemented since 2011, and the data cover 29 provinces, excluding Xinjiang, Tibet, Hong Kong, Macao and Taiwan, with data representation at the national, provincial, urban and rural levels. The community questionnaire mainly includes basic community information, basic public service facilities, the rural collective economy, community governance, environmental health, social security, education and culture and grassroots rule of law.

#### 3.2. Variables

(1) The explained variable includes total value of collective assets, total income and income from collective assets. In this study, these variables are separately included in the model and regressed in turn based on two considerations. First, the development of the collective economy is a comprehensive and multidimensional concept, and different variables measure different aspects of the collective economy. Therefore, multiple variables can reflect the overall situation of the rural collective economy better than single-dimensional variables and can reveal the different effects of empowerment on asset appreciation and

income increase better than synthetic comprehensive variables. Additionally, multiple variables can confirm the empirical results. Second, different variables have missing values in different situations, and the data used are cross-sectional data for 2017, making it difficult to supplement the missing values in a way that would not differ from the actual situation. In this study, variables are included in the model alone to prevent a serious reduction in sample size.

(2) The explanatory variable is empowerment. In research on empowerment, “organizational empowerment” is the most important link in empowerment [44]. Organizational empowerment is both the direct empowerment of individuals by social organizations and an enhanced degree of organization among individuals [45]. Education is one of the most important means of empowerment [38]. In addition, effective participation in various community activities is an important way to gain empowerment [46]. Considering the diversity of rural empowerment practice in China, the empowerment variable in this study has a wide range of meanings. Based on empowerment theory, this paper constructs a measurable comprehensive indicator of the rural empowerment level in China with the help of principal component analysis. Based on data availability, this study takes “organization” as an important empowerment link and measures the degree of empowerment based on the following aspects: community education and training, community participation and the organizational level. The measurement of empowerment requires variables such as rural empowerment actions and empowerment results. This paper refers to the research of Aziz et al. and Su et al. as well as the actual development of the rural collective economy in China [47,48]. It uses indicators such as the number of community training service institutions, the voter turnout rate in the last election, the total number of community social organizations and how many people have participated in voluntary service in the last year to measure empowerment. Additionally, it uses principal component analysis to generate empowerment.

(3) Control variables. The control variables selected in this paper are village characteristics. The village characteristic variables include the proportion of the labor force, county roads, credit villages, land acquisition and demolition, the number of party members and distance. Among them, the proportion of the labor force measures the ownership of labor resources in villages. Roads leading to the county indicate the locational conditions of a village, and the geographical location of a village is very important. More roads indicate that the county is more exposed to spillover effects of economic development and that is easier for a village to receive injection of external resources. There are still many villages in China that are in a state of financial scarcity. When financial institutions provide financial credit to all residents, they will mark the village as a credit village. Hence, the consideration of credit villages represents the financial resources and industrial development of a village, which can provide financial convenience for farmers. Land requisition and demolition show the degree of urbanization of villages, indicating the proximity and timing of influence from a city. A party member is usually an able person with certain social resources in rural areas, which can promote the development of rural collective economy. The number of party members shows villagers’ political participation and the ability of the party committee in a village. Distance means the distance between the village committee and the township government. The closer the distance is, the easier it is to obtain resources.

(4) Substituted explained variable. The variable substitution method is one of the best methods for robustness testing. To complete the robustness analysis, this paper uses variables such as operating collective assets, per capita disposable income and the net income of collective assets to replace the total value of village collective assets, the total income of village collective assets and annual collective income, because operating collective assets are closely related to the total value of village collective assets, per capita disposable income is closely related to the total income of village collective assets and the net income of collective assets is highly related to the total value of collective assets. Then, regression analysis is performed in turn, and the robustness of the model is verified by comparing and analyzing the regression results (Table 2).

