Research Article

Selecting Rural Development Paths Based on Village Multifunction: A Case of Jingjiang City, China

Tianqi He,1,2 Weifeng Qiao,1,2,3 Kaiyang Jia,1,2 Yibei Chai,1,2 Yi Hu,1,2 Pan Sun,1 Yahua Wang,1,2 and Ting Feng1,2

1School of Geography, Nanjing Normal University, Nanjing 210023, China
2College of Rural Vitalization, Nanjing Normal University, Nanjing 210023, China
3Jiangsu Center for Collaborative Innovation in Geographical Information Resource Development and Application, Nanjing 210023, China

Correspondence should be addressed to Weifeng Qiao; qiaoweifeng@njnu.edu.cn and Kaiyang Jia; jiakaiyang96@163.com

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The diverse value of rural areas has been gradually highlighted, and promoting the sustainable development of rural areas with the theoretical guidance of rural multifunction is the key to realizing rural revitalization. This study defined the concept of rural multifunction from the perspective of resident’s demands and divided it into five main functions including rural agricultural production, nonagricultural production, living, ecological environment, and social security. By constructing the evaluation index system of rural multifunction, we analysed the spatial distribution characteristics of 160 villages of Jingjiang in Jiangsu Province. And functional combinations were identified to select targeted rural development paths oriented by balanced development of rural multifunction. The results showed the following. (1) The development of various rural functions in Jingjiang city was uneven, and agricultural production function still dominated. (2) The villages with strong agricultural production function were mainly concentrated in the northwest, while the villages with a high level of nonagricultural production function were mostly distributed in the industrial parks or around towns. There is still much room for improvement in social security function, especially in areas dominated by nonagricultural production. Nonagricultural production function had a negative effect on the ecological environment function, which is contrary to the agricultural production function. (3) Balanced development rather than equal development of rural functions should be pursued to achieve multifunctionality. Scientific guidance for the functional growth of villages in Jingjiang city and theoretical support for the microscale evaluation of rural multifunction and its application were provided by the research results.

1. Introduction

The traditional rural areas are a complex system composed of the economy, society, and environment, and it is a human living space dominated by agricultural production. However, rural areas are being pushed forward by the marketization brought by rapid industrialization and urbanization [1, 2]. At the same time, the improvement of the level of social and economic development and the enrichment of the demand level of humans have prompted the diversification of activities that humans use to meet their own needs [3], which leads to a continuous increase in the types of rural functions that support human activities. The rural space is undergoing a dramatic reconstruction [4], and rural functions are changing accordingly, especially in China.

From 1978 to 2018, the urbanization rate of China’s permanent population gradually increased from 17.92% to 59.58% [5, 6]. It is expected to enter a mature period by 2035, and rural transformation and development will also enter a critical period [7]. By the end of 2018, China’s rural population still accounted for 40 percent [8]. In 2020, the rural revitalization strategy, which was a major decision and deployment implemented by the 19th National Congress of the Communist Party of China, was further emphasized in
Central Document No. 1. Rural revitalization and transformation and paired rural-urban development can be supported theoretically by the multifunctional theory of rural areas [9, 10], namely, strengthening the research on rural multifunction and perfecting rural multifunctional theory are of great significance for optimizing the functional pattern and realizing rural revival in the new era. Under this trend, rural multifunction and its application have become a widely discussed topic in academia.

Since the 20th century, scholars have conducted extensive research on the types and distributions of rural functions. At the beginning of the 21st century, scholars gradually began to use multifunctional theory to replace the framework of “postproductivism” to explain a series of changes in rural areas. The principle for selecting the indicators for measuring rural multifunction was discussed [11–13] and then a wider range of versatile applications was further proposed [14, 15]. During this period, the multifunctional theory was also widely used in rural development policies [16]. The early research mainly focused on qualitative analysis. In recent years, research on rural multifunction tends to be empirical. Although the existing research has strengthened the theoretical and practical foundations of research on multifunction, the related research is still somewhat weak compared with that on multifunctional agriculture and urban multifunction [17].

For the study of rural multifunction, the spatial heterogeneity can be more reflected from the village level, and there is a more practical significance for exploring rural development [18, 19]. However, there are still few studies conducted at the village level. Of the few studies that have been made, most were mainly based on the data processed according to the proportion of population or land area, which is not scientific enough. Many scholars have explored the multifunctionality of the rural areas from the perspective of farmers, while others from the perspective of land [17, 19]. More studies are needed on general rural areas with universal significance rather than typical areas such as suburban areas [13] and “villages within cities.” Moreover, the status quo, evolution process, and influence factors for rural multifunction have received extensive attention from scholars [20–22]. Limited attention has been paid to the future development of rural multifunction. More efforts are needed to describe the characteristics of rural multifunction with a systematic quantitative evaluation method on villages.

