Research on the Measurement and Power Mechanism of Urban-Rural Integration Level in Hebei Province from the Perspective of Common Prosperity

Wang Limin[1*], & Wang Canyu[1]

[1]College of Economics, Hebei University

Abstract

Urban-rural integrated development is an important way to eliminate the Urban-rural dual economic structure gradually, as well as an inevitable choice for China's economic and social development. In order to eliminate the imbalance of urban-rural development and achieve common prosperity ultimately, it is of great practical significance to measure the level of urban-rural integration and to explore the power mechanism of its development. Based on the data of prefecture-level cities in Hebei Province from 2012 to 2022, taking into account the two dimensions of urban-rural integration power system and target system, this paper constructs an evaluation index system for the level of urban-rural integration development from the perspective of common prosperity, and calculates the level of urban-rural integration development in Hebei Province, studies its changes from multiple dimensions, and finally uses a spatial econometric model to study the power mechanism of urban-rural integration in Hebei Province. The results show that: (1) The overall trend of urban-rural integration in Hebei Province is positive, but the level is still low; (2) There is a large north-south gap in the spatial distribution of urban-rural integration among prefecture-level cities; (3) Government support, industrial structure adjustment, financial development, economic development level and fiscal decentralization will all affect the development process of urban-rural integration. Based on this, this paper proposes further targeted policy measures to promote the integrated development of urban and rural areas in Hebei Province.

Keywords: urban-rural integration; common prosperity; measurement; power mechanism

1.0 Introduction

Common prosperity is an essential requirement of socialism, which means the common prosperity of all people. But the fact of a huge gap between urban and rural development has long time been existed in China, so the most arduous and burdensome task in realizing common prosperity lies in promoting the development of rural areas. In order to solve this problem, the central government has issued a series of relevant policies, from “coordinating urban and rural development” in 2003, to “integrated urban and rural development” in 2012, to “urban-rural

* Corresponding author: Wang Limin. E-mail address: ladylmwang@126.com.

integration development" in 2017. From this, we can see that, to eliminate the gap between urban and rural areas and ultimately make the common prosperity of all people into reality, the method of integrated urban-rural development is getting clearer and clearer. Therefore, measuring the level of integrated urban-rural development and exploring the power mechanism of its development are of great practical significance for improving the imbalance between urban and rural development and ultimately realizing common prosperity.

Current research on urban-rural integration mainly focuses on the following three aspects: first, the connotation of urban-rural integration. Scholars believe that urban-rural integration is to achieve a rational distribution of industries and close ties between urban and rural areas through the free flow of resource elements, and ultimately to achieve the optimal allocation of urban and rural resources and outputs as well as the maximization of the social welfare of the entire region. Second, the measurement and evaluation of urban-rural integration development. Scholars have established multi-dimensional indicator systems based on different concepts and from various perspectives to measure the level of urban-rural integration development at the national, regional and provincial levels. The third is the research on the influencing factors of urban-rural integration. Scholars, with the tool of econometric models, have mainly explored the influencing factors such as factor mobility, economy and policies on urban-rural integration.

About the way to realize common prosperity, taking the path of urban-rural integration development has become a consensus among the academic community. Existing research has provided theoretical support and basic ideas for realizing common prosperity through urban-rural integration, but the research on the relationship between the two parts has mainly focused on the impact of urban-rural integration on the path of common prosperity. Although there have been some research on measuring the level of development of urban-rural integration from the perspective of common prosperity, most of the indicator systems constructed are still based on the connotation of urban-rural integration, which cannot visually reflect the role of urban-rural integration in promoting common prosperity, neither can they reflect the process of urban-rural integration under the goal of common prosperity; What's more, there is yet no research on the level of urban-rural integration development from the perspective of Hebei Province's common prosperity. Based on such a condition, this paper carry out research from the following three perspectives: First, based on the connotation of common prosperity, to construct an evaluation system for urban-rural integrated development from the perspective of common prosperity, by which trying to make the judgment of urban-rural integrated development of the index system more in line with the objective requirements of the goal of common prosperity. Second, to carry out empirical research with the data of prefectural-level cities in Hebei Province, which aims at reflecting the level of urban-rural integration development under the goal of common prosperity objectively and comprehensively. Third, to study the power mechanism of the urban-rural integration in Hebei Province with spatial econometric model, which is useful to promote the development of urban-rural integration under the goal of common prosperity.