**Table 2.** Descriptive statistics of the variables.

Variable	Variable Description	Sample	Mean	S.D.	Min	Max	Remarks
Explained variable (collective economy of rural communities)							
Total value of collective assets	There are collective assets in this community	587	11.344	5.152	0	19.114	Take natural logarithm
Total income	In 2016, various incomes of the community (CNY)	589	8.335	5.322	0	18.392	Take natural logarithm
Income from collective assets	The income from collective assets (CNY)	488	3.673	5.212	0	17.910	Take natural logarithm
Explanatory variables							
Empowerment	The level of village empowerment	580	2.351	0.806	0	6.948	Take natural logarithm
Control variables							
Labor force proportion	Proportion of population aged 15–60 to total population	520	0.590	0.141	0.061	0.884	
County road	The number of roads leading to the county center in rural communities	583	2.719	0.831	1	5	
Credit village	Credit village = 1, noncredit village = 0	581	0.358	0.479	0	1	
Land requisition and demolition	Whether this community experienced land requisition and demolition since 2000	608	0.257	0.437	0	1	
Party member quantity	The number of party members in a rural community	606	53.929	44.695	2	700	
Distance	Kilometers from the rural area to the county seat	582	1.827	0.764	0	5.081	Take natural logarithm
Substituted explained variable (for robustness analysis)							
Operating collective assets	Community-operated collective assets	491	2.997	5.394	0	16.811	Take natural logarithm
Net income of collective assets	Net income from collective assets of rural communities	491	3.259	5.009	0	16.118	Take natural logarithm
Per capita disposable income	Per capita disposable annual income of community residents (CNY)	589	8.690	0.949	0	11.513	Take natural logarithm

### 3.3. Methods

Based on the ordinary least square (OLS) method, this study quantitatively analyzes the influence of empowerment on rural collective economy, in which empowerment is a comprehensive variable generated by principal component analysis of empowerment-related variables. Based on this setting, this paper also completes a robustness analysis and heterogeneity analysis. A diagram of the framework of the model is shown in Figure 2.

#### 3.3.1. OLS Model

Empowerment is a continuous variable integrated by multidimensional variables. This study measures the development of the collective economy of rural communities based on the level of economic income. The dependent variable is a continuous variable; thus, an OLS model is constructed to verify the influence of the integrated variable of empowerment on the development of the collective economy of rural communities. The model expression is as follows:

$$\ln income_i = \alpha_i + \beta_i Empowerment_i + \sum \delta_i Z_i + \mu_i \quad (1)$$

In the formula above,  $\ln income_i$  represents the collective economic development of a village (taking the logarithm),  $Empowerment$  represents the integrated variable of village empowerment and  $Z_i$  represents a series of control variables, including the proportion of the labor force, the number of roads leading to the county, whether a village is a credit village, land acquisition and demolition, the number of party members and distance. Moreover,  $\alpha$ ,  $\beta$ ,  $\delta$  are the coefficients to be estimated and  $\mu$  indicates the random disturbance term.

