land

MDPI

Article

Research on Rural Typology Based on the Symbiotic Model of Rural Revitalization and Basic Public Services

Yujiao Li [1], Rong Ma [2] and Bei Jin [1,*]

[1] College of Economics and Management, Northwest Agriculture and Forestry University, Xianyang 712100, China; 2020014389@nwafu.edu.cn
[2] College of Plant Protection, Northwest Agriculture and Forestry University, Xianyang 712100, China; rongma@nwafu.edu.cn
* Correspondence: jinbei@nwsuaf.edu.cn

Abstract: The basic unit of rural revitalization is the village. Rural revitalization can be comprehensively promoted by using rural typology as an instrument for rural zoning planning, which is a significant factor. This study clarified the relationship between rural revitalization and basic public services, constructed evaluation index systems, and analyzed the symbiotic mode. The comprehensive development level and the symbiotic mode were incorporated to determine the type of village. The results showed the following: (1) The thriving industry and affluent life of Tangfang Town obviously contributed to its rural revitalization; the achievement of basic environmental improvement was eminent. (2) There are differences in the comprehensive development level of rural revitalization and basic public services among administrative villages, with an overall trend of "high in the north and low in the south", corresponding to the industrial layout of "north industry and south agriculture" in Tangfang Town. (3) The symbiosis coefficients of all the administrative villages in Tangfang Town were between 0 and 0.5, and there was a positive symmetric mutualism relationship overall, indicating that basic public services have a significant impact and can effectively promote the process of rural revitalization. (4) Villages in Tangfang Town are divided into five functional areas—the comprehensive coordination area, potential improvement area, restricted development area, unbalanced allocation area, and backward guarantee area—and various types of optimization development strategies are proposed. As one of the top 100 demonstration towns for rural revitalization in Shaanxi Province, Tangfang Town plays a leading and exemplary role. Within the context of rural revitalization strategies, solving the problem of how to realize differentiated development in the next five years has become urgent. This study aimed to effectively promote the process of rural revitalization, provide theoretical guidance for scientific development in Tangfang Town, and promote research ideas for other towns in China.

Keywords: symbiosis theory; towns; rural revitalization; basic public services; rural typology

Citation: Li, Y.; Ma, R.; Jin, B. Research on Rural Typology Based on the Symbiotic Model of Rural Revitalization and Basic Public Services. *Land* **2023**, *12*, 1259. https://doi.org/10.3390/land12061259

Academic Editor: Rui Alexandre Castanho

Received: 17 April 2023
Revised: 8 June 2023
Accepted: 16 June 2023
Published: 20 June 2023

1. Introduction

Rural areas are the foundation of society, and the prosperity of rural areas leads to a flourishing country. On the other hand, the prosperity of a country can be constrained by the unbalanced development of rural areas. Currently, the rural areas of China are plagued by the inequitable distribution of public services, which impedes the progress of the rural revitalization initiative. In the current transformation period from rural development into comprehensive revitalization, the task of rural governance is onerous. As a system of categorization methods for grouping, typology is an important method for understanding complex factors. Rural typology can be used to study the panorama of heterogeneity and changes in rural areas. The assessment of rural typology for village typing is not only a pioneering and fundamental work for the implementation of rural revitalization strategy, but it is also the most basic and microscopic planning unit for the control of all elements

of land spatial planning in rural areas [1]. Therefore, the study of rural typology can lay an essential foundation for optimizing the regional allocation of unit spatial resources, the allocation of public services, the guidance of capital investment, and other planning and construction developments.

Currently, most studies about village classification undertaken by scholars are based on rural typology, which aims to depict or define rural areas. It is a powerful tool for understanding the full picture of heterogeneity and changes in rural areas, and providing a scientific basis for developing differentiated rural policies [2]. Moreover, rural typology is important for the sustainable development of rural areas [3]. In the context of rural revitalization and the structural transformation of rural areas, rural typology has gained more and more attention. In terms of classification ideas, Chinese scholars have generally focused on urban areas [1] or the county-level scale [4], and categorization has been carried out by combining the results of quantitative evaluation or qualitative judgments of different dimensions of a village.

In terms of classification methods, there are three main types: hierarchical identification via a logical process, combinatorial matrix, and systematic cluster analysis [5]. For example, Gaji'c, A et al. (2021) used principal component analysis and cluster analysis to create a classification framework based on the potential and limitations of rural areas, in orderto divide Serbia into six regions [6]. With the abundance of basic data and the rapid development of GIS and RS technologies, methods of rural typology have gradually changed from qualitative descriptions and field surveys to evaluating models for constructing spatial clusters, among other things [7,8]. Previous investigations have mainly focused on classical machine learning methods (i.e., decision trees, random forests [9], support vector machines, etc.) for UV detection from satellite images. With the continuous development of deep learning techniques, their application to remote sensing for zoning planning research has become a popular theme. For example, Wurm et al. (2019) applied full convolutional networks and migration learning to land boundary delineation [10]. In terms of classification results, scholars have mainly studied rural evaluation based on rural geography and regional economic theories. As early as the nineteenth century [11], some scholars classified rural areas into various types [12], and most classified village functions through quantitative identification [13]. Chinese scholars have studied village classification from the perspective of national top-level design, dividing all villages into four types: (1) Agglomerative Promotion, (2) Suburban Annexation, (3) Special Endowment-Based Development, and (4) Out-Migration and Relocation [14,15]. Within the stage where more complex village development issues emerge, the traditional qualitative approach to rural typology that is dependent on experience is no longer applicable [16]. Most studies nowadays are based on the above four basic types for further transformation and subdivision. For example, Yang Kun et al. (2021) subdivided the characteristic conservation category villages based on four basic types of villages. They were divided into 10 types of village revitalization under 3 symbiotic systems: the external symbiosis type, the internal symbiosis type, and the internal and external symbiosis type [8]. The above investigations mainly determined village classification at the theoretical level, without considering the characteristics of regional development, while our work attempted to address this issue.

There is a natural connection between rural revitalization and basic public services. A sound rural basic public service system can promote the smooth implementation of rural revitalization strategies, which in turn can improve the level of rural basic public services [17]; the two integrate with each other and develop together. Research on the coupled and coordinated development of the two sides is of great significance to resolving the unbalanced and insufficient problems of agricultural and rural development [18]. Scholars have conducted numerous studies on the relationship between rural revitalization and basic public services. Earlier foreign scholars generally used ruralness indices (including employment structure, transportation patterns [19], and population density [13]) to evaluate the level and characteristics of rural development. These studies focused only on material living standards and neglected to measure spiritual life. More in-depth and

detailed investigations on the construction of the rural revitalization indicator system have been conducted, incorporating spiritual and cultural factors into the analysis [20], or refining the calculation of rural property indicators through the classification of property indicators [11]. Additionally, the study of the relationship between the two has mainly been carried out using qualitative description and quantitative research. The former focuses on describing the supply integration mechanisms [21] and interactions [22,23], etc., between the two, while the latter mostly utilizes the coupling coordination degree to study the level of coordinated development between the two [24–26].

On the basis of existing investigations, this study incorporated two dimensions, the comprehensive development level and the symbiosis mode of rural revitalization and basic public services, to identify village types.

