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Analysis of the Development Level and Obstacles of Agricultural Rural Modernization in Guangdong Province

Peixin WU[a], Jiatao ZHENG[b], Lichang FENG[c] and Yang ZHOU[a,1]
[a] *School of Management, Guangdong University of Technology, Guangzhou (510520), Guangdong, China*
[b] *School of Computer Science and Technology, Guangdong University of Technology, Guangzhou (510006), Guangdong, China*
[c] *School of Materials and Energy, Guangdong University of Technology, Guangzhou (510006), Guangdong, China*

Abstract. Based on the relevant connotation of rural revitalization strategy and existing research results, this paper comprehensively uses the entropy weight method, comprehensive index measurement model, overall regression model and obstacle model, selects 29 representative indicators from five dimensions of rural industrial modernization, rural ecological modernization, rural cultural modernization, rural governance modernization and rural life modernization, constructs an index system, evaluates and analyzes the development level of agricultural and rural modernization in Guangdong Province from 2011 to 2020, predicts the future development level, and detects the obstacle factors. The results show that from 2011 to 2020, the level of agricultural and rural modernization in Guangdong Province has entered the late stage of upgrading from the development stage of Chinese-style modernization, and has developed rapidly. Through the overall regression model, the level of agricultural and rural modernization in Guangdong Province will enter the sprint stage in 2040, and the modernization of Chinese-style agriculture and rural areas will be basically realized in 2050. According to the degree of obstacles, the impact of rural ecological modernization and peasant life modernization on the development of agricultural and rural modernization in Guangdong Province is more obvious, followed by the impact of rural industrial modernization, rural governance modernization and rural cultural modernization.

Keywords. Guangdong province; modernization of agriculture and rural areas; comprehensive evaluation; barrier degree model; entropy weight method

1. Introduction

The "parallel" Chinese-style modernization requires exerting efforts from industrialization, informatization, agricultural and rural modernization, and urbanization [1]. And compared with the rapidly advancing industrialization, informatization and urbanization, the process of agricultural and rural modernization is obviously lagging

1 Corresponding Author, Yang ZHOU, School of Management, Guangdong University of Technology, Guangzhou, Guangdong, China; E-mail: zhouyang8908@163.com

behind, and the gap between urban and rural modernization is obvious. Therefore, in the process of accelerating China's modernization and development, exploring the construction of agricultural and rural modernization level indicator system, statistical measurement of agricultural and rural modernization development level, and diagnostic analysis of its obstacle factors can help to further understand the development process of agricultural and rural modernization level, the development trend and the existing problems, in order to explore effective paths of modernization of agriculture and rural areas to make up for the obstacles, and realize the coordinated development of urban and rural areas, and promote the balanced development of urban and rural areas. coordinated development of urban and rural areas, and promote rural revitalization.

Agricultural and rural modernization is one of the important directions of current global development, and domestic and foreign scholars on agricultural and rural modernization can be traced back to the early 1950s, and there have been a large number of in-depth and rich research.

As for the research on statistical measurement of agricultural and rural modernization, at present, most of the domestic and foreign related research focuses on agricultural modernization, while the related research on measuring agricultural and rural modernization is still relatively small and not in-depth, and the research directions are also different and similar. First, there are differences in research objects. Existing studies have focused on the national region [2,3] or province [4–6] for analysis, but also for individual provinces and municipalities [7–10], or counties[11], regions [12,13]for analysis and evaluation. Second, the construction of the indicator system varies. For example, Rezaei and Karami (2017) [14] constructed a rural modernization indicator system applicable to Golestan Province from five aspects: agricultural resources, agricultural development, environment and ecosystems, rural society and science, education and management. While Zhang J (2022) [15] constructed an evaluation index system based on six guideline layers: agricultural production, agricultural operation, agricultural industry, rural environment, rural facilities, and rural economy. Third, the model application is different. In terms of measuring the development level of agricultural and rural modernization, most studies use entropy weight-TOPSIS model to analyze the measurement of the development level of agricultural and rural modernization of the research object [16,17]. In terms of research perspectives, most scholars use the comprehensive index model to measure the index of the level of agricultural and rural modernization [18,19]; regression analysis to predict the future development trend of agricultural and rural modernization; and the obstacle degree model to explore the obstacle molecules [20,21].