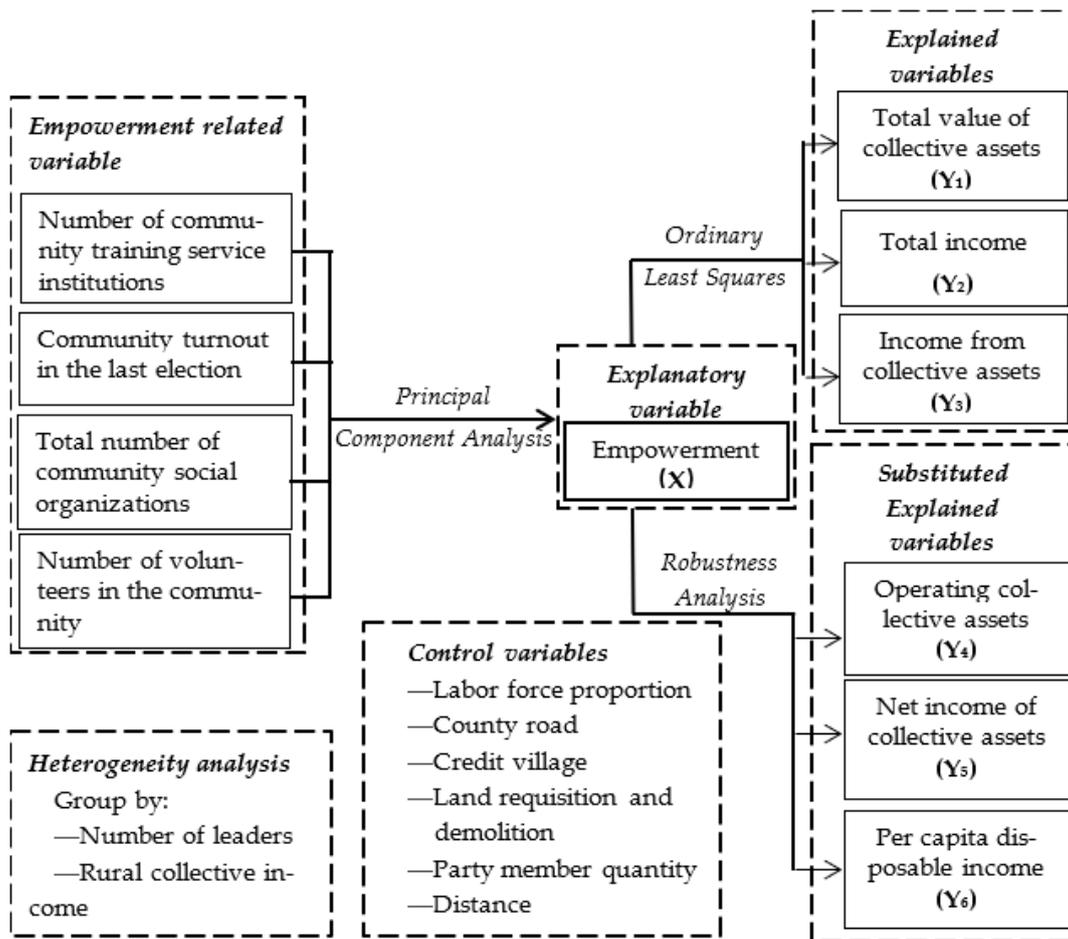


Figure 2. Model frame diagram.

### 3.3.2. Principal Component Analysis Model

Based on the analysis of the empowerment variables in Section 3.2, we find that the practice of rural empowerment in China is diverse, and the concept of empowerment in this paper has rich connotations. Empowerment is closely related to the education level, community participation and organizational level of community residents. Therefore, this study uses principal component analysis to construct an integrated variable to measure the empowerment level of rural communities in China based on the number of community training service institutions, the voter turnout rate in the last election, the total number of community social organizations and the number of people who participated in volunteer service in the last year in the CRHPS database.

Principal component analysis, which was first proposed by Hotelling in 1933, is one of the most important and commonly used methods in multivariate statistical analysis. Additionally, it is one of the mainstream methods for data dimension reduction in econometrics. Principal component analysis uses dimensionality reduction to transform multiple variables into fewer integrated variables on the premise of losing less information. The integrated variables generated by transformation are called principal components. Each principal component is a linear combination of original variables, and each principal component is irrelevant.

The core idea of principal component analysis is the method of transforming multiple variables into a few principal components through dimensionality reduction. The principal

components retain most of the information of the original variables, and they are usually expressed as linear combinations of the original variables:

$$\begin{cases} y_1 = \alpha_{11}x_1 + \alpha_{21}x_2 + \dots + \alpha_{p1}x_p \\ y_2 = \alpha_{12}x_1 + \alpha_{22}x_2 + \dots + \alpha_{p2}x_p \\ \dots \dots \dots \end{cases} \quad (2)$$

$x = (x_1, x_2, \dots, x_p)'$  is the original variable and  $y_i$  is the principal component. Principal component analysis makes the variance of the first principal component  $y_1$  larger. That is,  $var(y_i)$  is the largest; thus, it contains the most information. If the first principal component is not enough to represent the information of the original  $p$  variable, the second principal component  $y_2$  is considered, and the existing information is required not to appear in  $y_2$ , that is,  $cov(y_1, y_2) = 0$ .