2. Materials and Methods

2.1. Study Area

Tangfang Town in Shaanxi Province is situated in the midst of Guanzhong Plain. The topography is high in the north and low in the south. There is a small, low mountain crossing the district in the central part of the town, and the whole district spans two stages of terraces. There are 15 administrative villages under its jurisdiction, with a combined area of 31.1 km^2 and a household population of 37,000, and in 2021, there was an estimated total agricultural output value of CNY 250 million. With fertile soil and well-developed agriculture, the general pattern of development is "northern industry and southern agriculture". Wheat, maize, and garlic are the main crops in the south, near to the River Wei, whereas the trade in peppers is booming in the north. Tangfang Town was designated as a "Rural Revitalization Demonstration Town of Shaanxi Province" in 2021 and was given the title of "Significant Development Town" in the province. The town will receive annual financial subsidies totaling CNY 5 million for five years to promote the process of rural revitalization. As shown in Figure 1, it is overview of Tangfang Town.

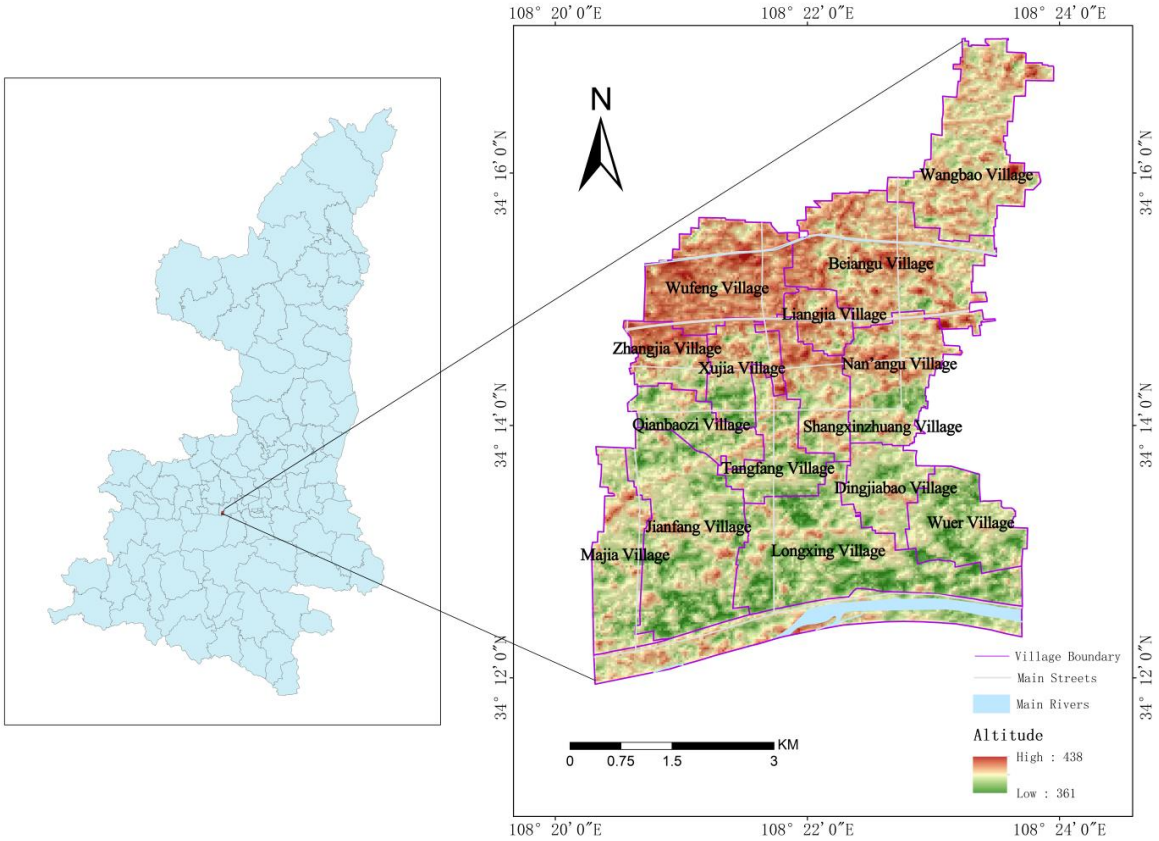


Figure 1. Overview of the study area.

2.2. Data Sources

The data for this study came from a field survey conducted by the research team in July 2022. The questionnaire was divided into a household section and a village-level section. Essential data about the villagers' households, the industrial and economic state, and an assessment of village governance were all included in the household questionnaire. The village-level questionnaires were distributed to the village cadres and were primarily focused on essential information about the villages, environmental improvement accomplishments, and the construction of basic public service systems. The data came from interviews with committee members conducted by the research team. Ultimately, 301 valid household questionnaires were collected, with a response rate of 98.05%, and 13 valid village-level questionnaires were collected, with a response rate of 100%. Through in-depth interviews with villagers and village committees, it was found that the level of rural revitalization and development varied among different villages in Tangfang Town, and the industrial development trend was good, forming a pattern of "northern industry and southern agriculture". However, villagers generally reflected that the construction of basic public services in the village collective needed to be further strengthened. Attempts were made to explore the logic of basic public services blocking rural revitalization and develop response strategies. Finally, we integrated all the data and interview analysis results, explored the symbiotic conditions of the stakeholders, and constructed a model for the symbiotic development of rural revitalization and basic public services.

2.3. Methodology

2.3.1. Theoretical Framework

The term "symbiosis" originates from biology, and describes the mutualist relationship between two or more biological populations that act and depend upon one another. Symbiotic unit, symbiotic mode, and symbiotic environment are the three elements of the symbiosis system. In 1998, Yuan Chunqing initially introduced symbiosis theory to social science for the study of small-scale economies [27]. Rural revitalization and basic public services are closely connected, reciprocally influencing and promoting one another. This paper posits that rural revitalization and the provision of basic public services are inextricably linked, forming a symbiotic relationship in which they exchange material and energy to promote rural development. Specifically, rural revitalization serves as a catalyst for the supply of basic public services, driving their improvement and expansion. Conversely, the supply of basic public services provides a material foundation for rural revitalization, propelling its development. Individual villages serve as research units to provide a platform for material and energy exchange between rural revitalization and the supply of basic public services. Therefore, the two are in line with the characteristics of "symbiosis theory".