To sum up, most of the existing studies focus on the measurement of national or provincial areas, while there are fewer studies on the statistical measurement of the level of modernization of Guangdong Province's agriculture and rural areas, and fewer studies on the comprehensive application of various research methods and models. This paper combines the connotations of rural revitalization and the "five-in-one" agricultural and rural modernization in the new era, constructs an evaluation index system based on the goals of the strategic plan for rural revitalization, applies a comprehensive index measurement model to measure the level of agricultural and rural modernization in Guangdong Province from 2011 to 2020, and predicts the stage of agricultural and rural modernization in Guangdong Province in the next 30 years with the help of an overall regression model.At the same time, the obstacles and shortcomings of China's modernization of agriculture and rural areas are explored

through the obstacle model, so as to find out the effective path of the modernization of agriculture and rural areas in Guangdong Province, and to make suggestions for the coordinated development of the urban and rural areas and the modernization of the Chinese style.

2. Evaluation Indicator System and Methodology

2.1. Construction of the Indicator System

The Indicator System for Modernization of Agriculture and Rural Areas in Guangdong Province is shown in table 1.

Table 1. Evaluation indicator system for the level of modernization of agriculture and rural areas in Guangdong Province.

Standardized level	Indicator level	Basic indicator	Interpretation and calculation of indicator	Weight	
A Modernization of rural industry	A1 Level of agricultural technologization	Number of units of farmland science and technology institutions (units)	Number of units of scientific and technological institutions in agricultural reclamation (units)	0.1641	0.2007
	A2Agricultural mechanization level	Agricultural land machinery power utilization rate (kW/ha)	Total power of agricultural machinery (10,000 kilowatts)/Area of agricultural land (10,000 hectares)	0.1672	
	A3 Agricultural hydration level	Percentage of effective irrigated area of arable land (%)	Effective irrigated area (thousand hectares)/cultivated land area (thousand hectares)	0.1673	
	A4 Land output level	Output of food crops per unit of grain sown area (tons/thousand hectares)	Total grain output (10,000 tons)/grain sown area (thousand hectares)	0.1673	
	A5 Economic contribution of rural industries	Share of added value of primary industry in regional GDP (%)	Value-added ratio of primary industry to regional GDP (%)	0.1669	
	A6 Production capacity of rural industries	Value-added rate of primary industry (%)	Value-added rate of primary industry (%)	0.1673	
B Modernization of rural ecology	B1 Rural greening coverage rate	Greening coverage rate (%)	Greening coverage rate (%)	0.1670	0.2002
	B2 Rural sewage treatment	Proportion of administrative villages with treatment of domestic sewage to the total number of administrative villages (%)	Proportion of administrative villages with treatment of domestic sewage to the total number of administrative villages (%)	0.1647	
	B3 Rural domestic waste treatment	Proportion of administrative villages that dispose of household	Proportion of administrative villages with treatment of domestic garbage to the	0.1664	