2.0 Construction of the index system of urban-rural integration development in Hebei Province under the perspective of common prosperity

2.1 Basis for the selection of indicators and description of indicators

Urban-rural integration is a dynamic process in which the elements of urban-rural development are convected and integrated to form a close link, and there must be a power system to promote the emergence of this process; and the ultimate goal of urban-rural integration is to realize the common prosperity of all people in urban and rural areas so that the entire population can share the fruits of economic development and public services on an equal footing. Therefore, this paper takes the power system and target system of urban-rural integration as the first-level indicators to construct the indicator system of urban-rural integrated development under the perspective of common prosperity. Specific indicators and measurement descriptions are shown in Table 1.

Among them, the dynamic system of urban-rural integration focuses on the process of integration and development and measures the intrinsic ability to sustain urban-rural integration and development, which is broken down into five categories of indicators: population integration, financial support, agricultural technology, three-industry integration, and transportation facilitation. Population integration measures the distribution of urban and rural populations; financial support measures the level of financial support for agriculture; agricultural technology measures the level of agricultural technology; tri-industry integration measures the degree of coordinated development of the three industries between urban and rural areas; and transportation convenience measures the level of transportation facilities. The target system of urban-rural integration measures the results of urban-rural integration and development, and also represents the status of “urban-rural sharing” of common prosperity, which is broken down into two categories of indicators: shared economic development results and shared public services. Shared economic development results measure the effect of economic development results on urban and rural residents; shared public services measure the gap between urban and rural residents in terms of public service treatment.

2.2 Data sources and research methodology

In this paper, prefecture-level cities in Hebei Province are selected as the research object, and the data are obtained from Hebei Economic Yearbook (2013-2019), Hebei Statistical Yearbook (2020-2023), Hebei Rural Statistical Yearbook (2013-2023), EPS database, and the statistical yearbooks of prefecture-level cities in 2013-2023, and the individual missing data are filled in by the method of linear interpolation for the neighboring years. Due to the limitation of data availability, this paper selects data from eight prefecture-level cities in Hebei Province.

In this paper, the entropy weight method is used to assign weights to the indicators to avoid the drawbacks of strong subjectivity that exist in the subjective assignment method, and the

weights of the indicator system obtained are shown in Table 1.

3.0 Characterization of the temporal and spatial evolution of the level of urban-rural integration and development in Hebei Province under the perspective of common prosperity

3.1 Characterization of temporal evolution

By applying the entropy value method and the data of prefecture-level cities in Hebei Province from 2012 to 2022, the results of measuring the level of urban-rural integration in Hebei Province obtained are shown in Table 2.

Table 2: Level of urban-rural integration in 8 prefecture-level cities in Hebei Province, 2012-2022

City	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Baoding	0.31	0.37	0.37	0.38	0.35	0.39	0.37	0.40	0.45	0.42	0.45
Tangshan	0.48	0.50	0.52	0.55	0.50	0.51	0.53	0.52	0.57	0.58	0.59
Zhangjiakou	0.22	0.24	0.24	0.30	0.29	0.33	0.32	0.33	0.36	0.37	0.38
Chengde	0.21	0.23	0.27	0.27	0.26	0.32	0.34	0.41	0.44	0.44	0.51
Cangzhou	0.35	0.43	0.45	0.43	0.44	0.41	0.42	0.47	0.53	0.52	0.53
Shijiazhuang	0.48	0.55	0.61	0.62	0.53	0.59	0.52	0.55	0.60	0.65	0.64
Qinhuangdao	0.35	0.40	0.41	0.39	0.36	0.39	0.38	0.38	0.40	0.41	0.40
Xingtai	0.37	0.47	0.49	0.52	0.48	0.49	0.54	0.57	0.61	0.63	0.59

As can be seen from Table 2: Firstly, the level of urban-rural integration in Hebei Province from 2012 to 2022 is overall low, with the average level maintained maintained at around 0.43, and its overall distribution range is [0.21,0.65]. Secondly, the overall urban-rural integration development level in Hebei Province shows a fluctuating growth trend. Among them, the urban-rural integration level of Shijiazhuang, Tangshan, Xingtai and Cangzhou is higher overall, while the urban-rural integration level of Qinhuangdao and Zhangjiakou is lower. In terms of growth rate, the average annual growth rate of the eight prefecture-level cities in Hebei Province is within the range of 1.1%-8.6%, with Chengde City having the fastest average annual growth rate and Qinhuangdao City being the slowest.