In response, taking Jingjiang as the case area, this study constructs the index system from three aspects of residents, land, and industry and puts forward the method of locating dominant function and inferior function to systematically study the spatial differentiation for rural multifunction based on villages. The purpose of this article is to answer the questions: ‘what is the general definition of rural multifunction? How should rural multifunction develop in the future?’ The research results are expected to provide feasible guidance for future rural revitalization practices and urban-rural integration for many rural areas, especially developing nations, and promote the further microscale evaluation and application of the multifunctionality of rural areas.

The remainder of this paper is structured as follows. Section 2 presents a brief review of the literature and introduction to rural multifunction. Section 3 illustrates the data source and empirical methods used. Section 4 reports the empirical results and brief analysis. Section 5 contains the discussion and prospects for future research, and some brief conclusion are drawn in Section 6.

2. Literature Review

Multifunctional agriculture (MFA) refers to the fact that agriculture not only has the basic function of producing food and fibre but also has several other functions such as the management of renewable natural resources, landscape, conservation of biodiversity, and contribution to the socioeconomic viability of rural areas [23]. MFA was originally proposed by the Japanese government to protect its rice market in the late 1980s. The combination of human social activities and the nature of agricultural production forms agricultural multifunctionality. The agricultural production activities carried out by humans in rural areas cannot exist in isolation from other social activities. The EU and other developed agricultural regions began to attach importance to the understanding of agricultural multifunctionality after the relative surplus of agricultural production reached its peak [24]. By the late 1990s, the concept of MFA has been widely accepted. With the maturity of agricultural multifunction theory and the proposal of sustainable development, the multifunctional theory has gradually expanded from the agricultural field to other areas such as territorial multifunction [25, 26]. The territorial function is the combined functionality of specific regions in the sustainable development of natural ecosystems and activities for human production and life [27, 28], including urban territorial function and rural territorial function. Wilson pointed out that multifunctional theory can be used not only in agriculture but also in rural transformation and development, especially in describing the population, industry, environment of rural areas, and thought that the theory of rural multifunction is feasible in less developed countries or regions [29]. The theory of rural multifunction is an extension of MFA [30, 31] and the result of further refinement of the theory of territorial function, providing a complete analytical framework for the research of rural functions and their diversification.

Rural space with natural characteristics, territoriality, and functional complexities is a unity of production, ecology, and living space. The function is one of the important attributes of rural space. Actually, rural itself is a region space with multifunctionality that has been neglected in the past [32]. From the perspective of multifunction, the heterogeneity of rural space can be well characterized [33]. There is no unified definition for rural multifunction among scholars. It is stated that rural multifunction refers to the comprehensive characteristics of a village that play a beneficial role in nature or human development by exerting their attributes and joint effects with other systems from the perspective of the connection between rural areas and the surrounding region [34]. The European declaration on rural
development in the 21st century stated that the contemporary countryside is not only composed of traditional agricultural production sites and farmer gathering places but also has multiple functions, such as economic, societal, cultural, and ecological functions. This set of functions is irreplaceable for the overall development and is coordinated and complementary with urban territorial function [35].

Scholars also have different classification of rural multifunction. Ma et al. divided rural functions into the living, productive, and ecological functions [36]. Yang et al. utilized geographical detectors to explore the rural multifunction on counties in China from the functions of economic development, agricultural production, ecological conservation, and social security and find that rural multifunction in China’s plains and eastern coastal areas were more obvious than those in plateaus and mountains, and the overall rural multifunctionality was showing an upward trend [37]. To objectively understand the rural multifunction and its evolution mechanism, different spatial analysis approaches have been used. Zhao et al. used the kernel density estimation to reveal the spatial differentiation and pointed out that the function of rural homestead originates from the needs of farmers [38]. The local spatial autocorrelation models [39] and BP neural network models [40], as well as the Spearman ranking correlation coefficient method [41] were also applied to related studies. Xu and Fang provided a scientific reference for promoting the future development and transformation of rural areas based on functional status and function division [41]. Effective rural development policies must be based on accurate classification of the essential characteristics of the regional types [24], so the scientific cognition for rural multifunction is particularly important. At the same time, rural multifunction research on villages is needed to provide a significant reference for village planning. And what principles should be followed to develop the rural function and how to develop is worth further exploring.

3. Scientific Cognition and the Balanced Development of Rural Multifunction

3.1. Scientific Cognition of Rural Multifunction. Holmes and Argent indicated that changes in people’s demand for production, consumption, and ecology are the main reason driving the continuous transformation of rural functions in the process of social development [42]. In traditional agricultural society in China, the change of demand can be characterized by the increase in demand. In this period, city and rural are two relatively closed system and the rural residents lived a self-sufficient life. The subject of demand was mainly rural residents who earn their living from agriculture. Therefore, rural areas as the space carrier to meet the needs of rural dwellers have the function of agricultural production and living.