		garbage to the total number of administrative villages (%)	total number of administrative villages (%)		
	B4 Sanitary latrine coverage	Penetration rate of sanitary latrines (%)	Sanitary latrine penetration rate (%)	0.1675	
	B5 Flood control and water management	Soil and water erosion control area (thousand hectares) and flood removal area (thousand hectares)	0.5* Soil erosion control area (thousand hectares) + 0.5* Flood control area (thousand hectares)	0.1670	
	B6 Intensity of fertilizer and pesticide use	Fertilizer and pesticide use per unit of arable land area (tons/thousand hectares)	0.5* fertilizer application (10,000 tons) + 0.5* pesticide use (10,000 tons)/cultivated land area (thousand hectares)	0.1673	
C Modernization of rural culture	C1 Level of education	Percentage of rural people with high school education and above (%)	Number of rural people with high school education and above (person)/ Total rural population (persons)	0.2443	0.1995
	C2 Construction of cultural facilities	Number of cultural stations in rural townships (nos.)	Number of cultural stations in townships (persons)	0.2530	
	C3 Quality level of education and teaching	Percentage of full-time teachers with bachelor's degree or above in rural general junior and senior high schools (%)	Number of full-time teachers with bachelor's degree or above in rural general junior and senior high schools (persons)/ Number of full-time teachers in rural general junior and senior high schools (persons)	0.2514	
	C4 Expenditure level of farmers on education, culture and recreation	Percentage of per capita education, culture and recreation expenditure of rural residents (%)	Per capita education, culture and recreation expenditure of rural residents (yuan)/per capita consumption expenditure of rural residents (yuan)	0.2513	
D Modernization of rural governance	D1 Level of community services	Number of rural community service organizations (number)	Number of rural community service organizations (number)	0.1471	0.2005
	D2 Farmers' minimum living security	Per capita minimum subsistence allowance for rural residents (yuan)	Per capita minimum subsistence allowance for rural residents (yuan)	0.1650	
	D3 Health Service Level	Village health rooms (number)	Number of village health centers (number)	0.1720	
	D4 Level of Party Building Work	Percentage of members of village committees who are party members	Number of members of village committees (persons)/Number of village committee members (persons)	0.1721	
	D5 Poverty incidence rate	Incidence of poverty (%)	Incidence of poverty (%)	0.1721	
	D6 Coverage rate of village	Percentage of administrative	Percentage of administrative villages	0.1717	

	planning and management	villages with construction plans (%)	with construction plans (%)		
	E1 Farmers' income level	Per capita disposable income of rural residents (yuan)	Per capita disposable income of rural residents (yuan)	0.1427	
	E2 Farmers' consumption level	Per capita consumption expenditure of rural residents (yuan)	Per capita consumption expenditure of rural residents (yuan)	0.1419	
	E3 Farmers' quality of life	Rural Residents' Expenditure on Living Goods and Services (yuan)	Rural Residents' Expenditure on Living Goods and Services (yuan)	0.1438	
E Modernization of rural life	E4 Farmers' housing level	Rural per capita residential floor area(square meters)	Rural per capita residential floor area (square meters)	0.1454	0.1991
	E5 Farmers' Engel's coefficient	Engel's coefficient of rural residents	Engel's coefficient of rural residents	0.1454	
	E6 Rural water penetration rate	Rural water penetration rate (%)	Rural water penetration rate (%)	0.1450	
	E7 Farmers' transportation infrastructure construction level	Ownership of domestic automobiles by rural residents(per 100 households/volume)	Ownership of domestic automobiles by rural residents (units)/Number of rural households (100)	0.1358	

2.2. Research Methodology

The data in this article come from the 2011–2020 China Statistical Yearbook, China Rural Statistical Yearbook, China Agricultural Yearbook, Guangdong Statistical Yearbook, and publicly available data from China's National Bureau of Statistics, China's Ministry of Education, China's State Administration of Grain, China's Ministry of Agriculture, China's Ministry of Housing and Urban-Rural Development, and China's Ministry of Civil Affairs, among other government departments.

2.3. Data Sources

1. Pre-processing of indicator data

(1) Standardized processing of indicator data

This paper uses the relative scoring method to standardize the indicator data, taking the percentage score of the unweighted data obtained after processing the basic indicator data as the single scoring value of the indicator. For all indicators other than fertilizer and pesticide use intensity, poverty incidence, and farmers' Engel's coefficient, the maximum value of their corresponding basic indicator data and domestic provinces in 2020 is used as the target value to calculate the single scoring value of the indicator.

(2) Normalization of reverse indicator data

For the intensity of fertilizer and pesticide use, the percentage score of the inverse of the ratio of its corresponding basic indicator data and the minimum value of the domestic provinces in 2020, i.e., Tibet Autonomous Region, is taken as the single scoring value of the intensity of fertilizer and pesticide use; for the Engel's coefficient of farmers, the percentage score of the inverse of the ratio of the corresponding basic indicator data

and the minimum value of the domestic provinces in 2020, i.e., Shanghai Municipality, is taken as the single scoring value of the Engel's coefficient of farmers. Engel's coefficient; for the poverty incidence rate, the percentile score of the inverse of the data of its corresponding basic indicator is used as the single scoring value for the poverty incidence rate.