A spatial distribution map is used to visualize the level of urban-rural integration in Hebei Province in the typical years of 2012, 2015, 2018 and 2022, as shown in Figure 1. It can be seen that although the overall level of urban-rural integration in Hebei Province is relatively low, the development trend is positive, and it shows the process of transformation from “quantitative” change to “qualitative” change.

Table 1: Indicator system of urban-rural integration under the perspective of common prosperity

Level 1 indicators	Level 2 indicators	Level 3 indicators	Description of calculations	causality	weight
Rural-Urban Integration Dynamics System	Population integration	Distribution of urban and rural population	Urban population/rural population	-	0.05
	Financial support	Financial support for agriculture	Expenditure on culture, tourism, sports and media / Expenditure on agriculture, forestry and water	-	0.01
	Agricultural technology	Agricultural technology level	Total power of agricultural machinery/cultivated area	+	0.14
	Integration of the three industries	binary comparison coefficient	(Value added of primary sector/employment in primary sector)/(Value added of secondary and tertiary industries/employment in secondary and tertiary industries)	+	0.16
Targeted system for urban-rural integration	convenient transportation	Urban-rural spatial circulation media	Vehicle ownership per 100 households (vehicles)	+	0.19
		Transportation network density	Miles of the road in operation/total land area	+	0.16
	Shared economic results	Urban-rural income gap	Per capita disposable income of urban residents / Per capita disposable income of rural residents	-	0.04
		Urban-rural consumption gap	Consumption expenditure per urban resident / Consumption expenditure per rural inhabitant	-	0.06
		Urban-rural transportation and communication gap	Transportation and communication expenditures per urban resident / Transportation and communication expenditures per rural resident	-	0.02
		Rural-urban disparities in education, culture and recreation	Per capita expenditure on culture, education and recreation of urban residents / Per capita expenditure on culture, education and recreation of rural residents	-	0.02
		The ratio of Engel's coefficient between urban and rural areas	Urban Engel's coefficient / Rural Engel's coefficient	-	0.11
	Shared public services	The ratio of the number of urban and rural residents covered by the minimum subsistence allowance	Number of urban residents covered by the minimum subsistence allowance/ Number of rural residents covered by the minimum subsistence allowance	-	0.03

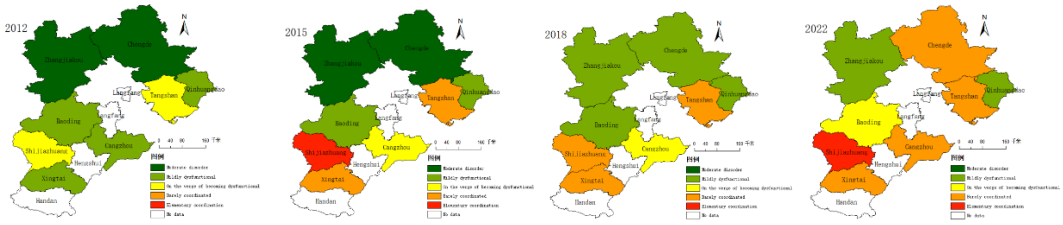

Figure 1 Spatial distribution of urban-rural integration levels in Hebei Province, 2012-2022.

Note: The map is produced based on the standard map with review number GS (2024) 0650 downloaded from the National Geographic Information Public Service Platform, with no modifications to the base map.

3.2 Characterization of spatial evolution

The spatial trend of urban-rural integration level in Hebei Province in typical years from 2012 to 2022 can be obtained by using the trend surface analysis method. As seen in Figure 2, the overall spatial differentiation of urban-rural integration level in Hebei Province is obvious, showing the polarization feature of decreasing gradient from south to north with the increase of geographic distance; over time, the east-west direction has changed from the positive U-shaped distribution of "low in the middle and high in the east and west" to the distribution pattern of "low in the east and high in the south". As time goes by, the east-west direction changes from a positive "U" shape of "low in the center and high on the east and west flanks" to a distribution pattern of "low in the east and high in the south.