Principal component analysis is a common method of constructing integrated variables. In the field of economics, many papers have used principal component analysis to construct integrated variables, such as the high-quality economic development level [49] and the inclusive finance development level [50,51]. To simplify the analysis, this paper uses principal component analysis to generate weighted related variables into an integrated variable. Based on the analysis of empowerment above and the fact that it is difficult for a single indicator to fully reflect the empowerment level, in this paper, the number of community training service institutions, the voter turnout rate in the last election, the total number of community social organizations and how many people in the community have participated in voluntary service in the last year are selected to reflect the village empowerment level. In this paper, based on the following steps, principal component analysis is used to construct an integrated variable reflecting the village empowerment level:

- (1) Due to the different dimensions and magnitudes of the basic variable, all the original variables need to be standardized first.
- (2) Principal component analysis is conducted on the processed variable. The number of principal components is determined based on the principle that the cumulative variance contribution rate is not less than 85% (generally  $\geq 80\%$ ), and the scores of each principal component are calculated. Another important criterion is that the principal component eigenvalue  $>1$ . This paper comprehensively considers these two criteria to determine the number of principal components.
- (3) Based on the proportion of the variance contribution rate of each principal component to the cumulative variance contribution rate of the extracted principal components or whether the eigenvalue  $>1$ , the scores of the principal components are weighted and summed to obtain the village weighting variable (Table 3).

**Table 3.** Descriptive statistics of the original variables for principal component analysis.

Variable	Variable Description	Sample	Mean	S.D.	Min	Max
Number of community training service institutions	Number of institutions providing community training services in the village	607	0.135	0.750	0	13
Community turnout in the last election	The voter turnout rate in the last community election	600	89.155	13.855	0	100
Total number of community social organizations	Number of social organizations owned by the community	606	0.366	1.281	0	18
Number of volunteers in the community	Total number of volunteers in the community	590	50.544	230.033	0	4000

## 4. Results

### 4.1. Principal Component Analysis Results

The Kaiser-Meyer-Olkin (KMO) test statistic is an index used to compare simple correlation coefficients and partial correlation coefficients between variables. It is mainly

used in factor analysis of multivariate statistics. KMO statistics take values between 0 and 1. When the sum of the squares of the simple correlation coefficients among all variables is far greater than the sum of the squares of the partial correlation coefficients, the KMO value is closer to 1. This means that the stronger the correlation between variables is, the more suitable the original variables are for factor analysis. When the sum of the squares of the simple correlation coefficients among all variables is close to 0, the KMO value is closer to 0. This means that the weaker the correlation between variables is, the less suitable the original variables are for factor analysis. In this paper, the KMO test is carried out, and the test results are as follows (Table 4).

**Table 4.** Sampling adequacy measurement table.

Variable	KMO Value
Number of community training service institutions	0.5007
Community turnout in the last election	0.2916
Total number of community social organizations	0.6436
Number of volunteers in the community	0.5009
Overall value	0.5012

The KMO value in this section is 0.5012, which is greater than 0.5, indicating that the sample is acceptable and can be used for principal component analysis.

In this paper, Stata13.0 software is used to conduct principal component analysis on the related variables of empowerment, and the integrated variable of empowerment is generated. First, the principal component coefficient table (Table 5) is generated.