In the industrial society, the demand hierarchy has been enriched. As the man-land relationship became increasingly tense, agriculture was facing the problem of “over densification,” and traditional Chinese agricultural development models that have long relied on high labor input to increase land yield are declining, while modern agricultural development models that increase labor productivity are emerging. A large number of agricultural labor was in the state of recessive unemployment which led to the transfer of rural surplus labor to nonagricultural industries [43]. The nonagricultural production function of the countryside appeared.

When it comes to the postindustrial society, demand subject presents the trend of diversification (including rural and urban residents), and people’s desire for consumption begins to transform into nonmaterial products. The middle-income groups mainly concentrated in cities with higher income levels, and scientific and cultural qualities gradually progress to a “green” consensus, driving the formation of ecological consumption trends [31, 44]. The functions undertaken by villages in terms of ecology have gradually become prominent. Simultaneously, with the increase in people’s income, people’s requirements for the quality of life are improving. People are beginning to pay attention to the social security system. The government is also committed to strengthening social security functions in rural areas.

Thereupon, this study defines rural multifunction as the sum of various functions provided by rural areas as a carrier for implementing human activities to meet the diverse needs of residents at a certain stage of socio-economic development, and these functions rely on the resource characteristics of the rural space. Rural multifunction can be divided into agricultural production function (APF), nonagricultural production function (NPF), living function (LF), ecological environmental function (EEF), and social security function (SSF). And rural multifunction, which is rooted in the suitability for the land for multiple uses, as is agricultural multifunction, is an inherent attribute of rural areas. Rural multifunction has obvious spatial heterogeneity and temporal variability (see Figure 1).

3.2. Balanced Development of Rural Multifunction. Agriculture, rural areas, and development have always been crucial issues for international organizations. One of the essential features of rural development is to achieve multifunctionalization [45]. Firstly, comprehensiveness and diversity are the basic features of rural multifunction (see Figure 1). Rural value is the result of the comprehensive action of various functions. The diversification of residents’ spatial needs determines the simultaneous development of rural multiple functions, that is, it is unreasonable to develop one function at the expense of others. In addition, the combination of elements and structural conditions of the rural area determine the attributes and strength of rural functions and restrict the direction and trend of the rural multifunction evolution [46]. Different regions differ in the combination of elements and characteristics of resources [47]. Therefore, rural multifunction cannot achieve equal development. This inequality is manifested in two aspects, one is the unequal development of a certain function in different regions, and the other is the unequal development of various functions in the same region.
With that in mind, we proposed the concept of the balanced development of rural multifunction, which is different from the equal development of all functions. Balanced development of rural multifunction in this paper refers to the relative synchronization in the development of functions, whether among functions or among regions, which is basically kept under the limitation of element combination and structure. Multifunctional balanced development not only emphasizes the balanced development with the distinction between functions but also advocates the balanced development of various rural areas. Most functions are not at their best for some factors and there is still much room for improvement. Besides, there are interactions between rural functions. For example, in general, the non-agricultural production function is negatively related to agricultural production function and ecological environmental function [24, 48]. Some functions were even gone beyond the limits allowed by the ecological environment, thus causing negative effects on it (see Figure 2). LG the selection of rural development paths should be guided by the balanced development of rural multifunction.

4. Materials and Methods

4.1. Survey of the Research Area. Jingjiang city, which is located in eastern China, is located between Nanjing city and Shanghai city (see Figure 3) and is included in both the Shanghai and Nanjing metropolitan areas. Jingjiang has a total land area of 655.58 square kilometres. The terrain of Jingjiang is mostly flat with few hills. As the bridgehead for the economic integration of northern Jiangsu and southern Jiangsu, it has a coastline of 52.3 kilometres along the Yangtze River and belongs to the Yangtze River Economic Zone. The economic development level in Jingjiang city is relatively high. At the end of 2017, its rural permanent population was 236,800, and the urbanization rate of the permanent population was 65.55%. The per capita disposable income of rural residents is 21,361 yuan, and the proportion of the primary, secondary, and tertiary industries in the GDP is 2.5 : 48.6 : 48.9. Since the removal of the county and the establishment of the city in 1993, the urbanization process of Jingjiang city has been accelerating. Since 2004, it has accelerated the construction of a “five horizontal and three vertical” road network to create a new spatial pattern of “two core areas, three axes, and four zones.” The scope of the main city zone is gradually expanding, and the rural areas have been driven to gradually show a multifunctional development trend. Therefore, choosing Jingjiang as the case is representative.