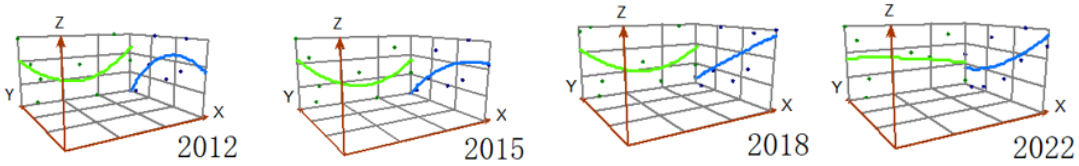

Figure 2 Trend surface analysis of urban-rural integration level in Hebei province

Specifically, in the north-south direction, the level of urban-rural integration in Hebei Province shows a decreasing trend from south to north with the increase of geographic distance, it decreases excessively from cities in the south (Xingtai and Shijiazhuang) to cities in the north (Zhangjiakou, Chengde and Qinhuangdao), with the level of urban-rural integration and development in the cities in the south and the central part of the province being significantly higher than that in the northern part of the province. In addition, the inclination of the fitted curve in the north-south direction is significantly higher than that in the east-west direction after 2015, indicating that the north-south direction is the main direction that generates spatial differentiation in the level of urban-rural integration in Hebei Province.

3.3 Analysis by Guideline layer

To further explore the relative strengths and weaknesses of each prefecture-level city in developing urban-rural integration and the direction of focusing on improvement, this paper will analyze each quasi-measurement level. The results of the analysis of the first-level

indicators, the power system and the target system, are shown in Table 3.

Table 3: Rural-Urban Integration by Guideline Tier and Composite Score

year	Integration dynamics	Integration goals	Aggregate score	year	Integration dynamics	Integration goals	Aggregate score
2012	0.22	0.13	0.35	2018	0.26	0.17	0.43
2013	0.25	0.15	0.40	2019	0.29	0.17	0.45
2014	0.26	0.16	0.42	2020	0.32	0.18	0.50
2015	0.27	0.16	0.43	2021	0.31	0.19	0.50
2016	0.24	0.16	0.40	2022	0.32	0.19	0.51
2017	0.26	0.16	0.43				

As seen in Table 3, the comprehensive score of the urban-rural integration development power system in Hebei Province was 0.2212 in 2012 and rose to 0.3174 in 2022, an increase of 49.6%; the integration goal was 0.1262 in 2012 and 0.1932 in 2022, an increase of 53%. In terms of growth rate, the improvement of the comprehensive urban-rural integrated development index relies mainly on many elements under the urban-rural integrated development dynamics system. The gap between the two systems, integration dynamics and integration goals, gradually widened from 2012 to 2020, and began to narrow since 2021, when Hebei Province proposed to improve the institutional mechanism for urban-rural integrated development.

The results of the analysis of the secondary indicators are shown in Table 4, from which it can be seen that the process of urban-rural integration and development in the eight prefectural-level cities in Hebei Province is polarized, with a large gap between regions, and the rankings of the level of urban-rural integration in the prefectural-level cities, from high to low, are Shijiazhuang, Tangshan, Xingtai, Cangzhou, Qinhuang-dao, Baoding, Chengde, and Zhangjiakou.

Accordingly, the relative disadvantages of municipalities in developing urban-rural integration can be analyzed, as shown in Table 5. Accordingly, it can be obtained that each city focuses on the direction of improvement: Shijiazhuang needs to make sustained efforts to improve agricultural technology and improve transportation facilities. Tangshan needs to make efforts to increase financial support for agriculture and promote industrial transformation. Xingtai needs to focus on improving agricultural technology and introducing policies and measures to improve the level of urban and rural residents sharing the fruits of development. Cangzhou needs to make further improvements in promoting industrial transformation and upgrading, improving agricultural technology, and narrowing the gap between urban and rural residents' incomes and expenditures. Qinhuangdao, Baoding, Chengde and Zhangjiakou, have a lower level of integrated urban-rural development and need to be upgraded on all fronts, but there should be some focus on the timing of development.

Table 4: Results of the assessment of urban-rural integration development in 8 prefecture-level cities

City	Mechanical system					Target system		Total value
	Population integration	Financial support	Agricultural technology	Integration of the three industries	Convenient transportation	Shared economic results	Shared public services	
Baoding	0.041	0.010	0.036	0.035	0.092	0.145	0.028	0.387
Tangshan	0.026	0.010	0.062	0.036	0.144	0.231	0.024	0.533
Zhangjiakou	0.031	0.009	0.008	0.081	0.047	0.104	0.026	0.307
Chengde	0.041	0.011	0.030	0.075	0.049	0.102	0.030	0.336
Cangzhou	0.042	0.010	0.054	0.072	0.123	0.119	0.033	0.452
Shijiazhuang	0.022	0.010	0.103	0.043	0.245	0.126	0.028	0.576
Qinhuangdao	0.031	0.009	0.043	0.026	0.114	0.152	0.015	0.389
Xingtai	0.041	0.011	0.052	0.085	0.174	0.131	0.029	0.523