**Table 5.** Table of principal component coefficients.

Principal Constituent	Eigenvalue	Discrepancy	Weight	Cumulative Weight
Principal component 1	1.517	0.502	0.380	0.379
Principal component 2	1.016	0.038	0.254	0.633
Principal component 3	0.977	0.488	0.244	0.877
Principal component 4	0.489	—	0.122	1.000

Because the eigenvalue (0.489) of principal component 4 is less than 1, it is not regarded as a principal component. The eigenvalues of principal components 1 and 2 are all greater than 1, and therefore, can be used for subsequent analysis. Although the eigenvalue of principal component 3 is not greater than 1, it is very close to 1, and the explanation rate of the cumulative variance of the first three principal components is 87%, exceeding 80%. Based on the analysis above and the data results (see Tables 5 and 6), principal components 1 to principal component 3 can be generated in turn. The generation formula of principal component 1 is as follows:

$$\begin{aligned} & \text{Principal component 1} \\ & = 0.702 * \text{Number of community training service institutions} \\ & \quad - 0.003 * \text{Community turnout in the last election} + 0.131 \\ & \quad * \text{Total number of community social organizations} + 0.699 \\ & \quad * \text{Number of volunteers in the community} \end{aligned}$$

Similarly, principal component 2 and principal component 3 can be calculated in turn. Based on the generated principal components, the weighted integrated variable is calculated as follows:

$$\begin{aligned} & \text{Composite index of empowerment} \\ & = (0.380 * \text{Principal component 1} + 0.254 \\ & \quad * \text{Principal component 2} + 0.244 * \text{Principal component 3}) / 0.878 \end{aligned}$$

**Table 6.** Principal component feature vector table.

Variable	Principal Component 1	Principal Component 2	Principal Component 3	Principal Component 4	Unexplained
Number of community training service institutions	0.702	−0.069	−0.031	0.708	0
Community turnout in the last election	−0.003	0.792	−0.609	0.054	0
Total number of community social organizations	0.131	0.606	0.784	−0.037	0
Number of volunteers in the community	0.699	−0.041	−0.119	−0.704	0

#### 4.2. Regression Results

The following Table 7 shows the empirical results of the effect of empowerment on the rural collective economy based on model (1) and CRHPS 2017 village data. Empowerment has a positive significant impact on the rural collective economy. Specifically, for the total value of collective assets, the effect of empowerment is significant at the 1% level. Additionally, for total income and income from collective assets, the effect is significant at the 5% level. The influence coefficients of the total value of collective assets, total income and income from collective assets are 0.851, 0.760 and 0.729, respectively. Thus, empowerment has the greatest influence on the total value of collective assets.

**Table 7.** Regression results.

Variable	Total Value of Collective Assets	Total Income	Income from Collective Assets
Empowerment	0.851 *** (0.304)	0.760 ** (0.321)	0.729 ** (0.324)
Control variable			
Labor force proportion	1.156 (1.654)	−1.780 (1.759)	0.228 (1.819)
County road	0.451 (0.282)	0.102 (0.297)	0.577 * (0.299)
Credit village	0.662 (0.478)	1.333 *** (0.503)	1.002 * (0.519)
Land requisition and demolition	0.430 (0.541)	0.571 (0.572)	1.365 ** (0.592)
Party member quantity	0.016 ** (0.007)	0.016 ** (0.008)	0.007 (0.008)
Distance	−0.126 (0.297)	−0.327 (0.314)	−0.359 (0.342)
_cons	6.522 *** (1.535)	6.332 * (1.612)	−0.453 ** (1.686)
N	467	468	392
R <sup>2</sup>	0.055	0.053	0.064

Note: \*\*\*, \*\*, and \* indicate significance levels of 1%, 5%, and 10%, respectively, and the standard errors are in parentheses.

#### 4.3. Robustness Analysis

The measurement method selected based on the literature review above and the availability of related data often cannot guarantee the reliability of the conclusion. Considering the superiority of the variable substitution method in robustness testing, the variable substitution method is chosen as the robustness testing method. The variable substitution method includes replacing the explained variable, replacing the main explanatory variable and relaxing the variable conditions. There are many variables related to the rural collective economy in the database used in this paper. Compared with the explanatory variable of

empowerment generated by principal component analysis, other explained variables are more easily available. Therefore, operating collective assets, per capita disposable income and the net income of collective assets are chosen to replace the total value of collective assets, the total income of villages and the income of collective assets.