Taking the end of 2017 as the time node, this study selected 160 administrative villages in Jingjiang city as the research units. The relevant data mainly include the socio-economic data and land use status data of 160 administrative villages. Among them, the socio-economic statistical data came from the “Jingjiang Statistical Yearbook” (2018) and other relevant departments, and the land use data came from the land use change survey data of Jingjiang city in 2017. Since the collective construction land area in 2017 of some administrative villages could not be obtained, the 2018 data were used instead.

4.2. Research Method

4.2.1. Construction of a Rural Multifunction Index System. According to the scientific cognition of rural multifunction, this study measured rural multifunction from the five functions of agricultural production (APF), nonagricultural production (NPF), living (LF), ecological environmental (EEF), and social security (SSF), respectively. Moreover, the
countryside is an extremely complex system [49]. Demographic characteristics are the most important and active factor reflecting changes in rural development. The foundation of rural revitalization is industrial prosperity, and industrial development is the basic indicator to measure rural development. And land use is the external representation of changes in rural spatial function structure [50]. So, we selected 16 indicators from three dimensions of people, land, and production for comprehensive evaluation (see Table 1).

4.2.2. Calculation of Function Index. The accuracy of the evaluation results is directly affected by the chosen standardization method. Compared with other methods, the z-score method is more effective [53] and is immune to the effects of the original unit of measurement. It can convert data of different magnitudes into a unified score for comparison and can be subjected to further statistical processing. Therefore, the z-score method was adopted for de-dimensioning, and then a linear transformation was performed to facilitate comparison. The minimum relative information entropy was used to couple the objective weights and subjective weights [54]. The comprehensive weights were obtained with the Lagrange multiplier method. Weighted summation was used to obtain the functional index of each function. The calculation process is as follows.

(1) Dimensionless processing:

\[ Z_{ij} = \frac{X_{ij} - \mu_j}{\sigma_j}, \]  

where \( X_{ij} \) is the original data value of the \( j \)th index of the \( i \)th unit, \( \mu_j \) represents the mean, \( \sigma_j \) represents the standard deviation, and \( Z_{ij} \) represents the dimensionless z-score.

(2) Weight calculation with the entropy method:

\[ X'_{ij} = \frac{X_{ij} - \min(X_j)}{\max(X_j) - \min(X_j)}, \]

\[ Y_{ij} = \frac{X'_{ij}}{\sum_{i=1}^{m} X'_{ij}}, \]

\[ e_j = -k \sum_{i=1}^{m} (Y_{ij} \times \ln Y_{ij}), \]

\[ d_j = 1 - e_j, \]

\[ W_j = \frac{d_j}{\sum_{j=1}^{n} d_j}, \]  

where \( X'_{ij} \) represents the standardized value of the evaluation index, \( \min(X_j) \) and \( \max(X_j) \) are the minimum and maximum values of the \( j \)th indicator, respectively, and \( W_j \) is the weight \( (k = 1/\ln m, m = 160) \).

(3) Calculation of the comprehensive weight with the minimum relative information entropy:

\[ W_j = \frac{\left( w_{aj} \times w_{bj} \right)^{0.5}}{\sum_{j=1}^{m} \left( w_{aj} \times w_{bj} \right)^{0.5}}, \]  

where \( w_{aj} \) and \( w_{bj} \) are the weights calculated by the entropy method and analytic hierarchy process, respectively, and \( W_j \) is the comprehensive weight.

(4) Calculation of index value for rural functions:

[Figure 2: Balanced development of rural multifunction: (a) imbalanced development and (b) balanced development.]
\[ S = W_j \times Z_{ij}, \]  
\[ (4) \]

where \( S \) is the index value of the rural functions.

4.2.3. Identification for Dominant Functions and Inferior Functions. The identification of functional types contributes to refined governance of rural areas and rational land use, thereby enhancing the value of rural spatial functions [51]. In this study, the index values of each function were compared with the sum of the mean and standard deviation of the corresponding function. Combined with the characteristics of the collected data, the judgement rule in Table 2 was used to identify the dominant function and the inferior functions. Here, \( S_a \) is the index value of function \( a \) of the unit, \( V_a \) is the average value of function \( a \) of all units, and \( \sigma_a \) is the standard deviation of function \( a \) of all units.

5. Results

According to the above method, the index values of the agricultural production, nonagricultural production, living, ecological environmental, and social security functions of each administrative village were calculated. A scatter plot was used for statistical analysis (see Figure 4). And ArcGIS 10.0 software and the natural breaks method were also used to divide each function into 5 levels: higher, high, medium, low, and lower (see Figure 5).