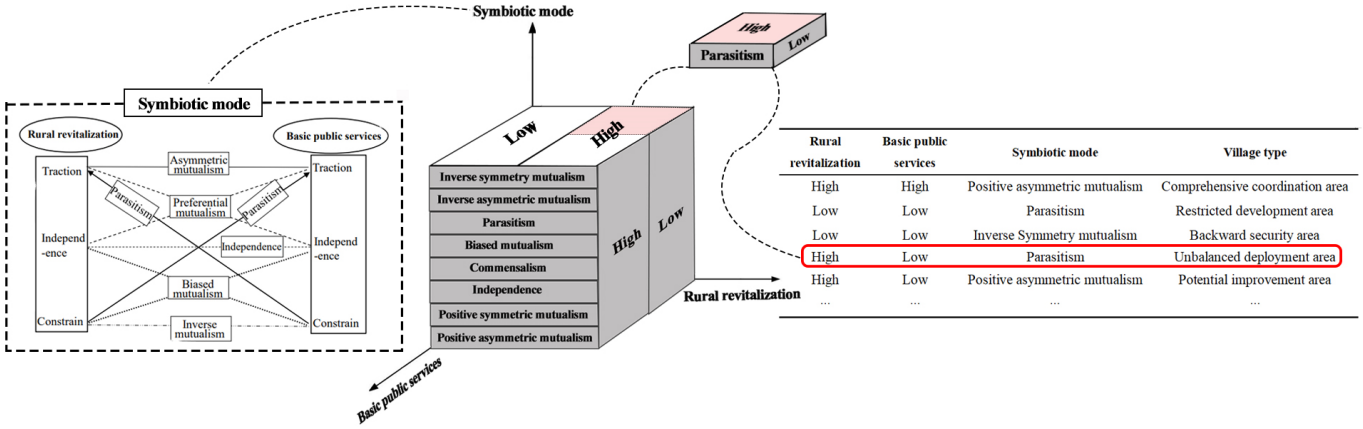
Rural revitalization serves as the catalyst for advancing the development of basic public service systems. The rural revitalization strategy aims to improve farmers' livelihoods in many aspects, including economic status, environmental conditions, and spiritual culture. It integrates the encouragement of rural economic growth, draws talent and resources to rural areas, and does so in a way that supports talent and provides resources for basic public services. Building beautiful and livable villages will simultaneously enhance the environment, draw in metropolitan residents, and expand rural public services supply in rural areas. Improving rural education and the cultural literacy of rural populations can stimulate cultural demand in rural areas; therefore elevating the standard of basic cultural services. The analysis index system of rural revitalization in this paper consists of five sub-indexes: thriving industry, ecological livability, rural civilization, effective governance, and affluent life.

The supply of basic public services can be a strong guarantee for rural revitalization. The prerequisite for rural revitalization is to effectively solve issues closely related to farmers' lives, encompassing the environment, culture, education, and access to medical care. All these issues can be concretized by the availability of basic public services. Basic

public services in rural areas cover cultural services, infrastructure, medical and health care, the ecological environment, and other areas that are deeply associated with the lives of farmers. Continuously elevating the quality and level of basic public services will empower rural revitalization in several fields, ultimately achieving the goal of "thriving industry, ecological livability, rural civilization, effective governance, and affluent life". The evaluation index system in this study consists of five sub-level indicators: basic public education, basic medical care and health, basic public facilities, basic environmental health, and basic public cultural services.

In the evolution process, if both rural revitalization and basic public services promote the development of each other, they will have a mutualist relationship; if one of them has traction and the other is constrained, they will have a parasitic relationship; if they are mutually constrained, the relationship between them is reverse mutualism; if one has traction and has no impact on the other, the relationship is called commensalism; if one is constrained and has no effect on the other, the relationship is called biased mutualism; and if neither are affected, they are independent and have no impact on each other.

The research ideas in this article were established based on the above analysis. Assuming rural revitalization to be symbiotic unit X and basic public services to be symbiotic unit Y, the different symbiotic modes between them are shown in Figure 2. As depicted in Figure 2, using the symbiotic model to analyze the symbiotic relationship between X and Y, a symbiotic pattern can be obtained (1). A comprehensive evaluation model is used to analyze X and Y, and based on the classification of X and Y, the symbiotic pattern can be introduced to establish three-dimensional operational coordinates for classification (2), thereby obtaining the basis for village classification.



Rural revitalization	Basic public services	Symbiotic mode	Village type
High	High	Positive asymmetric mutualism	Comprehensive coordination area
Low	Low	Parasitism	Restricted development area
Low	Low	Inverse Symmetry mutualism	Backward security area
High	Low	Parasitism	Unbalanced deployment area
High	Low	Positive asymmetric mutualism	Potential improvement area
...	...	...	...

Figure 2. A comprehensive scheme of the study approach. (**1**) Symbiotic mode action structure; (**2**) Three-dimensional role map of the comprehensive development level and symbiosis model of rural revitalization and basic public services; (**3**) Three-dimensional role map of the comprehensive development level and symbiosis model of rural revitalization and basic public services; The location of the red box indicates the three-dimensional result.

2.3.2. Index System of Rural Revitalization

In China, investigations into the development level of rural revitalization were mainly conducted from provincial and county perspectives. Based on the scientific connotations and overall requirements of rural revitalization, most studies on the provincial perspective constructed a three-level index system, comprehensively measuring the development level of rural revitalization and its spatial clustering characteristics. Additionally, global spatial auto-correlation analysis has been used to portray the spatial dependence, further revealing the spatial clustering characteristics of the development level of rural revitalization in Chinese provinces and the evaluation of the basic public service level in the correlation pattern [28]. In terms of the county perspective, this has mainly been based on studying

the development index and barrier degree, dividing the development echelon by towns, and analyzing the imbalance and differences in development in each region. Further suggestions have been put forward to optimize the development level of rural revitalization by county [29]. In summarized analyses, the empirical studies on rural revitalization have included both overall evaluations on a national scale and targeted evaluations on individual provinces, cities, or poorer counties, but there is a lack of small-scale focused evaluations. This study constructed an index system to evaluate the level of rural revitalization in Tangfang Town.

In response to the shortcomings in existing research, this article is based on the research model of rural revitalization and development level at the provincial and county levels. In order to determine the form and research focus for the town, this article makes extensive reference to Liu, Y. et al. (2022) [30], from the perspective of selecting indicators such as technology, nature, education, etc., and Yang, G. et al. (2022) [31], from the perspective of indicators such as enriching cultural and sports facilities, energizing villages' self-governance, etc. By reviewing relevant literature and high-frequency indicators on rural revitalization, common indicators suitable for this study were selected. Subsequently, through on-site investigation, combined with the goals and characteristics of rural revitalization development in Tangfang Town, single indicators were selected. Finally, in order to comprehensively reflect on the potential for rural development, in line with the principles of scientific and operational methods and in combination with the characteristics of rural revitalization and development in the town, this article expanded the indicators, using "industrial prosperity, ecological livability, rural civilization, effective governance, and affluent living" as secondary indicators, selecting 21 tertiary indicators, and constructing an indicator system to evaluate the level of rural revitalization in Tangfang Town. The indicator system is shown in Table 1.

Table 1. Index System of Rural Revitalization.

