



Research on the Construction of the Evaluation Index System of Digital Rural Construction

—Take Pujiang County in Chengdu City as an Example

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Abstract. With the vigorous development of digital technology, Pujiang County is committed to improving the level of rural infrastructure, optimizing the industrial structure, promoting farmers' income increase, and realizing the comprehensive revitalization of rural areas through the construction of digital rural areas. This paper uses the entropy method to study the digital rural construction in Pujiang County, and scientifically evaluates the development status and effect of the digital countryside in the region by constructing a comprehensive evaluation index system. The study finds that Pujiang County has made some progress in the construction of digital countryside, but there are still problems such as insufficient policy support, imperfect service system and cooperation mechanism to be deepened. Based on this, this paper puts forward optimization suggestions from three aspects: policy, infrastructure and government-enterprise cooperation, to jointly promote the high-quality development of digital countryside in Pujiang County.

Keywords: Digital countryside, rural construction, evaluation index, entropy value method

1 Introduction

Digital village construction is an important means to help rural revitalisation. It is leading rural areas to move towards informatization and intelligence, and profoundly reshape the production and life pattern of rural areas. Digital governance, innovation-driven, integrated development, etc. provide new conceptual guidance and technical support for the construction and comprehensive revitalisation of digital villages. Strengthen the construction of rural public service system; broaden the channels and paths for farmers to participate in rural construction; promote the transformation and upgrading of rural industries, the innovation of governance methods and lifestyle change, and further improve the level of China's digital village construction. At present, the development of the digital economy and the construction of digital villages are not only a new direction for the promotion of rural revitalisation in China, but also an important support for the rapid development of basic industries in countries around the

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world. The construction of digital technology and digital infrastructure can improve the application level of rural informatization, support the development of agricultural modernisation, and promote rural development. Change to an emerging direction and inject new vitality into the high-quality development of rural areas.

2 Construction of Evaluation Index System

2.1 Framework Construction of Evaluation Index System

The country has issued many policy documents on the construction of digital villages to promote the construction of digital villages. In the process of building a digital village construction level evaluation index system, this study follows the scientific and systematic principles of the evaluation index system, builds an evaluation index system for the construction of digital villages in Pujiang County according to the systematic principles, and divides the index system into general target layer, secondary index layer and three-level index layer.

2.2 Evaluation Index System Is Determined

1. Secondary indicators are determined

According to the main second-level indicators appearing in the relevant policy documents of digital village construction, the frequency statistics of the main second-level indicators are conducted. As shown in Table 1. In this study, the three indicators with the highest frequency were selected as secondary indicators: digital infrastructure, rural digital governance, and rural digital economy.

Table 1. Frequency Statistical Table of Indicators Related to Digital Village Construction

Key contents and main indicators	Frequency (times)
Digital Infrastructure	6
Rural Digital Governance	6
Rural Digital Economy	5
Digital Industry Development	4
Rural Digital Culture	4
Wisdom and Beautiful Countryside	2
Informatisation of agricultural services	2
Smart Agriculture	1
Smart Green Countryside	1
Rural Network Culture	1
Rural Digital Finance	1
Digitalisation of rural industry	1

2. The third-level indicator is determined

The design of three-level indicators needs to consider the difficulty of obtaining indicator data and the degree of relevance to the research object. Therefore, on the basis of referring to national policy documents and scholarly research, this study deeply understands the current situation and specificity of the construction of digital villages in Pujiang County through field visits and visits to local villagers, and aims to comprehensively and deeply evaluate the construction level of digital villages in the county. Select indicators according to the specific situation, including 3 secondary indicators and 9 third-level indicators. The specific indicators are shown in Table 2.

Table 2. Determination of three-level indicators for the evaluation of digital rural construction in Pujiang County

Total target layer	Secondary indicators	Level 3 indicators	Unit
A An empirical study on the evaluation of digital village construction in Pujiang County	A1 Digital Infrastructure	A11 smartphone ownership ^[1]	W
		A12 "5G" network coverage ^[2]	%
		A13 comprehensive mechanization rate ^[3]	%
	A2 Rural Digital Governance	A21 online handling rate of government affairs ^[3]	%
		A22 Rural coverage of sanitary latrines ^[4]	%
		A23 Household Waste Removal and Transportation ^[4]	t
	A3 Rural Digital Economy	A31 Penetration rate of agricultural digital economy ^[3]	%
		A32 express business volume ^[5]	Billion
		A33 Online retail sales of agricultural products ^[6]	Billion

3 Determination of the Weight of Evaluation Indicators

3.1 Data Source

This study selects the relevant data of Pujiang County from 2019 to 2023 as the analysis sample data. All research data come from the Chengdu Statistical Yearbook, the Pujiang County Statistical Yearbook and the Work Report of Pujiang County Government in the corresponding year.