Table 5 Comparison of Relative Disadvantage Indicators for Urban-Rural Integration Development in 8 Prefecture-Level Cities in Hebei Province

City	Indicators of relative disadvantage
Shijiazhuang	Integration of population, integration of the three sectors and sharing of the fruits of economic development
Tangshan	Population integration, financial support, integration of three industries, sharing of public services
Xingtai	Agricultural technology, sharing the fruits of economic development
Cangzhou	Integration of three industries, access to transportation, and sharing of the fruits of economic development
Qinhuangdao	Population integration, financial support, agricultural technology, tertiary integration, transportation accessibility
Baoding	Financial support, agricultural technology, integration of three industries, transportation facilitation, sharing of public services
Chengde	Agricultural technology, access to transportation, sharing the fruits of economic development
Zhangjiakou	Population integration, financial support, agricultural technology, access to transportation, sharing the fruits of economic development, sharing public services

4.0 Analysis of the power mechanism of urban-rural integration development in Hebei Province under the perspective of common prosperity

4.1 Model Setting and Variable Selection

Considering that the urban-rural integration level of each prefecture-level city in Hebei Province and its influencing factors are spatially correlated and cannot avoid the problems of spatial dependence and heterogeneity, this paper carries out empirical tests by setting up a panel data spatial econometric model, which is set as follows:

$$URI_{it} = d'_i X_t \delta + \beta X'_{it} + \mu_{it} + \varepsilon_{it} \quad \text{formula（1）}$$

$$\varepsilon_{it} = \lambda \omega_i \varepsilon_t + \nu_{it} \quad \text{formula（2）}$$

Where URI_{it} is an explanatory variable indicating the level of urban-rural integration in period t in the i province; $d'_i X_t \delta$ is the spatial lag of the explanatory variables; X'_{it} is a set of control variables; d'_i is the ith row of the spatial neighbor weight matrix ω_{ij}; ε_{it} is the random perturbation term; $\lambda \omega_i \varepsilon_t$ denotes the effect of the surrounding regional disturbance term on the local region's disturbance term.

The explanatory variables are selected and justified as follows:

Strength of government support (gover). Government intervention can better promote factor flows between urban and rural areas and promote integrated urban and rural development. The government usually intervenes in economic activities mainly by fiscal means, so the ratio of fiscal expenditure to regional GDP is used to measure the strength of government support.

Industrial restructuring (ind). Industrial structure not only measures the degree of industrial development of a region but also promotes the flow of factors between urban and rural areas through industrial radiation. This paper uses the ratio of the output value of tertiary industry to that of secondary industry to measure the industrial structure adjustment.

Financial development (fin). The vigorous development of the financial industry will further narrow the gap between urban and rural areas and drive the development of the financial industry in rural areas. This paper adopts the ratio of the year-end loan balance of financial institutions to the year-end deposit balance of financial institutions to measure financial development.

Level of economic development (eco). The level of economic development is an important cornerstone for the realization of urban-rural integration and development, this paper chooses to measure the level of economic development by the ratio of GDP to the area of the administrative district.

Fiscal decentralization (fis). Fiscal decentralization is an important indicator for measuring the financial autonomy of local governments. With more financial autonomy, the government can flexibly solve the problem of unbalanced urban-rural development and promote urban-rural integration within its jurisdiction. This paper uses the ratio of per capita fiscal revenue of prefecture-level cities to per capita fiscal revenue at the provincial level to measure fiscal decentralization.

4.2 Analysis of the results of model estimation

Through the Hausman test, LM test, and LR test, the spatial Durbin model with fixed effects is finally selected for regression analysis. The spatial neighbor weight matrix was selected for the benchmark regression, and the regression results were obtained as shown in column (1) of Table 6.

From the regression results, it can be seen that the strength of government support has a significant enhancing effect on the level of urban-rural integration. Government support is not only conducive to promoting the mutual circulation of factors between urban and rural areas but also facilitates the exchange of information between urban and rural areas; in particular, the government's promotion of urbanization by means of financial expenditure can strongly balance the development gap between urban and rural areas and directly promote urban-rural integration.

Table 6: Model estimation results and robustness test

variant	SDM	robustness test
	（1）	（2）
gover	0.7049***	0.9152***
	（0.2078）	（0.2131）
ind	0.6914***	0.6403***
	（0.2683）	（0.2883）
fin	0.1677***	0.1438***
	（0.0777）	（0.0690）
eco	0.0121***	0.0118***
	（0.0044）	（0.0038）
fis	-0.1724**	-0.1717**
	（0.1014）	（0.0930）
R^2	0.6364	0.7414

Note:*** denotes 99% significance level, ** denotes 95% significance level, * denotes 90% significance level.