Guideline Layer	Indicator Layer	Nature of Indicator	Weights
Thriving industry (X_1)	Crop diversity (%) (X_{11})	+	0.0682
	Per capita food production (kg/person) (X_{12})	+	0.0353
	Agricultural labor productivity (yuan/person) (X_{13})	+	0.0393
	Average economic input per m^2 (yuan/m^2) (X_{14})	+	0.0792
	Arable land per capita (m^2/person) (X_{15})	+	0.1333
Ecological livability (X_2)	Fertilizer usage intensity (kg/m^2) (X_{21})	-	0.0288
	Percentage of hardened roads in the village (%) (X_{22})	+	0.0086
	Village greening coverage rate (%) (X_{23})	+	0.0654
Rural civilization (X_3)	Per capita consumption expenditure on education, culture, and entertainment (yuan/person) (X_{31})	+	0.0597
	Average number of years of education for rural residents (years/person) (X_{32})	-	0.0503
	Number of village collective cultural groups (one) (X_{33})	+	0.0362
	Awareness of village rules and regulations (%) (X_{34})	+	0.0358
Effective governance (X_4)	Incidence of rural poverty (%) (X_{41})	-	0.0328
	Participation in the recent general election of village committees (%) (X_{42})	+	0.0250
	Basic work of the village committee informed (%) (X_{43})	+	0.0653
Affluent life (X_5)	Per capita income of farmers (yuan/person) (X_{51})	+	0.0511
	Housing area per capita (m^2/person) (X_{52})	+	0.0483
	Engel coefficient of rural residents (X_{53})	+	0.0337
	Per capita consumption expenditure of rural residents (yuan/person) (X_{54})	+	0.0323
	Household information coverage (%) (X_{55})	+	0.0261
	Percentage of households with private cars (%) (X_{56})	+	0.0451

2.3.3. Index System of Basic Public Services

Investigations on the evaluation of basic public services can be mainly divided into two aspects: subjective performance and objective evaluation. In terms of subjectivity, the method of improvement in the governance of basic public services has been to construct a public satisfaction model and measure satisfaction in the main areas [32]. In terms of objectivity, this is an internal quantitative evaluation based on cost–benefit analysis, which focuses on the cost–benefit analysis of public service performance [33]. Most studies have separated the objective and subjective evaluations, but have neglected to examine the "fit" between subjective public evaluations and objective measurements, leading to biased results. The index system in this study contained objective indicators and subjective indicators.

This study consisted of an overview of the research area based on the principles of data accessibility and indicator representativeness, policy relevance, etc., and was founded on actual research data, while also taking into account the mainstream trends and research results of the relevant basic public service indicator system [34,35]. The construction included five primary indicators—basic public education, basic health care, basic public facilities, basic environmental health, and basic public cultural services—and 14 secondary indicators. Within these, there were no poverty problems in the research area, and social security policies were unified and could meet basic living needs. This indicator cannot reflect regional differences, so it was excluded. With the steady progress of rural revitalization, the overall economic level of the villages has increased, and the basic environmental health indicator could reflect the villagers' demand for a better life (negatively correlated). The subjective indicators of the villagers mainly evaluated their satisfaction with the fairness and convenience of local basic public services. The objective indicators mainly examined financial investment in basic public services and objective achievements. Non-quantitative indicators, such as satisfaction scores, were quantified using a 5-point Likert scale, where 1–5 were used to represent "very dissatisfied", "dissatisfied", "average", "satisfied", and "very satisfied". Quantitative indicators were represented by actual numbers. The indicator system is shown in Table 2.

Table 2. Index system for basic public services.

Guideline Layer	Indicator Layer	Nature of Indicator	Weights
Basic Public Education (Y_1)	Number of schools (including kindergartens) (Y_{11})	+	0.1185
	Local satisfaction with education quality (%) (Y_{12})	+	0.0372
Basic Health Care (Y_2)	Rural residents' medical insurance participation rate (%) (Y_{21})	+	0.0241
	Number of medical technicians (Y_{22})	+	0.1206
	Satisfaction with village medical services (%) (Y_{31})	+	0.0260
Basic Public Facilities (Y_3)	Satisfaction with street lighting at night (%) (Y_{32})	+	0.0425
	Number of supermarkets and small stores (Y_{33})	+	0.0941
	Satisfaction with the accessibility of the town (%) (Y_{34})	+	0.0198
	Satisfaction with village public facilities (%) (Y_{35})	+	0.0197
Basic Environmental Health (Y_4)	Village sewage network coverage rate (%) (Y_{41})	+	0.0518
	Rural habitat improvement (Y_{42})	+	0.2420
	Satisfaction with village waste management (%) (Y_{43})	+	0.0179
Basic Public Cultural Services (Y_5)	Number of cultural activities organized in the village (times/year) (Y_{51})	+	0.0310
	Total area of village entertainment and cultural square (m^2) (Y_{52})	+	0.1550

2.3.4. Comprehensive Evaluation Model

The entropy-weighted method is an objective method of estimating weights based on the degree of variability in the values of each evaluation index as a measure of information. It was adopted to standardize the data and determine the weights of each evaluation indicator in order to reduce scale disparities among evaluation indicators. The level of

comprehensive development of rural revitalization and basic public services in Tangfang Town was assessed using the simple linear weighting approach. The calculation formula is as follows:

$$v = \sum_{i=1}^{n} \lambda * u, \quad (1)$$

where v is the value of the comprehensive development level of each village, λ is the weight of each indicator, and u is the standardized value of each indicator.

2.3.5. Symbiotic Theory Model

Symbiosis degree reflects the correlation extent of 2 symbiotic units' qualitative covariates influencing one another [28]. Assuming that rural revitalization and basic public services are symbiotic units X and Y respectively, the symbiosis degree of X to Y is defined as:

$$\delta xy = \frac{dZx/Zx}{dZy/Zy} \quad (2)$$

Similarly, the symbiosis degree of Y to X is:

$$\delta yx = \frac{dZy/Zy}{dZx/Zx} \quad (3)$$

where Zx and Zy are qualitative parameters, and dZx/Zx and dZy/Zy are the changes in X and Y, respectively.

By comparing the relationship between two symbiosis degrees, the symbiosis mode of two symbiotic units can be determined. The standards are shown in Table 3.

Table 3. Symbiotic mode judgment criteria.

Symbiosis Degree	Symbiotic Mode
$\delta xy = \delta yx < 0$	Inverse symmetry mutualism
$\delta xy \neq \delta yx < 0$	Inverse asymmetric mutualism
$\delta xy \times \delta yx < 0$	Parasitism
$\delta xy = 0$, $\delta yx < 0$ or $\delta xy < 0$, $\delta yx = 0$	Biased mutualism
$\delta xy = 0$, $\delta yx > 0$ or $\delta xy > 0$, $\delta yx = 0$	Commensalism
$\delta xy = \delta yx = 0$	Independence
$\delta xy = \delta yx > 0$	Positive symmetric mutualism
$\delta xy \neq \delta yx > 0$	Positive asymmetric mutualism

The symbiosis coefficient is an index calculated from the symbiosis degree, which can reflect the magnitude of the interaction between two symbiotic units, and its value range is [0, 1]. The calculation formulas are as follows:

$$\theta xy = \frac{|\delta xy|}{|\delta xy| + |\delta yx|}, \quad (4)$$

$$\theta yx = \frac{|\delta yx|}{|\delta xy| + |\delta yx|}, \quad (5)$$

$$\theta xy + \theta yx = 1, \quad (6)$$

$\theta xy = 0$ indicates that X has no influence on Y at all and Y has no influence on X at all; $\theta xy = 1$ indicates that Y has no influence on X at all and X has no influence on Y at all; $0 < \theta xy < 0.5$ indicates that the influence of Y on X is relatively large; $\theta xy = 0.5$ indicates that X and Y interact to the same degree; $0.5 < \theta xy < 1$ indicates that X has relatively large influence on Y.

3. Results and Discussion

3.1. Analysis of the Town Development

The weight of each indicator was determined using the normalized data, preprocessed via the dimensionless processing of the original data. The entropy-weighted method was used to measure the weights of the five dimensions of rural revitalization and the five aspects of basic public services in Tangfang Town. The measurement results are shown in Tables 1 and 2.

