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Research on Rural Economic Development Based on the Perspective of Economic Structure Modernization——Taking the Yangtze River Delta Region as an Example

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ABSTRACT

Chinese-style modernization is the modernization of common prosperity for all people. With the continuous acceleration of my country's modernization construction, the modernization of economic structure is also accelerating, which is specifically manifested in the optimization and upgrading of industrial structure. The optimization and upgrading of industrial structure has an increasingly significant impact on the development of rural economy. At the same time, the rural revitalization strategy is being fully implemented, and it is particularly important to promote the high-quality development of rural economy. In terms of industrial structure, rural economy is a complex system that includes the first, second and third industries in rural areas. In recent years, with the development of urbanization, the rural industrial structure has been continuously optimized and upgraded, and the proportion of non-agricultural industries has gradually increased. The modernization of economic structure has begun to play a more important role in rural revitalization. Based on the conclusions of this study, feasible suggestions are provided for the development of rural economy in the Yangtze River Delta region to help rural revitalization.

KEYWORDS

Economic structure modernization; Rural economy; Yangtze River Delta region

1. INTRODUCTION

The concept of a modern economic system was first proposed in the report of the 19th National Congress of the Communist Party of China. Building a modern economic structure has become a major strategic goal of China's economic development in the new era. Grasping the transformation of the main contradictions of Chinese society in the new era, vigorously developing the economy to meet people's pursuit of material needs, and embarking on a new journey of building a modern power in China. The rural revitalization strategy is an important strategic deployment of China at present. The revitalization of the rural economy is the due meaning and solid foundation of rural revitalization, indicating that the core of rural revitalization is to promote the high-quality development of the rural economy. The modernization of the rural economic structure is an important topic in the development of China's rural economy. Studying the impact of the modernization of the rural economic structure on the development of the rural economy can provide a theoretical basis for the formulation and

adjustment of the rural revitalization strategy. By studying the optimization and upgrading of the economic structure, we can deeply understand the internal mechanism of rural economic development and provide empirical support for rural economic theory to promote its further development. The Yangtze River Delta region has a pivotal strategic position in the overall situation of national modernization and the all-round opening-up pattern. Studying the impact of the modernization of the economic structure on the development of the rural economy in the Yangtze River Delta region can provide important references for policymakers and decision makers on the development of the rural economy. The rural revitalization development in the Yangtze River Delta region has a demonstration and leading role. Studying the experience and problems of the rural economic development in the Yangtze River Delta region can provide specific cases and experiences for other regions to help them formulate more effective policies and measures in the implementation of the rural revitalization strategy. By understanding and measuring the current situation and development trend of the rural economy in the Yangtze River Delta region, we can promote economic cooperation and exchanges between regions, promote complementary resource advantages and coordinated industrial development, and achieve overall improvement of the regional economy. On the new journey of basically realizing socialist modernization and building a socialist modern power in an all-round way, we should continue to promote the implementation of the rural revitalization strategy, consolidate the achievements of rural economic construction, continuously resolve the problems faced by rural industrial structure and development, further promote the diversified and symbiotic integrated development of the rural economy, and promote the revitalization and prosperity of the rural economy.

2. CURRENT RESEARCH STATUS AT HOME AND ABROAD

2.1. Domestic Research Status and Development Trends

In recent years, China's rural economic development has become the focus of academic and policy attention. In China, a large number of scholars have conducted empirical research on rural economy. Li Ye et al. (2010) constructed an evaluation system for the level of rural economic development through the analysis of the rural economic situation in Henan Province. This system covers four aspects, namely economic level, industrial structure, living standards, and production conditions, and nine categories of indicators. This system also provides a basic paradigm for subsequent rural economic research. He Qiang (2019) started his research from the momentum of rural economy. On the one hand, he proposed that the new momentum of rural economic development relies on three factors: industrial integration, agricultural scientific and technological progress, and the intensity of rural collective economic reform. On the other hand, from the perspective of rural economic development momentum, this study established a new rural economic development momentum measurement system with capacity foundation, agricultural modernization, industrial integration and development results as the first-level indicators. On this basis, Xu Shuhong (2020) integrated five factors that affect rural economic development. In his measurement system, government financial support for agriculture, rural network infrastructure construction, rural transportation, rural education and rural tourism development are the main indicators affecting the level of rural economic development.