(3) Handling of missing values

For some indicators with missing or discontinuous data in individual years, the mean method is used to fill in the annual missing values with data from neighboring years or to replace them with values from similar years; the linear interpolation method is used to fill in the annual missing values with regular changes in the values of the indicators; and the average growth rate is used to derive the annual missing values for which there are baseline and target values in the government plan.

2. Determination of weights - entropy weight method

After pre-processing the indicator data, the entropy weight method is used to determine the indicator weight values. The formula of entropy weight method is as follows:

First, the groups of indicator data are de-quantified：

$$\hat{X}_i = X_{max} - X_i \tag{1}$$

Positive Indicator:

$$Y_{ij} = \frac{X_{ij} - \min(X_i)}{\max(X_i) - \min(X_i)} \tag{2}$$

Reverse indicators:

$$Y_{ij} = \frac{\max(X_i) - X_{ij}}{\max(X_i) - \min(X_i)} \tag{3}$$

Next, calculate the weight of each indicator under each program:

$$P_{ij} = \frac{Y_{ij}}{\sum_{i=1}^{n} Y_{ij}}, i = 1,2,\dots,n; j = 1,2,\dots,m \tag{4}$$

Then, calculate the information entropy of a set of data:

$$E_j = -\ln(n)^{-1} \sum_{i=1}^{n} P_{ij} \times \ln(P_{ij}),\ E_j \geq 0, \text{when } P_{ij} = 0, E_j = 0 \tag{5}$$

In the end, the weight of each indicator is calculated using the information entropy:

$$\omega_j = \frac{1 - E_j}{k - \sum E_j} (j = 1,2,\dots,m)\quad k = m \tag{6}$$

In Equation (4), it is the weight of the jth indicator in the ith year, and n in Equation (5) is the number of years of evaluation.

3. Composite index measurement model

In this paper, the comprehensive index measurement model is used to weight and summarize the indicator layer and criterion layer step by step, successively obtaining the evaluation value of the indicator layer and the evaluation value of the criterion layer, and finally obtaining the comprehensive evaluation value of the level of modernization of Guangdong Province's agriculture and rural areas. The formula for calculating the comprehensive index is as follows:

$$M = \sum_{i=1}^{m} \left\{ \sum_{j=1}^{n} X_{ij} \times \omega_{ij} \right\} \times \omega_i \tag{7}$$

M: Comprehensive assessment value of Guangdong Province's agricultural rural modernization level.

X_{ij}: Individual rating value of the j_{th} indicator under the i_{th} criterion layer.
ω_{ij}: The weight of the J_{th} index under the i criterion.
ω_i: The weight of the i criterion level.

4. logistic regression model

Using Matlab to calculate the R-square value of each criterion of the criterion layer tends to be close to 1. The linear regression fit is strong, which can explain the variability of the dependent variable to a greater extent, and the prediction ability is strong. Therefore, this paper uses the global regression model to forecast the future development level of agricultural and rural modernization in Guangdong Province. The overall regression model is constructed using known data with the following formula:

$$Y = \sum_{i=1}^{m} \beta_{i0} + \sum_{i=1}^{m} (\sum_{j=1}^{n} \beta_{ij}) X_i + \sum_{i=1}^{m} \varepsilon_i \quad (8)$$

m: Number of criteria in the criterion layer.
n: The number of linear regression coefficients corresponding to the criteria.
β_{i0}: Intercept of the regression function of the ith criterion level.
β_{ij}: The jth regression coefficient of the regression function of the ith criterion layer.
ε_i: Error term of the ith criterion level.
Y: The value of comprehensive prediction of the modernization level of Guangdong Province's agriculture and rural areas.