Based on the OLS analysis, Table 8 suggests that empowerment has a significant impact on operating collective assets and the net income of collective assets, with coefficients of 0.832 and 0.699, respectively. The results are not much different from the influence coefficients of empowerment on the total value and income of collective assets (0.851 and 0.760, respectively). Empowerment has no significant influence on per capita disposable income (coefficient is 0.035), but it has a significant influence on the total income of villages (coefficient is 0.760). Considering that per capita disposable income is diversified and cannot fully represent the total income level of villages, this result is not difficult to accept. In summary, the robustness analysis based on the substitution of the dependent variables is basically consistent with the results of the baseline regression, showing that the analytical results of this study are robust.

**Table 8.** Robustness test results.

Variable	Operating Collective Assets	Net Income of Collective Assets	Per Capita Disposable Income
Empowerment	0.832 ** (0.334)	0.699 ** (0.319)	0.035 (0.057)
Control variable			
Labor force proportion	0.101 (1.878)	−0.859 (1.790)	0.144 (0.314)
County road	−0.028 (0.311)	0.365 (0.298)	0.197 *** (0.053)
Credit village	1.130 ** (0.536)	0.579 (0.513)	0.243 ** (0.090)
Land requisition and demolition	0.850 (0.619)	0.485 (0.586)	0.062 (0.102)
Party member quantity	0.008 (0.008)	0.012 * (0.007)	0.003 *** (0.001)
Distance	−0.163 (0.354)	−0.220 (0.335)	−0.153 *** (0.056)
_cons	−0.022 (1.739)	0.506 (1.661)	7.950 *** (0.288)
N	392	392	471
R <sup>2</sup>	0.043	0.041	0.095

Note: \*\*\*, \*\*, and \* indicate significance levels of 1%, 5%, and 10%, respectively, and the standard errors are in parentheses.

#### 4.4. Heterogeneity Analysis

##### 4.4.1. Heterogeneity of Rural Collective Income

Villages need to develop and manage collective resources and turn “dormant resources” into “living assets”. However, the vast majority of villages in China do not have operational collective assets, which undoubtedly increases the difficulty of village development and requires external inputs to build a foundation for village industrial development. The early costs of development are very high, which is also the reason why most villages develop with difficulty. Additionally, it is difficult to initiate the development of the collective economy because of the lack of initial funds. Based on whether the total income of villages exceeds 100,000 CNY, the villages are divided into two categories, and the influence of empowerment on the development of the collective economy is analyzed. The results are shown in Table 9. For villages with an annual income of less than 100,000 CNY, empowerment has a significant role in promoting per capita disposable income. However, it has a negative impact on village collective assets and income. For villages with an annual income of more than 100,000 CNY, empowerment has a significant role in promoting collective

assets, total income and the income of collective assets. However, it has no significant role in promoting the total value of collective assets and per capita income. The reason is that certain basic resources are still required for empowerment to start development. That is, a specific development foundation is needed to empower individuals. When rural resources are scarce, it is difficult to start development only by empowering individuals in rural areas. At this time, empowerment can bring only a certain income increase to individuals, and it is difficult to drive the development of the collective economy.

#### 4.4.2. Heterogeneity of the Number of Leaders

“One leader” is the Chinese expression indicating that one person carries the roles of both village secretary and director. When the secretary and the director are different people, the village secretary and the director may act as “double engines” for the village and make important decisions together, cooperating on both sides to promote the development of the village. In the case of one person “shouldering the burden”, the village secretary lacks powerful arms and needs to spend more energy dealing with village affairs, especially administrative aspects of village governance, and they will not have enough time and energy for plan development. Therefore, when there is “one leader”, one person may not be able to carry the burden, and the effect may not be as good as that under “two leaders”. In addition, the concentration of power may lead the village secretary to have great “self-respect” and lose enthusiasm for taking the initiative. In contrast, there is both cooperation and competition between the village secretary and the village director. The competition is manifested in their competing for government support and social recognition, and taking the initiative is an important condition for gaining affirmation.