2.2. Current Status and Development Trends of Foreign Research

In foreign countries, rural economic development is also one of the research hotspots. Many countries and regions have conducted relevant research to explore the development model and path of the rural economy. Foreign research focuses on the characteristics of rural economy, rural development strategies and policies, rural industrial structure adjustment and other issues in different countries and regions. At the same time, some studies also explore the impact of rural economic development on society, environment and sustainable development, and pay attention to the participation and development of rural communities. It is worth noting that foreign research on rural economic

development involves a wide range of disciplines, including economics, agricultural economics, geography, sociology, etc. The research methods are diverse, including quantitative analysis, case studies, literature reviews, etc. At the same time, the research content also includes rural development strategies, rural industrial transformation, farmers' income growth, rural governance and other aspects.

Based on the above literature, it can be seen that scholars at home and abroad are currently studying the level of rural economic development from different perspectives, which widely involves the evaluation system of rural economic development level and the exploration of rural economic development momentum, which has a certain role in promoting rural economic development. However, from the perspective of rural economic structure modernization, there are not many studies that empirically examine the impact of rural economic structure modernization on rural economic development level, and there is no special literature to explore the impact of economic structure modernization on rural economic development. Exploring the relationship between the level of rural economic structure modernization and the level of rural economic development is of great significance to the development of rural economy in the Yangtze River Delta.

3. COMPREHENSIVE MEASUREMENT PROCESS

3.1. Data Collection and Organization

Based on the purpose of this study, the team members collected industry-related data from Shanghai, Jiangsu, Zhejiang and Anhui provinces over the past five years, including key indicators such as employment structure, number of employees, and industry growth.

After collecting the data, we used SPSS software to check the data, for example, checking for missing values, outliers, or duplicate values in the data, and then processed it with the data cleaning tools in the SPSS software, for example, filling missing values, deleting duplicates, and processing outliers to ensure the accuracy and consistency of the data.

The variables were standardized to eliminate the influence of dimension magnitude in subsequent analysis and make the analysis more convincing.

The collected data were classified by region and year, converted into panel data using pdata. frame in R language , and a fixed effect model was established (pooling=FALSE).

3.2. Factor Analysis

Analysis of employment situation in the Yangtze River Delta region in the past five years

3.2.1. Variable selection and preprocessing:

The variables selected this time are: Shanghai, Zhejiang Province and other four major cities, years (2019-2023), employment (six industries including transportation, retail and wholesale, and manufacturing). Based on the above panel data, the original data was standardized to eliminate the differences in dimensions between variables. At the same time, the data quality (data integrity, outliers, missing values, etc.) was checked and processed accordingly.

3.2.2. Correlation analysis

Table 1. Correlation

Correlation								
		Construction Industry	Transport-ation industry	Residential services and other service industries	Retail and wholesale industry	Private and individual	Manufac-turing	Accomm o-dation Industry
Construction Industry	Pearson correlation	1	.930**	0.384	0.409	.445*	.612**	0.394
	Significance (two-tailed)		0.000	0.094	0.073	0.049	0.004	0.086
	Number of cases	20	20	20	20	20	20	20
Transportation industry	Pearson correlation	.930**	1	.475*	.555*	.579**	.678**	.513*
	Significance (two-tailed)	0.000		0.034	0.011	0.007	0.001	0.021
	Number of cases	20	20	20	20	20	20	20
Residential services and other service industries	Pearson correlation	0.384	.475*	1	.899**	.823**	.811**	.992**
	Significance (two-tailed)	0.094	0.034		0.000	0.000	0.000	0.000
	Number of cases	20	20	20	20	20	20	20
Retail and wholesale industry	Pearson correlation	0.409	.555*	.899**	1	.984**	.917**	.899**
	Significance (two-tailed)	0.073	0.011	0.000		0.000	0.000	0.000
	Number of cases	20	20	20	20	20	20	20
Private and individual	Pearson correlation	.445*	.579**	.823**	.984**	1	.944**	.817**
	Significance (two-tailed)	0.049	0.007	0.000	0.000		0.000	0.000
	Number of cases	20	20	20	20	20	20	20
manufacturing	Pearson correlation	.612**	.678**	.811**	.917**	.944**	1	.784**
	Significance (two-tailed)	0.004	0.001	0.000	0.000	0.000		0.000
	Number of cases	20	20	20	20	20	20	20
Accommodation Industry	Pearson correlation	0.394	.513*	.992**	.899**	.817**	.784**	1
	Significance (two-tailed)	0.086	0.021	0.000	0.000	0.000	0.000	
	Number of cases	20	20	20	20	20	20	20
**. The correlation is significant at the 0.01 level (two-tailed).								
*. The correlation is significant at the 0.05 level (two-tailed).								