5. handicap model

For the sake of exploring the short boards of agricultural and rural modernization development in Guangdong Province, this paper draws on existing research methods and introduces three indicators, namely, factor contribution, indicator deviation and obstacle degree, to diagnose the main factors affecting the process of agricultural and rural modernization in Guangdong Province, which are calculated by the following formulas:

$$U_{ij} = \omega_j \times \omega_{ij} \quad (9)$$

$$E_{ij} = 1 - X_{ij} \quad (10)$$

$$M_{ij} = \frac{E_{ij} U_{ij} - X_{ij}}{\sum_{i=1}^{n} U_{ij}} \quad (11)$$

$$R = \sum M_{ij} \quad (12)$$

Where U_{ij} is the factor contribution degree, E_{ij} is the indicator deviation degree, X_{ij} is the indicator value after standardization, M_{ij} is the obstacle degree of the jth indicator, and R is the obstacle degree of the target layer.

3. Results and Analysis

3.1. Evaluation Results of the Level of Modernization of Agriculture and Rural Areas in Guangdong Province

From the perspective of rural revitalization strategy, the realization of modernization of

agriculture and rural areas is a long-term and gradual process, and this paper refers to the relevant research results of modernization evaluation at home and abroad, as well as the "Opinions of the State Council of the Central Committee of the Communist Party of China on the Implementation of the Rural Revitalization Strategy", the "Rural Revitalization Strategic Plan (2018-2022)". The development process of agricultural and rural modernization is divided into six stages (see table 2), with different evaluation value intervals corresponding to different stages of modernization, and the higher the comprehensive evaluation value, the higher the development level of agricultural and rural modernization.

Table 2. Stages of modernization of agriculture and rural areas.

Parameters	Memory
0-29	Beginning Stage
30-49	Development Stage
50-69	Upgrading Stage
70-84	Transformation Stage
85-94	Sprint Stage

The development level of agricultural and rural modernization in Guangdong Province and the evaluation value of each criterion at the criterion level in 2011-2020 were calculated through the entropy weight method and the comprehensive index measurement model, as shown in table 3.

Table 3. Comprehensive assessment of the level of modernization of Guangdong Province's agriculture and rural areas from 2011 to 2020.

Time	Modernization of rural industry	Modernization of rural ecology	Modernization of rural culture	Modernization of rural governance	Modernization of rural life	Consolidated assessed value
2011	10.95	10.41	8.01	9.25	8.50	47.12
2012	13.12	10.92	8.39	9.85	8.95	51.23
2013	13.15	11.84	9.34	10.40	9.66	54.38
2014	13.58	11.98	10.48	10.82	10.19	57.03
2015	13.63	12.31	10.62	11.00	10.74	58.31
2016	13.39	12.92	11.01	12.02	11.44	60.79
2017	13.36	12.83	11.71	12.30	12.07	62.28
2018	13.38	13.78	12.32	12.79	12.97	65.25
2019	13.53	14.12	12.60	13.26	13.55	67.06
2020	13.71	14.41	12.04	13.65	14.02	67.83

The results show that from 2011 to 2020, the level of modernization of Guangdong Province's agriculture and rural areas has risen from the development stage to the late stage of upgrading, and has been on a continuous upward trend. 20.71 percentage points higher in 2020 compared with 2011, which indicates that the implementation of rural-related policies and rural revitalization strategies in Guangdong Province during the

"12th Five-Year Plan" and "13th Five-Year Plan" periods have achieved greater results since 2011, and has improved the rural industry, ecology, culture, rural governance and farmers' life. "This indicates that since 2011, the implementation of rural policies and the rural revitalization strategy in Guangdong Province during the 12th and 13th Five-Year Plan periods has achieved great results, and there have been improvements in rural industry, ecology, culture, rural governance and farmers' lives.

In terms of the evaluation value of the guideline level, the evaluation value of the rural ecological modernization level in 2020 is the highest, showing a steady increase from 2011 to 2020, which is mainly due to the fact that since the 12th Five-Year Plan, Guangdong Province has actively strengthened green construction, environmental protection and ecological construction, and vigorously stepped up its control in environmental regulation, quality improvement and ecological governance and protection. It has achieved good results in environmental control, quality improvement, ecological governance and protection, and has actively strengthened the awareness of ecological protection and innovated mechanisms and policies. The rural cultural modernization index is the lowest, probably due to the fact that Guangdong Province has a large population of rural residents, and some remote rural areas are unable to keep up with the policy improvements due to financial and resource constraints. (2011-2020), the Outline of the National Medium- and Long-Term Education Reform and Development Plan (2010-2020), and the Action Plan for Education Informatization in the New Era (2018-2022) have greatly boosted the process of cultural modernization in rural areas of Guangdong Province, strengthened the construction of rural education facilities and the rural cultural service system, and enriched rural cultural life.