According to the measured results, a thriving industry and affluent life in Tangfang Town definitely contribute to rural revitalization. Rural civilization is the spiritual origin of rural revitalization, and it provides soft power for rural revitalization. The government needs to strengthen cultural construction, since the overall number of cultural groups is small and the degree of public awareness of village rules and regulations is low. The accomplishments of rural revitalization are directly reflected in the effective level of governance. The incidence of poverty in Tangfang Town is low, while the participation of the public in village elections is not high. Therefore, it is advisable to actively explore effective methods of grassroots governance to further consolidate the achievements of rural revitalization. Ecological livability is a shortcoming in Tangfang Town. The insufficient number of hardened village field roads and the overuse of chemical fertilizers in agriculture are the key factors preventing eco-construction. These findings are in line with the pattern of development in Tangfang Town. Taking the opportunity to enhance the construction of rural revitalization demonstration towns in Shaanxi Province, the town now prioritizes industrial revitalization, places importance on adjusting agricultural structures, integrates land resources, develops special industries in accordance with local conditions, and encourages industrial integration in a systematic way. The town has now built an industrial revitalization demonstration park with large-scale plantings of cash crops, such as peppers, garlic, and vegetables, which effectively drives the surrounding farmers to increase their income.

Basic environmental protection has made a significant contribution to the construction of the basic public services system. Tangfang Town won the title of "Provincial Sanitation Town of Shaanxi Province" in 2021 due to its outstanding contribution to enhancing the quality of life. The general lack of basic public education in Tangfang Town is mostly evidenced by the low public satisfaction with educational quality. The public are less satisfied with medical care, and the rate of medical insurance participation is low, largely due to the issue of "difficult reimbursement of medical insurance" that has arisen throughout the development of the basic medical service system. Tangfang Town has made progress in building basic public facilities, with solar-powered streetlights installed beside the roads in the villages. Furthermore, several villages provide their residents with recreational amenities, such as recreation squares. The planning of cultural activities and the formation of cultural organizations in the villages are the key ways in which basic public services have succeeded.

3.2. Development of Rural Revitalization in Each Village

The comprehensive evaluation model was used to measure the comprehensive development level of rural revitalization in each village, and the results are shown in Figure 3.

According to the findings, there are regional differences in the level of comprehensive development of rural revitalization, with a general trend of "high in the north and low in the south", which is consistent with the development pattern of "northern industry and southern agriculture" in Tangfang Town. Nan'angu Village had the highest rural revitalization score, at 0.5077. It is posited that the good multifaceted competencies of the village secretary exert a noteworthy influence on the superior advancement of this village. The ratio of hardened roads in Wuer Village, which at 0.2648 had the lowest level of rural revitalization, has limited the high-quality development of agricultural production and impeded rural revitalization.

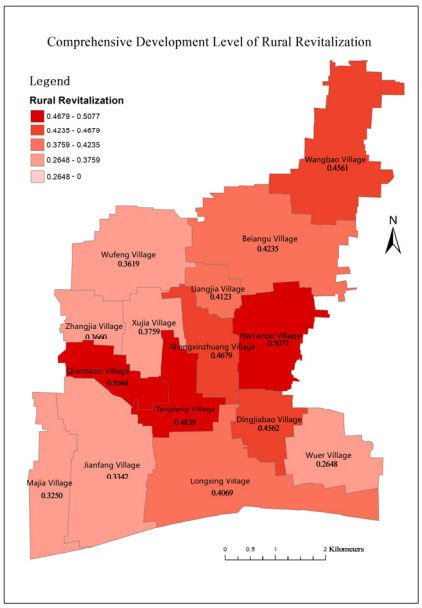


Figure 3. Comprehensive development level of rural revitalization.

The mean value of rural revitalization in Tangfang Town was 0.4098. There were seven villages below the mean value, four of which are in the south of the town, and eight villages above the mean value. The northern villages engaged in agricultural trade, and had higher economic levels than the southern villages, which were primarily involved in plantations. The findings imply that, to some extent, the process of rural revitalization is driven by economic conditions. Wangbao Village, which is a component of the town, is home to the largest chili trade market in northwest China. Because of the commerce and processing of chilies, whose annual production value might be up to CNY 1.5 billion, the economy in the village has grown quickly.

3.3. Development of Basic Public Services in Each Village

The comprehensive evaluation model was used to measure the comprehensive development level of the basic public services in each village, and the measurement results are shown in Figure 4.

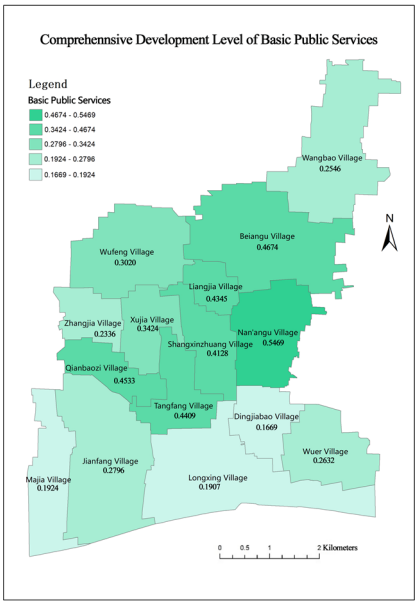


Figure 4. Comprehensive development level of basic public services.

The results show that there is a significant disparity in the quality of basic public services among the villages, with Nan'angu Village holding the top position. The village has reached milestones in the development of five aspects of basic public services, such as 100% of village roads being hardened and a 1000-square-meter cultural square. Dingjiabao Village is at the lowest point and has low greening coverage in the village. Due to the tiny village area, there is no cultural square in the village.

The average value for basic public services in the town was 0.3321, and the proportion of villages whose level was below the average value reached 53.33%, indicating that the overall level of basic public services in Tangfang Town is low and the disparity between villages is great. Although economic development in Wangbao Village is booming, it lacks a well-developed basic public services system. The underlying reasons are as follows: (1) Villagers have contradictory interests. (2) With people becoming wealthier, their expectations for infrastructure rise, and their level of satisfaction with the village's current infrastructure declines.

3.4. Analysis of the Symbiotic Model of Rural Revitalization and Basic Public Services

According to Equations (2)–(5), the symbiosis degree and symbiosis coefficient of rural revitalization X and public service Y of each administrative village were measured, and the results are shown in Table 4.

Table 4. Symbiosis coefficient of rural revitalization and basic public services.

Village	δyx	θyx	δxy	θxy	Symbiotic Mode
Wuer Village	−1.2642	0.9896	0.0132	0.0104	Parasitism
Longxing Village	1.7470	0.9264	−0.1387	0.0736	Parasitism
Beiangu Village	2.1084	0.7093	0.8642	0.2907	Positive asymmetric mutualism
Wangbao Village	2.6561	0.9958	−0.0111	0.0042	Parasitism
Nan'angu Village	3.1341	0.7251	1.1884	0.2749	Positive asymmetric mutualism
Qianbaozi Village	3.1146	0.7953	0.8018	0.2047	Positive asymmetric mutualism
Tangfang Village	2.9636	0.7989	0.7460	0.2011	Positive asymmetric mutualism
Zhangjia Village	0.6717	0.9132	−0.0638	0.0868	Parasitism
Dingjiabao Village	2.6583	0.9430	−0.1607	0.0570	Parasitism
Jianfang Village	−0.1848	0.7419	0.0643	0.2581	Parasitism
Shangxinzhuang Village	2.8032	0.8194	0.6180	0.1806	Positive asymmetric mutualism
Majia Village	−0.4026	0.7466	−0.1366	0.2534	Inverse asymmetric mutualism
Wufeng Village	0.5549	0.7959	0.1423	0.2041	Positive asymmetric mutualism
Liangjia Village	1.6543	0.7643	0.8532	0.2357	Positive asymmetric mutualism
Xujia Village	−0.5237	0.8046	−0.1456	0.1954	Inverse asymmetric mutualism

The coefficient of Tangfang Town, $\theta xy = 0.1687$, indicates that the influence of basic public services is greater, and the construction of basic public service systems is more effective than rural revitalization. The former offers the latter a solid foundation. The coefficients of symbiosis of all the villages were $0 < \theta xy < 0.5$, showing that all the villages demonstrate a considerably larger influence of basic public services on rural revitalization.