Based on the above correlation matrix data, we can know that:

(1) Highly positive correlation:

The Pearson correlation coefficient between the construction industry and the transportation industry reached 0.93; the correlation coefficient between residential services and others and retail and wholesale was as high as 0.899, indicating that they have a strong positive correlation.

(2) Interdependence between industries / agglomeration effect:

The significant positive correlation shows that different industries are interdependent, and the development of one industry will have a positive impact on other industries. Eg: The development of the construction industry will drive the development of the transportation industry, perhaps because construction usually requires a lot of logistics and transportation services.

3.2.3. Suitability test

Table 2. KMO and Bartlett's test

KMO and Bartlett's test		
KMO sampling suitability measure.		0.623
Bartlett's test of sphericity	Approximate Chi-Square	296.114
	Degrees of Freedom	twenty one
	Significance	0.000

(1) KMO test:

As can be seen from the above figure, the KMO value is .623, which is slightly lower than 0.7, but still acceptable, indicating that there are certain common factors between the variables and factor analysis can be performed.

(2) Bartlett's test of sphericity:

As can be seen from the above figure, the significance of Bartlett's sphericity test is less than 0.001, so it is also less than 0.05. Therefore, the original hypothesis is rejected, and it is believed that there is a correlation between the variables, which is suitable for factor analysis.

3.2.4. Common Factor ANOVA

Table 3. Common factor variance

Common factor variance		
	initial	extract
Construction Industry	1.000	0.970
Transportation industry	1.000	0.961
Residential services and other service industries	1.000	0.918
Retail and wholesale industry	1.000	0.971
Private and individual	1.000	0.912
manufacturing	1.000	0.907
Accommodation Industry	1.000	0.904
Extraction method: principal component analysis.		

From the above figure, we can see that:

The common factor variance extraction values of most variables are high, and most variables have values close to 0.96, indicating that the variance of most variables can be well explained by the common factors. The correlation between variables and common factors is very high, for example: the extraction values of construction industry and retail wholesale are 0.970 and 0.971 respectively. In summary: the common factors extracted by this principal component analysis method are effective.

3.2.5. Component coefficient matrix analysis

The first principal component:

The score coefficients of the construction industry, transportation industry, and manufacturing industry on the first principal component are positive and generally high, indicating that these industries have a strong positive correlation with the first principal component, indicating that they mainly represent the characteristics of logistics production and manufacturing related industries.

The second principal component:

The score coefficients of the four industries, including retail and wholesale, private and individual, on the second principal component are all negative, which means that there is a negative correlation between this and the second principal component, which means that the second principal component mainly represents the characteristics of related industries such as clothing and retail.

From the above, we can conclude that retail and wholesale industries, accommodation industries, etc. have low scores on the first principal component, and negative scores on the second principal component, indicating that these industries contribute less to manufacturing and other aspects, but more to the service industry. At the same time, the construction industry and transportation industry have positive but low scores on the second principal component, indicating that they are somewhat related to the service industry, but more related to infrastructure and logistics.