In terms of the growth rate of the evaluation value at the guideline level, the index of the modernization level of farmers' life has the fastest growth rate, with an increase of 5.52 from 2011 to 2020, which indicates that with the development of modernization of Guangdong Province's agriculture and rural areas, farmers have achieved comprehensive poverty alleviation, and the economic living conditions of farmers have been well improved, and are getting better year by year, with farmers' incomes growing, consumption expenditure continuing to be upgraded, and the sense of well-being and convenience of life being greatly enhanced The growth rate of rural industrial modernization has been the fastest. While the growth rate of rural industrial modernization is the slowest, only 2.76 from 2011 to 2020, the reason may be that the innovation and expansion of rural emerging service industry and 5G, big data into the countryside, greatly promote the development of rural industrial economy, Guangdong Province vigorously implement the optimization of the industrial structure, promote the upgrading of the traditional agricultural industry, and promote the integration of one, two, three industries, so as to make agriculture large-scale, informatization, and industrialization, marketization levels have been greatly enhanced, but may be due to excessive regional differences, resulting in uneven development and a lack of characteristic industries, thus leading to a slower growth rate. In addition, the three guideline levels except for rural cultural modernization and rural industrial modernization are all on a growing trend. Rural cultural modernization is on a continuous growing trend until 2020, and then suddenly declines in 2020, probably due to the impact of the epidemic that has led to the reduction of rural cultural modernization in all aspects. The level of rural industrial modernization grew extremely fast in 2012, but showed negative growth in 2016, mainly due to the meteorological year in Guangdong in 2016, which was more deviated than previous years, and some agricultural infrastructure was

severely damaged by the impact of a rare cold wave and torrential rains at the beginning of the year, while the overall agricultural modernization fell back due to the fall of animal husbandry production at a later stage, the lagging production structure of agricultural products, and thin agricultural product industrial chain, and other problems exist, it is urgent to promote the structural reform of the agricultural supply side and enhance the comprehensive production capacity of agriculture.

3.2. Forecast Results of the Level of Modernization of Agriculture and Rural Areas in Guangdong Province

Based on the actual measurements, the overall linear regression model was used to predict the comprehensive average of the future level of agricultural and rural modernization in Guangdong Province, resulting in the predicted values for 2021–2050 as shown in Table 4.

Table 4. Comprehensive assessment of the level of modernization of Guangdong Province's agriculture and rural areas from 2011 to 2020.

Time	Modernization of rural industry	Modernization of rural ecology	Modernization of rural culture	Modernization of rural governance	Modernization of rural life	Consolidated assessed value
2021	13.67	13.76	12.08	12.90	12.97	65.38
2025	14.02	14.63	13.12	13.89	14.25	69.92
2030	14.46	15.73	14.41	15.13	15.86	75.59
2035	14.90	16.83	15.71	16.37	17.46	81.27
2040	15.34	17.92	17.01	17.61	19.06	86.94
2045	15.78	19.02	18.31	18.85	20.66	92.62
2050	16.22	20.11	19.60	20.09	22.26	98.29

The forecast results show that the index of the level of modernization of agriculture and rural areas in Guangdong Province will reach 69.92 in 2025, which is the transition stage of the development of modernization of agriculture and rural areas; the index will reach 86.94 in 2040, which is the sprint stage of the development of modernization of agriculture and rural areas; and it will reach 98.29 in 2050, which basically realizes the modernization of agriculture and rural areas in the Chinese style.

3.3. Factor Analysis of Obstacles to Rural Modernization in Guangdong Province

The results of the analysis of obstacles to the development level of agricultural and rural modernization in Guangdong Province from 2011 to 2020 are shown in Table 5.