When two symbiotic units are in a parasitic relationship, the one with a positive symbiosis degree gains traction, while the one with a negative value is constrained. Taking Wuer Village as an example, $\delta yx < 0$ and $\delta xy > 0$ indicate that basic public services are constrained in the evolution process. Positive asymmetric mutualism between two co-development units promotes mutual promotion. For example, in Nan'angu Village, $\delta yx \neq \delta xy > 0$ indicates that rural revitalization and basic public services in the village are subject to mutual traction. $\delta yx \neq \delta xy < 0$ for Majia Village implies that both rural revitalization and basic public services are constrained. The symbiotic model of rural revitalization and basic public services in this town is shown in Figure 5.

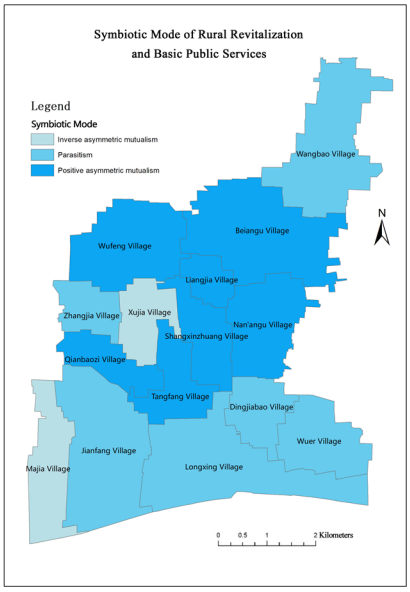


Figure 5. Symbiotic mode of rural revitalization and basic public services.

3.5. Village Classification

Utilizing the equal spacing grading method, the maximum and minimum values of the comprehensive development level of rural revitalization and basic public services for each village in Tangfang Town were used as the endpoints for equal spacing division and were divided into two levels: low and high. Among them, the integrated level values of rural revitalization from 0.25 to 0.40 were low and from 0.40 to 0.55 were high; the integrated level values of basic public services from 0.15 to 0.35 were low, and from 0.35 to 0.55 were high. The zoning of Tangfang Town was achieved based on the comprehensive level of rural revitalization and basic public services in various administrative villages, combined with the symbiotic model of the two. Tangfang Town was divided into five types of areas: namely, the comprehensive coordination area, the potential improvement area, the restricted development area, the unbalanced deployment area, and the backward security area. As shown in Figure 6, it is implemented in Tangfang Town.

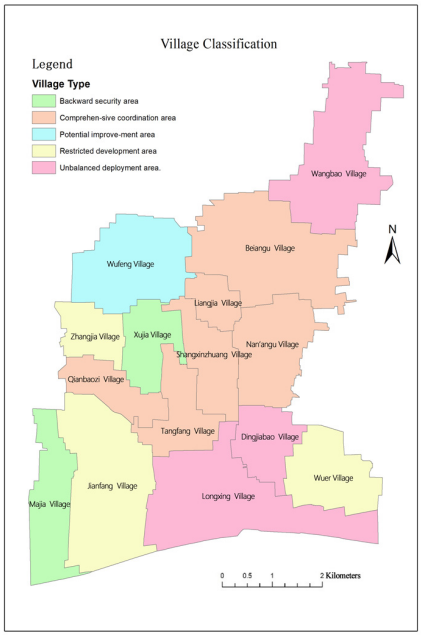


Figure 6. The results of village classification.

Specific suggestions for different villages are as follows:

(1) Comprehensive coordination area. There were five villages of this type, mainly concentrated in the central area of Tangfang Town, which had the advantages of high-quality development of rural revitalization and good basic public service facilities. Among these, Nan'angu Village is located about one kilometer due east of Tangfang Town Government. The village has achieved comprehensive development, made positive progress in rural revitalization, has a low poverty incidence rate, and won the title of "National Forest Village", etc. The construction of a basic public service system has achieved remarkable results. Beiangu Village is located directly north of Nan'angu Village and has a large population size with aging problems. Therefore, it is recommended that the basic public service system is further improved and a mutual aid senior center is established. Shangxinzhuang Village is located in the center of Tangfang Town. There are obvious characteristics of agricultural production. A pilot demonstration base for food technology integration has been built, and seeds are supplied and sold collectively. However, there are shortcomings in the industrial integration in the village. It is recommended that the agricultural industry chain based on the characteristic agricultural production is extended, attracting investment to build food processing plants and eventually accelerate the integration of one, two, and three industries. Tangfang Village and Qianbaozi Village are adjacent to each other. The two villages are small in area and population, and the people are well-off, with a high economic level. However, there is a problem regarding the low level of basic public service supply, which is mainly reflected in the villagers' low satisfaction with teaching quality and low participation rate in medical insurance. It is suggested that the cohort of rural teachers is strengthened, with excellent teachers being brought in through multiple channels to enhance the teaching quality, and that the problem of difficult reimbursement regarding medical insurance is effectively solved. Liangjia Village borders Nan'angu Village, Shangxinzhuang Village, Beiangu Village, and Wufeng Village. The village actively promotes the development of high-quality, high-efficiency agriculture and the construction of vegetable greenhouses. At the same time, it actively promotes the development of the labor market, creating new opportunities for farmers to enhance their income. It is proposed that the village should encourage the further development of industrial integration, support nearby local employment, take in farmers to boost income through work at home, and enhance the convenience of employment.

(2) Unbalanced deployment area. The three unbalanced deployment areas are located on the periphery of the town. It is suggested that while promoting rural revitalization, these villages should strengthen the construction of basic public service systems and gradually transform the parasitic relationship between the two into a mutually beneficial symbiotic relationship. Wangbao Village is located in the northernmost part of Tangfang Town, with a favorable geographical location, north of the Xibao Central Line and south of the Longhai Railway. It has the largest chili pepper trade market in the northwest, forming a rather distinctive chili pepper industry. However, the village greening rate and sewage treatment coverage rate are low, and the construction of a basic public service system is deficient. It is suggested that the high-quality development of basic services could be driven by industrial exploitation and would enhance the overall development level of the village. Longxing Village is located on the southwest edge of Tangfang Town, and has a large population and remarkable achievements in rural revitalization. Garlic is the leading economic crop in the village. The construction of village recreational facilities, however, needs to be improved, and there is a shortage of basic public cultural services. It is suggested that public space in the village is transformed, the basic public recreational facilities are increased, and various mass cultural and sports activities are carried out. Establishing square dance teams and organizing movie screening activities, for example, could help to activate the cultural life of the village and benefit people's quality of life. Dingjiabao Village is

located to the south of Tangfang Town, north of Nan'angu Village, with a small area and dense population. The village's rural revitalization has achieved phased results, but basic public cultural services are feeble and there is no recreational square. It is suggested that the village should interconnect with Nan'angu Village to promote the sharing of basic public service resources.