The results are shown in Table 10. Based on the theoretical analysis of Section 2.2 and the results of the heterogeneity analysis of this section, we find that empowerment has a significant effect on total income at the 10% level. However, it is not significant for collective assets and per capita income in villages with “one leader”. For villages with “two leaders”, the effect of empowerment on the total income and per capita disposable net income of villages is significant at the 1% level. Additionally, the effect on the scale and income of collective assets is significant at the 10% level. The reason for this is that empowerment needs to rely on social networks, and more leaders mean more social capital.

**Table 9.** Heterogeneity analysis of rural collective income.

Variable	Income ≤ 100,000						Income > 100,000					
	Total Value of Collective Assets	Operating Collective Assets	Total Income	Income from Collective Assets	Net Income of Collective Assets	Per Capita Disposable Income	Total Value of Collective Assets	Operating Collective Assets	Total Income	Income from Collective Assets	Net Income of Collective Assets	Per Capita Disposable Income
Empowerment	−0.291 (0.510)	−2.020 (1.506)	−0.263 (0.430)	−0.081 (0.609)	0.228 (1.013)	0.506 *** (0.141)	0.298 (0.257)	0.512 * (0.335)	0.356 **(0.164)	0.569 ** (0.225)	−0.204 (0.264)	0.061 (0.075)
Other variables	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
_cons	12.627 *** (0.691)	12.270 *** (1.956)	10.375 *** (0.519)	9.964 *** (0.825)	9.997 *** (1.432)	8.845 *** (0.187)	12.957 *** (0.864)	11.052 *** (1.427)	12.061 *** (0.525)	9.768 *** (0.819)	10.997 *** (1.132)	8.590 *** (0.236)
N	317	318	318	318	318	318	188	188	188	188	188	188
R <sup>2</sup>	0.016	0.108	0.022	0.029	0.105	0.045	0.010	0.097	0.118	0.112	0.049	0.092

Note: \*\*\*, \*\*, and \* indicate significance levels of 1%, 5%, and 10%, respectively, and the standard errors are in parentheses.

**Table 10.** Heterogeneity analysis of the number of leaders.

Variable	One Leader						Two Leaders					
	Total Value of Collective Assets	Operating Collective Assets	Total Income	Income from Collective Assets	Net Income of Collective Assets	Per Capita Disposable Income	Total Value of Collective Assets	Operating Collective Assets	Total Income	Income from Collective Assets	Net Income of Collective Assets	Per Capita Disposable Income
Empowerment	0.262 (0.315)	−0.177 (0.485)	0.654 * (0.354)	0.124 (0.372)	−0.197 (0.366)	0.058 (0.094)	0.514 * (0.315)	0.411 (0.511)	0.713 *** (0.261)	0.566 * (0.290)	0.272 (0.424)	0.311 *** (0.090)
Other variables	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
_cons	13.776 *** (0.791)	14.399 *** (1.857)	11.162 *** (0.862)	9.535 *** (1.119)	12.567 *** (1.405)	8.680 *** (0.214)	11.992 *** (0.724)	8.559 *** (1.523)	10.044 *** (0.560)	9.223 *** (0.786)	8.478 *** (1.413)	8.724 *** (0.194)
N	150	151	151	151	151	151	355	355	355	355	355	355
R <sup>2</sup>	0.059	0.097	0.102	0.107	0.065	0.032	0.087	0.142	0.132	0.129	0.084	0.113

Note: \*\*\*, \*\*, and \* indicate significance levels of 1%, 5%, and 10%, respectively, and the standard errors are in parentheses.

## 5. Conclusions

Empowerment plays an important role in promoting the development of the rural collective economy. This study empirically analyzes the influence of empowerment on the development of the rural collective economy. It completes a robustness analysis based on the variable substitution method and analyzes the heterogeneous influences of empowerment on the development of the rural collective economy based on the two aspects of rural collective income and the number of leaders. This study draws the following conclusions.