In Figure 4, the horizontal axis is 160 administrative villages sorted according to the variance of the index values, and the vertical axis indicates the strength of the functions of each administrative village. In general, the agricultural...
production function of rural areas in Jingjiang city was slightly stronger than the nonagricultural production function, indicating that agriculture still occupied a dominant position. And the living function was stronger than the social security function. From the comparison between the first 40 villages and the last 40 villages, it can be seen that there were striking differences in the functional index values between villages, that is, different functions of the same village had significant gaps. In particular, there were large differences between the social security function and the ecological environmental function, which had the characteristic of polarization.

5.1. Features of Spatial Differentiation of Rural Multifunction

5.1.1. Agricultural Production Function. Overall, the spatial distribution of rural agricultural production function in Jingjiang city has a significant variation (see Figure 5). It had a high degree of agglomeration, and the strength of this function showed a more obvious step distribution in the western region, gradually decreasing from north to south. The higher-value and high-value areas of agricultural production function included 53 administrative villages concentrated in Shengci town, Maqiao town, and Gushan town. Shengci town and Maqiao town are rich in high-quality cultivated land and have superior water and soil resources. As the main development areas for the planting industry in the city, they concentrated on developing highly efficient agriculture. Gushan town, which has a flat terrain, has good agricultural production conditions. There are 60
administrative villages in the lower-value and low-value areas, which are mainly located around urban areas. With the advancement of urbanization, this kind of area is affected by urban radiation and has a high degree of land use development, a shrinking proportion of cultivated land, and a diminishing capacity to attract and absorb agricultural workers, resulting in a weak agricultural production function.

5.1.2. Nonagricultural Production Function. The nonagricultural production function of the city presented evident spatial agglomeration characteristics, which is generally opposite to the agricultural production function. The 51 administrative villages with high levels of this function were mainly distributed in Xinqiao town, Dongxing town, and Jingcheng town along the river, indicating that the Yangtze River Economic Zone, cities, and towns were obvious drivers.

Figure 5: Spatial distribution of the rural function indexes in Jingjiang city in 2017: (a) APF, (b) NPF, (c) LF, (d) EEF, and (e) SSF.
for nonagricultural production. Located in the southwest of Jingjiang city, north of the Yangtze River, Xinqiao town, and Dongxing town are the main deployment areas of the industrial parks. Xinqiao town is adjacent to the Guangting Expressway and Jiangyin Yangtze River Bridge in the east. Dongxing town is an urban expansion area adjacent to the urban area. As the seat of the main urban area, Jingcheng town is centered on Jingjiang Bridge which connects the area to Wuxi city. This type of area, which has convenient transportation, is the main development area along the river and the main conduit of industrial transfer in southern Jiangsu, and it had a high proportion of secondary and tertiary industries and a high index value for the nonagricultural production function. The low-value and lower-value areas were mainly concentrated in the northwest, with a total of 63 administrative villages. Such areas were less affected by urban radiation and the Yangtze River Economic Zone and they had no economic or geographic conditions conducive to industrial development. The proportion of nonagricultural employment in these areas was relatively small, leading to a low index value for the nonagricultural production function.

5.1.3. Living Function. Figure 5 shows that the index value of the living function in the city was not high. The 31 administrative villages with higher index values were mainly concentrated around urban areas, such as Jingcheng town, Xieqiao town, and Xinqiao town. These villages have close urban-rural links, convenient transportation, complete infrastructure, and public facilities, a large number of employment opportunities, and convenient commuting, making them the preferred residence for most residents. The spatial distribution of the villages with low index values of the living function was scattered. These 74 administrative villages were mainly distributed in Maqiao town, Gushan town, Dongxing town, and Xilai town. Areas that are far away from cities and towns have imperfect road systems and service facilities and low index values of living functions.

5.1.4. Ecological Environmental Function. The ecological environmental function for most villages in the city was weak. The higher-value areas of this function were distributed in areas with a strong agricultural production function and the areas that were far from the urban, mainly including Shengci town, Maqiao town, Gushan town, and Dongxing town. Among them, Maqiao town and Gushan town are regarded as the important areas of ecological function. Dongxing town, which is the largest Cuiguan pear planting base in Jingjiang has a well-developed planting industry. The land development intensity in this type of area was relatively low, and the contribution to ecosystem conservation was high. Jingjiang city mainly realized the coordinated development of the whole city’s economy and society through the economic growth point (urban area) and axis (industrial zone along the river). Many types of land with high ecosystem service value have been developed for regional economic, industrial, and commercial development. At the same time, Jingjiang, as a port industrial city, has vigorously promoted development along the river and joint development across the river. As a result, the ecological environment has been destroyed. Therefore, the 90 administrative villages with low index values of ecological environmental function were distributed in the industrial areas close to the urban area and along the river.