(3) Restricted development area. There are three villages of this type in Tangfang Town. Among them, Wuer Village is located in the south of the township, east of Longxing Village, with a small area. The village has problems of a low greening rate and an insufficient level of road hardening, but the scale of village recreation and culture is enormous, exhibiting the development of a trend of dislocation of basic public facilities and basic cultural services. It is recommended that the village consolidate land resources for recreational construction, strengthen regional infrastructure construction as well as ecological environment construction, and promote the coordinated development of basic cultural service construction and basic environment construction. Zhangjia Village is located in the western part of the town and is adjacent to Shangxinzhuang Village to the east. The village has a high population density, and the supply of basic education services and cultural and recreational services is insufficient. It is recommended that the village strengthen interconnections with neighboring villages to form basic public services resource sharing and reduce the pressure on basic public services in the village. Jianfang Village is located in the south of Tangfang Town, with a large area, a lack of village ecological environment construction, and weak basic cultural services. It is suggested that the village should enhance the green area of the residential area by planting street trees, organize the public to attend cultural activities, and call on the villagers to actively set up cultural groups and organizations.

(4) Potential improvement area. Located in the northern part of the township and adjacent to Beiangu Village to the east, Wufeng Village lacks cultural and recreational venues due to the size of the village and its economic development. It is suggested that the village makes up for its shortcomings in basic cultural services, and promotes the relationship between rural revitalization and basic public services in a positive and symmetrical direction while enhancing the level of their comprehensive development.

(5) Backward security area. Majia Village is located on the northern periphery of the township, south of the northern bank of the Wei River, and has a small area. Most of the young people have gone out to work, resulting in the "hollowing out" of the village, which jeopardizes the long-term development of the collective economy. Meanwhile, the lack of ecological improvement and basic public facilities in the village hinders high-quality economic development. Xujia Village is in the middle of Tangfang Town, and in 2021, was given the title of "Beautiful and Livable Demonstration Village in Shaanxi Province" for its outstanding work in enhancing the quality of life there. However, the village's industrial development and the provision of essential public services still need to be strengthened. To support the economic development of the village and effectively promote the integration of the three industries to raise the overall development level, it is recommended that the peripheral residents of these two villages strengthen infrastructure interconnection and public service sharing with other villages.

The specific classification rules and characteristics for each type of village are shown in Table 5.

Table 5. The criteria of village classification.

Village Type	Characteristic
Comprehensive coordination area	High-quality development of rural revitalization and improvement of basic public service facilities promote each other.
Potential improvement area	The low level of development of rural revitalization is coordinated with the shortage of basic public service facilities, with smooth overall development.

Table 5. *Cont.*

Village Type	Characteristic
Restricted development area	The level of rural revitalization is not high, and the shortage of basic public service facilities further constrains the effectiveness of villages to improve.
Unbalanced deployment area	Rural revitalization has achieved positive results, but the low level of basic public services restricts the overall development level.
Backward security area	The lack of economic development in villages and the shortage of basic public service facilities, both of which are constrained, seriously hinder overall development.

3.6. Discussion

The relationship between rural revitalization and basic public services is clearly explained in this paper. The evaluation index systems for the two were constructed and the weights of each indicator were measured using the entropy-weighted method. The levels of comprehensive development were measured using the comprehensive evaluation model and the symbiotic mode and symbiosis coefficient of the two were determined using the symbiosis theory model. The classification system was eventually realized. This paper draws the following conclusions:

(1) The support for industrial prosperity and affluent living in Tangfang Town is significant from the perspective of the five dimensions for rural revitalization, while the support for ecological livability is smaller, restricting the process of rural revitalization.
(2) The level of rural revitalization varies among administrative villages in Tangfang Town, with a general trend of "high in the north and low in the south", which is consistent with the region's development pattern of "northern industry and southern agriculture".
(3) The symbiotic relationship between rural revitalization and basic public services in Tangfang Town has positive asymmetric mutualism, with the latter having a greater influence on the former. This finding suggests that the current level of rural revitalization accomplishments is insufficient for the development of a basic public service system.
(4) There are three kinds of symbiotic modes between rural revitalization and basic public services among the fifteen administrative villages: parasitism, positive asymmetric mutualism, and reverse asymmetric mutualism.
(5) Tangfang Town is divided into five types of development zones: the comprehensive coordination zone, potential enhancement zone, restricted development zone, imbalanced deployment zone, and backward guarantee zone.

Currently, Tangfang Town is in a critical period for promoting rural revitalization. While there is a strong focus on developing industries, it is imperative that the need for public services is not overlooked. In the process of revitalization, major efforts have been led by top-down governmental supply, without the establishment of a closed-loop system of bottom-up feedback. As such, it is recommended that a symbiotic model of rural revitalization and basic public services be explored, incorporating both subjective and objective evaluation methods to efficiently implement rural revitalization. Furthermore, this theoretical framework can be applied to the study of rural revitalization in other regions, with appropriate adjustments being made to the second- and third-level index systems in accordance with local development characteristics. Ultimately, the three-dimensional index calculation system can be utilized to determine the village type.

Of course, there are also shortcomings in existing research. Due to the limited research capabilities of our research team, this article only classifies 15 administrative villages in Tangfang Town, aiming to provide new ideas for the study of rural revitalization and basic public services. Further research is needed on the universality and applicability of the research results. In the future, our team will conduct extensive research on these ideas and further optimize the indicator system.

In conclusion, this study makes recommendations for various development areas to which villages belong and offers theoretical references for further advancing rural

revitalization construction while strengthening the infrastructure and provision of basic public services in Tangfang Town. Moreover, it offers research ideas and practical support for the development of other towns.

Author Contributions: Conceptualization, B.J.; Formal analysis, R.M.; Investigation, Y.L. and R.M.; Methodology, Y.L.; Writing—original draft, Y.L. and R.M.; Writing—review and editing, Y.L. and R.M.; Visualization, Y.L. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by Shaanxi Federation of Social Sciences Circles, Provincial Longitudinal Research Project, grant number 20ST-176.

Data Availability Statement: Some or all of the data supporting the results of this study were obtained through field research based on reasonable requirements.