Industrial restructuring can significantly promote urban-rural integration. Higher industrial structure can promote the shift of labor factors from the agricultural sector to the manufacturing and service sectors, thereby increasing the income of rural residents and promoting urban-rural integration.

Financial development has a significant positive impact on rural-urban integration. Providing farmers with greater access to financial services and solving their financing difficulties is important for revitalizing the rural market economy.

Economic level has a significant positive impact on urban-rural integration. Good economic conditions provide sufficient resources for the development of urban-rural integration, so the speed of economic development determines the speed of the urban-rural integration process.

Fiscal decentralization has a significant negative impact on the level of urban-rural integration in Hebei Province. This suggests that the traditional "growth-incentivized" evaluation system in Hebei Province hurts on the development of urban-rural integration. The local government tends to invest resources in industries and urban areas that yield quick results and produce political star effects, thus neglecting the development of public utilities such as education and health, which in turn affects the development of rural areas and widens the gap between urban and rural areas.

To further verify the reliability of the research findings, the geospatial distance weight matrix (w_d) is used to further test the robustness of the results, and the results of the robustness test are shown in column (2) of Table 6. The positive, negative, and significance levels of the regression coefficients did not change after replacing the spatial weight matrix, indicating that the baseline regression results are robust.

5.0 Concluding Remarks

This paper constructs the evaluation index system of urban-rural integration under the perspective of common prosperity, measures the level of urban-rural integration of prefecture-level cities in Hebei Province from 2012 to 2022 by using the entropy value method, and explores the driving mechanism of urban-rural integration with spatial econometric modeling, and obtains the following conclusions: First, the overall trend of the level of urban-rural integration in Hebei Province is improving, but the overall level is still relatively low. Secondly, there is a north-south difference in the level of urban-rural integration in Hebei Province. Third, the comprehensive score of urban-rural integration target system in Hebei Province is low, which restricts the development of urban-rural integration in Hebei Province. Finally, government support, industrial restructuring, financial development, economic development level and fiscal decentralization all affect the process of urban-rural integration development.
Accordingly, to ultimately achieve common prosperity through the promotion of integrated urban and rural development, further efforts are needed in the following areas: first, adjusting and optimizing the industrial structure, tapping the potential of the rural economy, and promoting the integrated development of the three industries. First, adjusting and optimizing the industrial structure, tapping the development potential of the rural economy, and promoting the integrated development of the three industries. Second, increasing the provision of universal public services to rural areas, promoting the integration of urban and rural public

services, and making up for the shortcomings of basic public services in rural areas. Thirdly, financial support for rural areas should be strengthened.

References

[1]Wei Houkai.(2020).Deeply Grasp the Essential Connotation of Urban-Rural Integration Development. *China Rural Economy*, 6, 5-8.

[2]Zhou Jianing, Qin Fucang, etal.(2019).Measurement, spatiotemporal evolution and influence mechanism of China's urban-rural integration level in a multidimensional perspective. *China Population-Resources and Environment*, 29, 166-176.

[3]Zhao Deqi, Chen Na.(2019).Research on measuring the level of urban-rural integration development in China. Exploration of Economic Issues, 12,1-28.

[4] Liu Peilin, Qian Tao , etal.(2021). Connotation, realization path and measurement method of common prosperity. *Management World* , 37, 117-129.

[5] Li Shi. (2021). The goal of common wealth and the choice of realization path. *Economic Research*, 56, 4-13.

[6]Liu Heguang.(2022). The Logic and Path of Promoting Urban-Rural Integration Development with the Goal of Common Prosperity. *Social Science Journal*, 1,149-157.

[7]Gao Fan.(2022). How urban-rural integrated development affects the realization of China's common prosperity goal. *China Economic Issues*, 5,12-24.

[8]Zhang Minghao, Ye Jingzhong.(2022). The inner mechanism and realization path of urban-rural integrated development to promote common prosperity. Rural Economy, 11,1-10.

[9] Ma Jun.(2023).Analysis of high-quality integrated development of urban and rural areas under the perspective of common prosperity. *Seeking*, 2, 119-129.

[10] LI Yan, Ye Mingming, Luo Wei.(2022).Study on the measurement and evolution of urban-rural integration development level in Zhejiang Province under the perspective of common prosperity. *Lanzhou Journal*, 6, 113-127.