5.1.5. Social Security Function. The villages with high index values of social security function were mainly located in the periphery of towns and areas with a stronger agricultural production function, and their distribution was slightly scattered. Among them, there were 11 administrative villages in the higher-value area, and 44 in the high-value area. In this type, villages with strong agricultural production functions that rely on local agriculture for development had relatively complete social service systems, such as health care and pensions. Villages adjacent to the urban area can also rely on the urban social service system due to the close urban-rural connection. The 55 administrative villages with weak social security functions were mainly located in the industrial parks of Xinqiao town and Gushan town. Due to the vigorous development of industry in these regions, they have employed a substantial number of nonindigenous people, resulting in a low level of average social services and a low index value for the social security function.

5.2. Recognition of Functional Combinations. The dominant functions and the inferior functions were identified by the method mentioned above. And if there were multiple advantageous functions, the strongest function was selected. Conversely, if there are multiple inferior functions, the function with the lowest index value was selected. There was a situation where there were 4 or 5 dominant functions, the area was determined to “integrated development.” The rest were named according to the form of “dominant functions-inferior functions.” Among them, because “APF-oriented-NPF-lagged” and “NPF-oriented-APF-lagged” were separately distributed in the northwest and southwest, other inferior functions were identified as alternatives to maintain the effectiveness of the type identification. Considering the necessity of the coordinated development of social security and the living functions, the “EEF-oriented-LF-lagged” and “EEF-oriented-SSF-lagged” and “SSF-oriented-EEF-lagged” and “LF-oriented-EEF-lagged” types were merged. Ultimately, 17 types of functional combinations were identified to place emphasis on highlighting the functional characteristics of each unit and obtain a comprehensive multifunctional pattern of rural areas in Jingjiang city (see Figure 6).

6. Discussion

6.1. Targeted Rural Development Paths Oriented by Balanced Development. The types of rural multifunction combinations reflect the current development level of functions in each village. Thereupon, the identification of rural multifunction combinations can serve to locate the village accurately [49] and to find strengths and weaknesses. Based on the principle of balanced development for rural
multifunction, this study analysed the identified multifunction combinations and divided the future development of rural areas into 5 types according to the number and combination of dominant functions and inferior function in the villages. Corresponding development paths were proposed at the same time (see Table 3). Concretely, we classified villages with 4-5 dominant functions as the “integrated development,” those without inferior functions as “dominant function breakthrough” and those with both dominant and inferior functions as “inferior function development with dominant function.” And if the villages had no dominant function but inferior functions, they were classified as “inferior function enhancement.” LG the villages which had no dominant function and their combination of elements and resource characteristics cannot well support the development of the weakest functions were judged to be “transfer development.” Targeted rural development paths can promote the scientific development of different villages and in turn enhance the multifunctionality for villages.

6.1.1. Integrated Development. Areas with integrated development have no weak function, and various rural functions are relatively well-developed and balanced. These areas not only have natural resource endowments but also certain geographical advantages. Therefore, on the one hand, this type of village should pursue the integrated development of agricultural and nonagricultural industries and reform the organic structure of the rural industries. On the other hand, based on the sound development of functions, they should pay close attention to the quality of development to proceed towards sustainable development. The governance and error correction mechanisms for the territorial space of the Yangtze River Economic Zone established by Jingjiang city proposed the concept of the Yangtze River coast and its surrounding 5 kilometres. Villages within 5 kilometres of the Yangtze River coast and its periphery can place a moderate emphasis on industrial development.

6.1.2. Dominant Function Breakthrough. This type, which has no undeveloped function, is outstanding in a certain function. In the future, great attention should be paid to optimizing the leading functions by this kind of village. “APF-oriented” villages are supposed to enhance the quality of cultivated land for yield assurance. And actively promoting rural land circulation to develop efficient, large-scale, and modern agriculture is also an appropriate way. Besides, this type should take the endogenous development path such as utilizing agricultural resources with outstanding local comparative advantages to develop high-quality and characteristic products and services and to build personalized and branded agriculture. The construction of the bases for special agricultural and secondary products and the bases for tourism and leisure would also be an effective direction. The “NPF-oriented” villages were mainly distributed in the southwest of Jingjiang and have convenient water and land transportation. Among them, the villages along the Yangtze

![Figure 6: Types of the rural multifunction combinations.](image-url)
River should raise the access standards for enterprises and the efficiency of shoreline utilization. The areas around towns can better develop local nonagricultural industries and tap into the potential for the rural market to realize the organic integration of urban and rural areas. The economic development levels and accessibility are still the main factors affecting the development of “LF-oriented” and “SSF-oriented” villages. This type should raise the living and social security to a higher level by revitalizing the available construction land and building the “four large networks,” namely, road networks, water supply networks, garbage and sewage collection, treatment networks, education networks, and medical networks. The era of ecological resources as an important carrier of wealth has arrived. “EEF-oriented” villages should actively build “eco-towns” and develop eco-tourism on the premise of not damaging the ecological environment to show the local ecological value and partly transform the ecological resources into economic advantages.