Acknowledgments: We gratefully acknowledge the support of the People's Government of Tangfang Town, Shaanxi Province.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Beyazli, D.; Aydemir, S.; Öksüz, A.M.; Özlü, S. Rural typology with and inductive approach. *Int. J. Environ. Res.* **2017**, *11*, 225–241. [CrossRef]
2. Chen, J.; Wang, C.; Dai, R.; Xu, S.; Shen, Y.; Ji, M. Practical Village Planning Strategy of Different Types of Villages—A Case Study of 38 Villages in Shapingba District, Chongqing. *Land* **2021**, *10*, 1143. [CrossRef]
3. Liu, J.; Fang, Y.; Wang, R.; Zou, C. Rural typology dynamics and drivers in peripheral areas: A case of Northeast China. *Land Use Policy* **2022**, *120*, 106260.
4. Li, Z.; Miao, X.; Wang, M.; Jiang, S.; Wang, Y. The Classification and Regulation of Mountain Villages in the Context of Rural Revitalization—The Example of Zhaotong, Yunnan Province. *Sustainability* **2022**, *14*, 11381. [CrossRef]
5. Zhou, Y.; Li, S.; Zhou, H.; Wei, B. Construction of a quantitative evaluation system for rural space classification and practice in Nanning. *Planner* **2019**, *35*, 59–64.
6. Gajić, A.; Krunić, N.; Protić, B. Classification of Rural Areas in Serbia: Framework and Implications for Spatial Planning. *Sustainability* **2021**, *13*, 1596. [CrossRef]
7. Yue, D.; Yang, X. Construction of a dynamic evaluation system for rural revitalization quality based on precise identi-fication: Logical framework and application analysis. *J. Macro-Qual. Res.* **2022**, *10*, 62–75.
8. Yang, K.; Rui, Y.; Li, Y.; Yang, Y. A study on the subdivision of revitalization types of Chinese characteristic conservation class villages based on symbiosis theory. *Adv. Geogr. Sci.* **2021**, *40*, 1861–1875.
9. Chen, B.; Feng, Q.; Niu, B.; Yan, F.; Gao, B.; Yang, J.; Gong, J.; Liu, J. Multi-modal fusion of satellite and street-view images for urban village classification based on a dual-branch deep neural network. *Int. J. Appl. Earth Obs. Geoinf.* **2022**, *109*, 102794. [CrossRef]
10. Wurm, M.; Stark, T.; Zhu, X.X.; Weigand, M.; Taubenböck, H. Semantic segmentation of slums in satellite images using transfer learning on fully convolutional neural networks. *ISPRS J. Photogramm. Remote Sens.* **2019**, *150*, 59–69. [CrossRef]
11. Harrington, V.; O'Donoghue, D. Rurality in England and Wales 1991: A Replication and Extension of the 1981 Rurality Index. *Sociol. Rural.* **2010**, *38*, 178–203. [CrossRef]
12. Mărioara, R. A Typology of Rural Areas in Danube Region. *Procedia Econ. Financ.* **2015**, *22*, 733–741.
13. Woods, M. Performing rurality and practising rural geography. *Prog. Hum. Geogr.* **2010**, *34*, 835–846. [CrossRef]
14. Marsden, T. New rural territories: Regulating the differentiated rural spaces. *J. Rural Stud.* **1998**, *14*, 107–117. [CrossRef]
15. Zhang, G.; Ye, Z. Research on development dilemmas and realization paths of different types of villages in the perspective of rural revitalization. *Rural Econ.* **2019**, *442*, 17–25.
16. Zhou, Y.; Shen, Y.; Yang, X.; Wang, Z.; Xu, L. Where to Revitalize, and How? A Rural Typology Zoning for China. *Land* **2021**, *10*, 1336. [CrossRef]
17. Guo, X. Several dimensional observations of rural revitalization strategy. *Reform* **2018**, *289*, 54–61.
18. Chen, G.S.; Liu, X.; Jiang, S.; Ding, C.; Guo, Q.; Yang, L. Study on the measurement of coupled and coordinated development and path selection for rural revitalization in Hunan Province. *Econ. Geogr.* **2019**, *39*, 191–197+206.
19. Cloke, P.; Edwards, G. Rurality in England and Wales 1981: A replication of the 1971 index. *Reg. Stud.* **1986**, *20*, 289–306. [CrossRef]
20. Nie, X.; Shi, P.; Zhang, X.; Lyu, R.; Zhu, Y.; Wei, W. Research on Rurality Evaluation and the Driving Mechanism in Arid Regions of Northwest China: A Case Study of Wuwei City in Gansu Province. *Geoscience* **2017**, *37*, 585–594.
21. Wu, R.-L. Analysis of the development level of provincial rural revitalization and spatial clustering characteristics. *Stat. Decis. Mak.* **2023**, *616*, 59–64.
22. Hu, C.P. Basic public services, endogenous dynamics of poverty eradication and rural relative poverty governance. *Search* **2021**, *6*, 146–155.

23. Liu, Y.; Zhang, S. Equalization of basic public services in rural areas: Opportunities and challenges of deep poverty governance. *J. Hubei Acad. Natl. Philos. Soc. Sci.* **2019**, *37*, 9.
24. He, Y.; Zhang, W. An analysis of the coupled and coordinated development of rural basic public services and rural revitalization in China's provinces: A multidimensional relative poverty perspective in rural areas. *Chongqing Soc. Sci.* **2022**, *8*, 48–68.
25. Huang, T.; Wang, Y.; Guan, H.; Tan, R. Study on the spatio-temporal coupling characteristics of rural basic public services and multidimensional poverty in the context of rural revitalization. *Hum. Geogr.* **2021**, *36*, 135–146+192.
26. Liu, Y.; Cheng, J.; Li, J.-Y. A study on the variation of coupling and coordination of rural public service systems in the context of urban-rural integration: An example with data from 22 counties and cities in Yunnan Province. *Explor. Econ. Issues* **2022**, *479*, 181–190.
27. Yuan, C. A study of symbiosis theory and its application to small economies (the first volume). *Reform* **1998**, *2*, 100–104.
28. Guo, Y.; Li, X.; He, P.; Hu, X.; Liu, Q. Evaluation of County Development Index Based on Rural Revitalization Background: A Case of the Poverty-stricken Mabian County in Sichuan. *China Agron. Bull.* **2019**, *35*, 158–164.
29. Yang, S.; Kang, J.; Zhu, S.N. The mechanism of subjective performance of basic public services on trust in local govern-ment—The mediating role of public participation and the moderating effect of access. *Soft Sci.* **2022**, *36*, 124–130.
30. Liu, Y.; Qiao, J.; Xiao, J.; Han, D.; Pan, T. Evaluation of the Effectiveness of Rural Revitalization and an Improvement Path: A Typical Old Revolutionary Cultural Area as an Example. *Int. J. Environ. Res. Public Health* **2022**, *19*, 13494. [CrossRef] [PubMed]
31. Shi, J.; Yang, X. Sustainable Development Levels and Influence Factors in Rural China Based on Rural Revitalization Strategy. *Sustainability* **2022**, *14*, 8908. [CrossRef]
32. Zeng, L.; Li, J. A study of the fit between subjective and objective evaluation of public service performance: An empirical analysis of grassroots police services from city H. *J. Public Adm.* **2013**, *6*, 72–103.
33. He, L.; Huang, L.; Liu, X. Study on the dynamic mechanism of rural revitalization and integration of rural basic public service provision. *Econ. Res. Ref.* **2022**, *9*, 30–39.
34. Yang, G.; Xue, Y.; Ma, Y. Social Organization Participation, Government Governance and the Equalization of Basic Public Services: Evidence from China. *Int. J. Environ. Res. Public Health* **2019**, *16*, 2996. [CrossRef] [PubMed]
35. Wang, X. Study of the Level of Basic Public Services and Its Regional Disparities among Provinces in China. *J. Zhongnan Univ. Econ. Law* **2013**, *3*, 23–29+158–159.