First, empowerment has a positive significant impact on the rural collective economy. Empowerment enhances the ability of rural community collective economic organizations and members and promotes the development of the rural community collective economy, which is mainly reflected in the increase in collective assets, total income and collective asset income. Empowerment mobilizes the enthusiasm of collective members to participate in collective economic development and enhances the actual development ability of organizations and members. This ability includes the ability to use collective assets. Therefore, the improvement in the ability of organizations and members significantly affects the total value, total income and income of rural collective assets.

Second, rural communities with lower rural collective income cannot rely solely on empowerment to develop the collective economy. They need external resources to start village development. Villages with a certain level of collective income can deepen and integrate the value of existing resources and adopt various empowerment strategies to promote the further development of the collective economy. Rural collectives without collective public affairs, especially economic development projects, have no ability to drive collective members, and collective members have no enthusiasm to participate. Most of these villages with low rural collective income are poor villages, which need an external injection of certain development resources. The government's various poverty alleviation policies are designed precisely for the development of these rural communities. For villages with a certain level of collective income, there is still room for further exploration of the value of assets owned. Through the mobilization of resources, the mobilization of collective members is started, and the development ability of collective members is improved in the process of participating in collective economic development. Hence, a positive cycle in which the development ability of collective members and collective economic development promote each other is formed.

Third, empowerment plays a significant role in promoting the rural collective economy in villages with two leaders, but it does not play an obvious role in villages with one leader. The reduced number of leaders reduces village social capital, which has a certain impact on the process of community empowerment. In the early stage of empowerment practice, competent community leaders are needed to drive organizational empowerment through their social capital. In most cases, villages with two leaders have more social capital than villages with one. Thus, the empowerment of villages with two leaders has more significant effect on the collective economic development of rural communities. However, by establishing village-level joint-stock economic cooperatives and professional cooperatives, we can bring more investors to the rural collective economy and strengthen the construction of leading teams to compensate for the disadvantages of one leader.

Suggestions for the development of the rural collective economy are as follows.

First, based on the reform of the rural collective property rights system, we can explore the full use of idle rural resources and accomplish new goals and tasks of rural development by creatively using and recombining the values and attributes of these resources. We can promote the market allocation of rural resources by liberalizing the market-oriented transactions of rural internal resources and then better tap the potential value of rural resources.

Second, promoting the overall revitalization of rural areas requires the government to further empower rural organizations and enhance farmers' property rights. The government's empowerment of rural organizations and farmers' property rights is equivalent to providing a policy space for rural communities' collective economic growth and farmers' income increase. Empowering rural organizations can promote the collective economic

development of rural communities and enhance the endogenous development ability of rural areas. Land is the most important means of production in rural areas, and the development of the rural collective economy in China is based on collective ownership of land. At present, farmers are not free to buy and sell homestead and contracted land, but with the improvement of land property rights trading market, doing so has become possible, thus giving farmers more property rights. Empowering farmers through property rights allows farmers to fully enjoy the value-added benefits of collective assets brought by their collective membership, realize economic empowerment and improve their development ability to improve their own situation. Increasing personal income is an important way to improve individuals and change their living situation, meaning that it is also a means of empowerment. Farmers receive more economic income and are more able to participate in rural collective economic development projects, which further promotes the development of the rural collective economy.

Finally, the key to exerting endogenous motivation and improving self-development ability is to make full use of social capital and to encourage successful people who have developed outside rural communities to return to their home villages and make contributions to the development of the local community. Social capital promotes the rural collective economy by influencing empowerment practices. Cultural capital plays an important role in grasping the opportunities at each stage of rural development. Based on social capital, the introduction of external resource heterogeneity and the effective combination of resources in rural communities can expand the industrial advantages of rural areas and improve the competitiveness of rural community collective economic organizations. Social capital plays an important role in empowerment practice to improve the development environment, enhance development ability and, finally, realize the new endogenous development of the integration of internal and external forces in rural areas.

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