6.1.3. Inferior Function Development with Dominant Function. This development type includes 7 combinations (see Table 3). The rural functions of this type developed in a polarized manner. Therefore, it is necessary to consolidate the advantages and adhere to the problem orientation to strengthen the weaknesses. “SSF-oriented-LF-lagged” and “LF-oriented-SSF-lagged” villages could learn from each other to coordinate the development of the living and social security functions. “APF-oriented-SSF-lagged” villages should improve social security services and realize the full coverage of rural areas under agricultural development in the future, while “NPF-oriented-SSF-lagged” villages should enhance the regional social security function depend on nonagricultural development and focus on social security work for part-time workers. “APF-oriented-EEF-lagged” villages should strengthen ecological protection and promote the integrated development of agriculture and ecology. The different management and control strategies should be implemented in the “NPF-oriented-EEF-lagged” villages. The areas within 5 kilometres of the coastline should guide the environmentally friendly development of enterprises and realize the gradual withdrawal of high-pollution enterprises, while the rest completely ban high-pollution enterprises. The “SSF-oriented-EEF-lagged” and “LF-oriented-EEF-lagged” villages should increase the cost for ecological restoration and environmental governance to improve the quality of human settlements.

6.1.4. Inferior Function Enhancement. This type of village has no superior function but has a low overall development level. They were mainly distributed in the east of Jingjiang; it includes four combination types: “APF-lagged,” “LF-lagged,” “SSF-lagged,” and “EEF-lagged” villages. The future development of this type ought to focus on identifying the least developed function and strengthening it. “LF-lagged” and “SSF-lagged” villages should highlight the regional advantages to promote weak functions under nonagricultural development. The “EEF-lagged” villages should put ecological safety first, increase ecological environmental protection, and make a point of enhancing regional ecological environmental function.

6.1.5. Transfer Development. This type of village has no superior function and do not have suitable conditions for the weakest function. So, this type ought to develop another function to achieve progress. Because the “APF-lagged” villages are distributed in small quantities along the Yangtze River and close to towns and have high levels of economic development and extremely convenient transportation, they should highlight the advantages of the nonagricultural production function to improve the comprehensive value of rural areas.

6.2. Balanced Development of Rural Multifunction and Sustainable Development. The 2030 Agenda for Sustainable Development, which represents a shared commitment by UN member states to address development challenges in the national context, proposes 17 Sustainable Development Goals (SDGs) [55, 56]. The diversification of rural functions is an inevitable requirement for respecting the laws of nature.

| Type of rural development | Type of rural multifunction | Development path |
|--------------------------|----------------------------|------------------|
| Integrated development   | Integrated development     | Promote the integration of industry and agriculture, and value the quality of development for steady progress |
| Dominant function        | APF-oriented/NPF-oriented/| Great attention should be paid to optimize the leading functions and realize differentiated development by region |
| breakthrough              | LF-oriented/EEF-oriented/ |                 |
|                         | SSF-oriented               |                 |
| Inferior function        | SSF-oriented-LF-lagged/    | Consolidate the advantages and adhere to the problem orientation to strengthen the inferior function in virtue of the dominant function |
| development with          | SSF-oriented-EEF-lagged/   |                 |
| dominant function         | LF-oriented-SSF-lagged/    |                 |
|                         | APF-oriented-SSF-lagged/   |                 |
|                         | APF-oriented-EEF-lagged/NPF-oriented-EEF-lagged |                 |
|                         | NPF-oriented-SSF-lagged   |                 |
| Inferior function         | SSF-lagged/LF-lagged/EEF-lagged | Identify the least developed function to strengthening it or improve the function that best fits the conditions of the village itself |
| enhancement              |                             |                 |
| Transfer development      | APF-lagged                 | Develop another function supported by local advantages for a replacement to achieve progress |

Table 3: Division of development types based on rural multifunction.
and achieving SDGs from many aspects [17]. Rural areas can achieve some of the SDGs such as reducing urban-rural inequality and protecting ecosystems by promoting balanced development of rural multifunction.

With the development of the social economy, rural areas have experienced a development process from "single" to "multiple" functions [49]. However, since priority has been given to urban-based economic development, rural development has been deprioritized [57, 58], resulting in a dual economic structure between urban and rural areas. Consistent with the dual economic structure of urban and rural areas, China’s social security system also exhibits a very obvious "dualistic" feature. Although the government has issued a series of policies to strengthen the construction of the rural social security system, there are still huge differences between urban and rural social security in terms of security projects, security levels, and coverage. The inequality between urban and rural areas is significant. The egalitarianization of social security in urban and rural areas can be promoted by realizing the balanced development of rural multifunction. Besides, the inequality between villages can also be weakened.