Table 5. Analysis of obstacles to agricultural and rural development in Guangdong Province from 2011 to 20 20 (unit: %)

Time/degree of obstacle	Modernization of rural industry	Modernization of rural ecology	Modernization of rural culture	Modernization of rural governance	Modernization of rural life
2011	5.47	2.37	11.81	4.50	8.80
2012	18.53	5.42	9.57	0.91	6.06
2013	18.66	10.94	3.84	2.39	1.86
2014	21.23	11.76	2.97	4.89	1.35
2015	21.59	13.78	3.82	5.99	4.65
2016	20.13	17.42	6.18	12.14	8.85
2017	19.96	16.91	10.38	13.80	12.64
2018	20.08	22.58	14.06	16.73	18.04
2019	20.95	24.60	15.69	19.58	21.52
2020	22.04	26.37	12.36	21.89	24.33

In the development process of modernization of Guangdong Province's agriculture and rural areas, the influence of rural ecological modernization and modernization of farmers' life is more obvious, with the mean value of obstacle degree of 26.37% and 24.33% respectively. Secondly, they are affected by rural industrial modernization, rural governance modernization and rural cultural modernization, with the mean values of obstacle degree of 22.04%, 21.89% and 12.36% respectively. 2011–2020 rural industrial modernization has shown a continuous growth trend, which means that its obstacle degree has also increased year by year, so it is necessary to adjust and optimize the structure of the agricultural industry and focus on the development of industrialization in the agricultural development in the future, and at the same time, we should be alert to the risks brought by the low industrialization and be alert to the risks brought by low industrialization. Rural ecological modernization shows fluctuating growth, indicating that the level of rural ecology is also unstable, and the obstacle degree was reduced in 2016–2017 after the strengthening of control over ecology, but then returned to the rise, so in terms of rural ecology, the construction of the ecological environment should be strengthened, and the regulation of pesticide and fertilizer usage should be strengthened, towards the development of green and sustainable development. The impact of rural cultural modernization has changed a lot, first falling sharply, then rising and falling again, reflecting that the development of rural culture in Guangdong Province is extremely unstable. In the future, rural cultural investment and construction should be increased, and rural culture and education should be greatly popularized. Modernization of rural governance and modernization of farmers' life both show a downward and then upward trend, indicating that Guangdong Province has made corresponding adjustments in the later stages and the implementation of the strategy of revitalization of the countryside has achieved better results in the areas of rural governance and farmers' life.

4. Conclusion

Based on the entropy weight method and comprehensive evaluation model, this paper conducts a stage exploration and comprehensive evaluation of the development level of modernization of agriculture and rural areas in Guangdong Province from 2011 to 2020, and adopts the overall linear regression analysis model to predict the future development level of modernization of agriculture and rural areas in Guangdong Province, and then seeks for obstacles to modernization through the hindrance model, so as to realize the vertical analysis of the time dimension and horizontal analysis of the development dimension. The conclusions of the study are as follows:

1. The development level of agricultural and rural modernization in Guangdong Province has entered the late stage of upgrading from the development stage of the Chinese-style modernization level, and is about to step into the transition stage; the development level is on an upward trend, and the rate of growth is fast.

2. Rural ecological modernization and modernization of farmers' life have made the greatest contribution to the overall development level of agricultural and rural modernization, and the data show that the effectiveness of agricultural and rural development policies over the past ten years has been reflected more in the improvement of farmers' life, which has adhered to the people-centered development ideology. The level of rural industrial modernization has increased more slowly in recent years, and the modernization of rural culture has even regressed.

3. The development of modernization of agriculture and rural areas in Guangdong Province will enter the fast lane in the next 30 years, and will enter the sprint stage in 2040, and basically realize the Chinese-style modernization of agriculture and rural areas by 2050.

4. In the development process of Guangdong Province's modernization of agriculture and rural areas, the influence of modernization of farmers' life and modernization of rural ecology is more obvious, followed by the influence of modernization of rural culture, modernization of rural governance and modernization of rural industry. Among them, rural cultural modernization has the least influence, indicating that Guangdong Province is gradually paying attention to cultural popularization, and agricultural and rural modernization is gradually developing in the direction of green and sustainable development.

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