3.2.6. Descriptive statistical analysis

Table 4. Descriptive Statistics

Descriptive Statistics											
	N	Minimum	Maximum	sum	average value	Standard Deviation	variance	Skewness		Kurtosis	
	statistics	statistics	statistics	statistics	statistics	statistics	statistics	statistics	standard error	statistics	Standard error
Construction Industry	20	40.20	311.30	2515.30	125.7650	96.52260	9316.613	1.178	0.512	-0.472	0.992
Transportation industry	20	16.20	103.50	881.30	44.0650	25.17825	633.945	1.349	0.512	0.972	0.992
Residential services and other service industries	20	20.70	168.70	1831.20	91.5600	47.06149	2214.784	-0.341	0.512	-1.000	0.992
Retail and wholesale industry	20	390.40	1018.00	13169.20	658.4600	206.96998	42836.573	0.323	0.512	-1.221	0.992
Private and individual	20	919.30	3604.20	42369.20	2118.4600	917.83133	842414.359	0.244	0.512	-1.517	0.992
manufacturing	20	118.70	1028.20	11366.60	568.3300	413.10141	170652.777	-0.001	0.512	-2.182	0.992
Accommodation Industry	20	20.30	192.80	2017.60	100.8800	54.64253	2985.806	-0.201	0.512	-1.104	0.992
Number of valid cases (in columns)	20										

As can be seen from the above figure, the minimum and maximum values together indicate the range and dispersion of the data. Therefore, it can be seen that the maximum value of private and individual is 3604.2, which is much higher than other industries, indicating that the data distribution is wider;

from the perspective of standard deviation, the standard deviation of private and individual and manufacturing industries is larger, indicating that the data of these two industries have greater fluctuations in terms of the mean. The average value is a measure of the trend of the data center of an industry. From the table, it can be seen that the average value of retail and wholesale is 658.46, which is relatively high, indicating that its industry level is relatively high; and from the perspective of total number, the total number of private and individual industries is 42369.2, which is the largest among these industries, indicating that the overall scale of the industry is large.

3.3. Regression Analysis

Analysis of the changes in industrial structure in the Yangtze River Delta region in the past decade

3.3.1. Variable selection:

The original data selected this time are the added value of the primary, secondary and tertiary industries in the Yangtze River Delta region (four major cities including Shanghai and Zhejiang Province).

In order to explore the impact of the added value (independent variable) of different industries on the level of rural economic development (dependent variable) in the Yangtze River Delta region, this analysis adopts a multiple linear regression model, taking the added value of the first, second and third industries as independent variables and overall economic growth as the dependent variable, and uses SPSS to conduct regression analysis, and judges the contribution of different industries to the rural economy in the Yangtze River Delta region through the influence coefficient of each variable on the dependent variable.

3.3.2. Preprocessing

First, delete the duplicate values in the original data; process the missing values in the original data and fill them with the mean, median, etc.; identify and process invalid values and outliers, and identify them according to their distribution.

Then, for the skewed distributed data, Box-Cox transformation is performed on it to make it closer to normal distribution.

The data is then standardized to eliminate the impact of the magnitude of different variables.

Table 5. Correlation Test

		Value added of primary industry	Value Added by Secondary Industry	Added value of tertiary industry
Value added of primary industry	Pearson correlation	1	.800**	.536*
	Significance (two-tailed)		0.000	0.015
	Number of cases	20	20	20
Value Added by Secondary Industry	Pearson correlation	.800**	1	.920**
	Significance (two-tailed)	0.000		0.000
	Number of cases	20	20	20
Added value of tertiary industry	Pearson correlation	.536*	.920**	1
	Significance (two-tailed)	0.015	0.000	
	Number of cases	20	20	20
**. The correlation is significant at the 0.01 level (two-tailed).				
*. The correlation is significant at the 0.05 level (two-tailed).				

3.3.3. Correlation analysis:

As can be seen from the above figure: the added value of different industries has a significant positive correlation. Among them, the Pearson correlation coefficient between the added value of the secondary industry and the added value of the tertiary industry is 0.92, indicating that their correlation is extremely strong. Since these independent variables are significantly correlated, if they are directly used as independent variables in the multivariate linear regression model, multicollinearity will occur, resulting in inaccurate estimated regression coefficients and making the model invalid. In order to solve this problem, principal component analysis is performed to eliminate the impact of multicollinearity.

Table 6. Component Matrixa

Component Matrixa	
	Element
	1
Value added of primary industry	0.844
Value Added by Secondary Industry	0.994
Added value of tertiary industry	0.902
Extraction method: principal component analysis.	
a. One component was extracted.	

Table 7. Total variance explained

Total variance explained						
Element	Initial eigenvalues			Extracting the sum of squares of loadings		
	total	Percentage of variance	accumulation %	total	Percentage of variance	accumulation %
1	2.514	83.817	83.817	2.514	83.817	83.817
2	0.472	15.745	99.562			
3	0.013	0.438	100.000			
Extraction method: principal component analysis.						