The good ecological environment of the village is one of the important characteristics that distinguish the village from the city. With the deterioration of the urban ecological environment, the importance of rural ecological environmental function has become more highlighted [44]. Rapid urbanization and industrial development have a great impact on the rural ecological environment, which is not conducive to the construction of ecological civilization. Due to the interaction of various rural functions, the development of other functions, especially the development of nonagricultural production function, will have more or less impact on the ecological environment. The concept of balanced development of rural multifunction pays more attention to the ecological environment function so that the development of agricultural production, nonagricultural production, and living and residential functions does not break through the restrictions of the ecological environment, which is conducive to protecting the ecosystem.

6.3. Research Shortage and Prospects. Compared with the previous research, this study gave a general definition of rural multifunction and divided the multifunction types. We further improved the index system of rural multifunction on villages and identified the dominant functions and inferior functions to accurately characterize spatial differentiation of rural multifunction. Then, we proposed the concept of balanced development of rural multifunction and explained why we should take balanced development as the goal orientation. On the basis of different combinations of multifunction, we put forward 5 development paths to realize balanced development. The governments can implement specific guidance for the development of each village based on the results. Village planning based on the evaluation of rural functions can also better adapt to the demands of sustainable rural development.

Culture has always been an indispensable part of maintaining social order [59]. With the change in rural society, rural material culture has been destroyed, and intangible aspects of culture have also gradually declined [36]. In recent years, the proposal of rural revitalization strategies has caused the public to pay more attention to the exploration and protection of rural culture [10, 39]. However, this study fails to discuss the cultural function, because the concept of culture function which is complex and abstract, are not yet prominent enough to conduct accurate quantitative analysis in ordinary villages at present. Thereupon, although some scholars have started to broach rural cultural function [60], there is no unified and complete understanding of rural cultural function in academia. And culture is multidimensional [59], but most scholars tend to measure rural cultural function from the perspective of rural tourism, which is an excessively narrow interpretation of rural culture and is not beneficial to rural cultural construction [1]. In the future, research on the concepts and characteristics of the rural cultural function should be further reinforced to compel the construction of a more scientific and reasonable index system. These efforts could enable people to grasp the development trend of rural culture and to break the plight of rural culture remodelling in the new era.

In addition, the study of rural multifunction in rural areas as a whole began only recently, so massive exploration and studies are needed. Simultaneously, due to the difficulty to obtain microscale temporal data, there are still insufficient studies on the evolution process, stages, and deep-level driving factors of multifunction on villages. The formation mechanism of rural territorial multifunction that is tailored to local characteristics at the microscale requires further study.

7. Conclusions

At the village level, multifunctional spatial differentiation in rural areas was more accurately characterized by constructing the spatial quantitative evaluation index system. Based on the evaluation results, the study extracted targeted rural development paths to realize the balanced development of rural multifunction. The main conclusions of this study can be summarized as follows:

(1) The multifunctionality of rural areas in Jingjiang city was noticeable. The development gap between different functions in the same village was large and the same function showed an obvious spatial difference. Concretely, the villages with strong agriculture production function were principally concentrated in the northwest, which has abundant cultivated land resources and flat terrain. The land use conversion and the transfer of surplus rural labor into the nonagricultural sector caused by urbanization are the main factors affecting agriculture production function. The villages with strong nonagricultural production function were mainly distributed in the industrial park and the surrounding areas of the city and towns indicating that this function is
significantly affected by urbanization and industrial development. Similarly, the villages with a high level of living function were mostly around towns. There is still much room for improvement in social security function in general. Contrary to the agricultural production function, nonagricultural production function had negative effects on ecological environment function. And different villages differed in functional combinations.

(2) A balanced development rather than an equal development of rural functions should be pursued to achieve multifunctionality. Based on the recognition of functional combinations, 5 types of rural development were extracted. The “integrated development” type should pay more attention to the comprehensive and steady improvement of multiple functions to achieve balanced development. The “dominant function breakthrough” type should further intensify the dominant functions and realize the innovative development of each dominant function while the “Inferior function development with dominant function” type should insist problem-oriented and drive the development of the weak functions with the dominant function to complement the shortcomings. The “inferior function enhancement” type should focus on the inferior functions according to the “Cannikin Law”. And the “transfer development” type could develop another function supported by local advantages to achieve progress.

**Data Availability**

The data used was obtained from “Jingjiang Statistical Yearbook” (2018).

**Conflicts of Interest**

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

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