3.2 Weight Calculation

1. This study adopts the entropy value method to empower, and the steps are as follows:

(1) Standardized processing

$$X_{ij}^* = \frac{X_{ij} - \min X_{ij}}{\max X_{ij} - \min X_{ij}}, \quad i = 2012, 2013, 2014 \dots 2021, j = 1, 2, 3 \dots 10 \quad (1)$$

Wherein, X_{ij}^* represents the standard value of the index in the (specific) year, X_{ij} represents the original value, \max_{ij} and \min_{ij} respectively represent the maximum and minimum values of each index over the years.

(2) Calculate the proportion of each index value P_{ij}

$$P_{ij} = \frac{X_{ij}^*}{\sum_{i=1}^{10} X_{ij}^*} \quad (0 \leq P_{ij} \leq 1) \quad (2)$$

(3) Calculate the information entropy of each index value e_j

$$e_j = -\frac{1}{\ln 10} \sum_{i=1}^{10} P_{ij} \ln P_{ij} \quad (e_j \geq 0) \quad (3)$$

(4) Calculate the difference coefficient of each index g_j

$$g_j = 1 - e_j \quad (4)$$

(5) Calculate the weight of each evaluation index w_j

$$w_j = \frac{g_j}{\sum_{j=1}^{10} g_j} \quad (5)$$

2. The weight of the evaluation indicators of digital technology and rural governance in Pujiang County is shown in Table 3.

Table 3. Weight of Digital Village Construction Evaluation Indicators in Pujiang County

Secondary indicators	Level 3 indicators	Unit	weight	remark
A1 Digital Infrastructure	A11 smartphone ownership	W	0.0483	Positive
	A12 "5G" network coverage	%	0.0100	Positive
	A13 comprehensive mechanization rate	%	0.0308	Positive

A2Rural Digital Governance	A21 online handling rate of government affairs	%	0.0672	Positive
	A22 Rural coverage of sanitary latrines	%	0.0002	Positive
	A23 Household Waste Removal and Transportation	t	0.0985	Contrarian
A3Rural Digital Economy	A31 Penetration rate of agricultural digital economy	%	0.1390	Positive
	A32 express business volume	Billion	0.0896	Positive
	A33 Online retail sales of agricultural products	Billion	0.5165	Positive

4 Comprehensive Evaluation and Analysis

4.1 Comprehensive Evaluation Results

According to the comprehensive evaluation results of digital rural construction in Pujiang County, the weight of online retail sales of agricultural products is the highest, at 0.5165, indicating that the advantages of online live delivery development are more and more obvious; secondly, the penetration rate of agricultural digital economy is 0.139, which shows that in the development of agriculture in Pujiang County, the digital industry has boosted the development of agricultural and rural economy and improved the living standard of rural residents.

4.2 Problems Existing in Digital Rural Construction

1. Digital infrastructure construction is still imperfect.

In the construction of digital countryside, the construction of digital infrastructure such as broadband network, communication facilities and data centers is still not perfect, and digital services cannot cover every countryside.

2. Digital rural services are less efficient.

The data security risk in rural areas is large, and the problems such as personal privacy leakage, network fraud and data leakage are prominent, which affect residents' trust in digital services in the country and hinder the orderly progress of digital rural construction.

3. It is very difficult to promote the digital industry.

The degree of digitalization of agricultural production is insufficient. Except for some demonstration agricultural parks, most villages have little application of advanced agricultural production equipment and technologies such as the Internet of Things, big data and artificial intelligence, and the construction of agricultural production information management system lags behind.

5 Conclusion and Recommendations

1. Accelerate the formulation of supporting policies for digital rural areas

Focus on strengthening the construction of digital facilities projects such as 5G / 6G base stations and 5G network coverage in rural areas, consolidate the new digital rural infrastructure, encourage farmers and agricultural enterprises to adopt advanced agricultural machinery and equipment, and make full use of existing capital channels to accelerate the implementation of major agricultural and rural informatization projects.

2. Build a grassroots digital rural service system

Pujiang County should follow the principle of "comprehensive construction and key promotion", systematically lay out the big data platform, smart agriculture digital transformation of rural environment monitoring, rural government services and other basic services, to ensure the all-round promotion of digital rural construction. We will focus on digitizing agricultural production and operation and building platforms for rural government affairs.

3. Deepen investment attraction and cooperation between government and enterprises

We will vigorously carry out investment attraction in digital rural areas, guide digital economy enterprises to enter the multi-level capital market for financing, and attract extensive participation of social forces. We will explore a mechanism for socialized paid services in digital rural areas, increase the volume of express delivery services, strengthen the management of competition in agricultural information services, and establish unified data trading standards.

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