As can be seen from the figure above: the sum of the added values of these three industries is relatively high, which means that this principal component reflects the common trend of the added values of the three industries, so these three variables have significant contributions to the principal component. Therefore, these three variables are combined into one principal component for analysis, and the model becomes a univariate linear regression model, so the average value of these three industries is used as the principal component for analysis.

3.3.4. Regression Analysis

It can be seen from the above figure that in the first-order linear regression, only a few points fall on the line, so it does not conform; in the second-order linear regression, half of the points fall on the line; and in the third-order cubic regression, most of the points fall on the line. Therefore, the relationship between GDP and industrial growth is a nonlinear relationship, which means that the increase rate of rural GDP will be different at different industrial growth levels; there is a turning point, which means that at a certain specific industrial growth level, rural GDP will change (accelerated growth, decelerated growth or other).

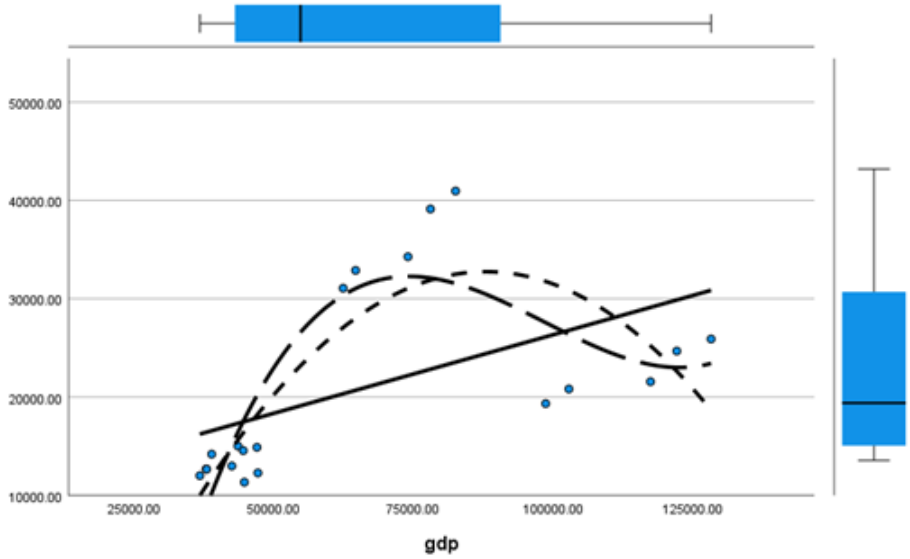

Figure 1. Correlation graph between GDP and industrial added value

The regression analysis is as follows:

When the industry increase is at a low level (10,000-20,000), the corresponding GDP growth is also relatively low, indicating that in the early stages of industrial development, due to its small scale or immature development, its role in promoting rural development is limited.

With the gradual increase of industrial output (30,000-75,000), GDP growth shows an accelerating trend, indicating that when the industry develops to a certain extent, its role in driving the rural economy becomes more obvious.

Finally, when the industry increase reaches a higher level (>75,000), the GDP growth rate returns, indicating that in the later stage of industrial development, due to factors such as market saturation and competition, the role of industry increase in promoting rural GDP gradually weakens.

4. CONCLUSION AND RECOMMENDATIONS

This study takes the Yangtze River Delta region as an example and draws the following conclusions from the perspective of economic structure modernization: (1) The modernization of economic structure promotes the balanced development of rural economic development. (2) The three major industrial structures in the rural areas of the Yangtze River Delta are highly correlated and have a strong impact on the comprehensive economic development. (3) The increase in industrial value and rural economic development show a positive trend, and the primary industry has a smaller impact, while the secondary and tertiary industries have a greater impact. In response to the above problems, the author puts forward the following suggestions: (1) Continue to adhere to the strategy of economic structure modernization and further strengthen the optimization and improvement of the economic structure. (2) Coordinate the development of the three major industries, strengthen and consolidate the basic position of agriculture, and increase investment in the secondary and tertiary industries. (3) Each region combines its own advantages to develop distinctive rural economies and make full use of the advantageous resources of the primary, secondary and tertiary industries.

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