A Study on the Coupling Coordination Degree of Rural Revitalization and New Urbanization in Jiangsu Province

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Abstract. The coupling and coordination of new urbanization and rural revitalization is of great significance for regional development. Analyze the development of Jiangsu Province at this stage, take the development data of 13 prefecture level cities in Jiangsu Province from 2011 to 2020 as the test sample, select four groups of evaluation target layers to establish the coupling evaluation system, divide the coordination level based on the coupling degree model, calculate the respective development level index of urban and rural economic systems, and study the coupling and coupling coordination degree of rural revitalization and new urbanization development in Jiangsu Province. The results indicate that the development index of new urbanization and rural revitalization in Jiangsu Province has generally shown an upward trend from 2011 to 2020, and the two economic systems are in a high-quality coupling state, which can provide mutual promotion for the common development of urban and rural economies.

Keywords: Rural revitalization · New urbanization · Coordinated development · Coupling evaluation · Coupling model

1 Introduction

In recent years, with the advancement of urbanization and the continuous deepening of understanding of rural revitalization, the academic community has gradually increased its attention to the coupling relationship between urbanization and rural revitalization. After the urban-rural integration development strategy was put forward, scholars carried out a lot of discussions. The research perspective mainly focused on theoretical research such as the urban-rural development process and stage division, institutional barriers and path innovation exploration, as well as empirical research such as the evaluation of the coupling coordination degree of urban-rural integration development and the analysis of influencing factors, and used a series of evaluation methods for the coupling coordination degree of urban-rural development, such as the Delphi method, factor analysis Analytic Hierarchy Process (AHP) and Analytic Network Process (ANP), among others. However, in the research on the development of urban-rural integration in Jiangsu Province, there are problems such as narrow research perspective and incomplete evaluation index

system. The evaluation index system built in the existing research does not highlight the attribute representation of "urban-rural integration", which is basically qualitative research. Only analyzing the relationship between the two from independent individuals can't comprehensively consider the relevance and influencing factors of urban-rural development. This paper takes 13 prefecture level cities in Jiangsu Province as the research object, and designs a coupling coordinated evaluation method to provide theoretical support for further promoting urban and rural development in Jiangsu Province [1–3].

2 Development Overview and Data Sources of Jiangsu Province

2.1 Development Overview of Jiangsu Province

Jiangsu Province is one of the regions with relatively rapid economic development in China, occupying a dominant position in the Yangtze River Delta Economic Zone, and is also a province with a fast pace of urbanization development in China. The report of the 20th National Congress of the Communist Party of China clearly proposes to comprehensively promote rural revitalization and prioritize the development of agriculture and rural areas. As a major agricultural province, Jiangsu Province proposed the integrated development plan of new urbanization and urban-rural development in early 2014, and proposed five goals to shift the focus of urban development from urbanization economic development to quality development [4–6]. During the 13th Five Year Plan period, Jiangsu Province carried out the "Beautiful Urban and Rural Construction Action" and "Village Environment Improvement Action Plan" according to the plan, and has completed the majority of rural renovation tasks, greatly improving the living environment in rural areas.

3 Coupling Evaluation Method of New Urbanization and Rural Revitalization in Jiangsu Province

3.1 Construction of Coupling Evaluation System

To carry out a coupling analysis of the new urbanization and rural revitalization in Jiangsu Province, it is necessary to build evaluation indicators of two economic systems. According to the specific development situation of Jiangsu Province, under the principle of systematic and accessible collection, and based on the development situation of the above selected regions, a coupling evaluation index system is established for the two systems in prefecture level cities of Jiangsu Province from 2011 to 2020 [7, 8].

Following the principles of ecological economy and modern economic development, and based on multiple research concepts, combined with the current situation of urban and rural construction and development in Jiangsu Province, a development level evaluation system for two economic systems has been constructed. Based on the information data of the target layer and indicator layer in the two systems, a coupling degree model is used to divide the evaluation level of economic development [9].

Table 1. Classification of Coupling Coordination Levels

Coordination level	Coupling coordination level	Meaning
Level 10	$0.9 \leq a_{is} \leq 1$	High quality coordination
Level 9	$0.8 \leq a_{is} < 0.9$	Good coordination
Level 8	$0.7 \leq a_{is} < 0.8$	Intermediate coordination
Level 7	$0.6 \leq a_{is} < 0.7$	Primary coordination
Level 6	$0.5 \leq a_{is} < 0.6$	Barely coordinated
Level 5	$0.4 \leq a_{is} < 0.5$	Near Dysfunction
Level 4	$0.3 \leq a_{is} < 0.4$	Mild disorders
Level 3	$0.2 \leq a_{is} < 0.3$	Moderate imbalance
Level 2	$0.1 \leq a_{is} < 0.2$	Highly dysregulated
Level 1	$0 \leq a_{is} < 0.1$	Extreme imbalance

3.2   Classification and Evaluation Levels Based on Coupling Degree Model

This time, the five sets of goals for rural revitalization will be integrated into four levels, and the evaluation system will be constructed from the perspectives of economy, society, space, and ecology. The evaluation indicators will be standardized according to the annual progress. Classify the urban-rural coupling coordination degree of 13 prefecture level cities in Jiangsu Province according to Table 1 [10–12].

According to the above table, the overall plan of two economic systems is divided into 10 levels based on the level of coupling coordination. As the levels continue to rise, the economic system presents a more coordinated state. According to the coupling assessment model and coordinated development index, this paper conducts a coupling analysis on the coordinated development level of new urbanization and rural revitalization in 13 prefecture level cities in Jiangsu Province from 2011 to 2020, and obtains the specific evaluation results of the two.

4   Coupling Analysis Results

4.1   Jiangsu Province New Urbanization and Rural Revitalization Development Level Index

The values for the two undetermined coefficients in the previous text are $\chi = 0.5$, $\delta = 0.5$, when the coupling coordination level a_{is}. The higher the value, the higher the degree of coordination between the two systems, and vice versa. According to formula (5), bring in the selected data values and calculate the new urbanization level index y of Jiangsu Province separately $y_{i1,s}$ and the index of rural revitalization and development level $y_{i2,s}$, and the total system index f_{is} composed of two systems. The calculation results are shown in Fig. 1.

According to the content in the figure, it can be seen that the development level index of new urbanization in Jiangsu Province has maintained a stable upward trend from 2011
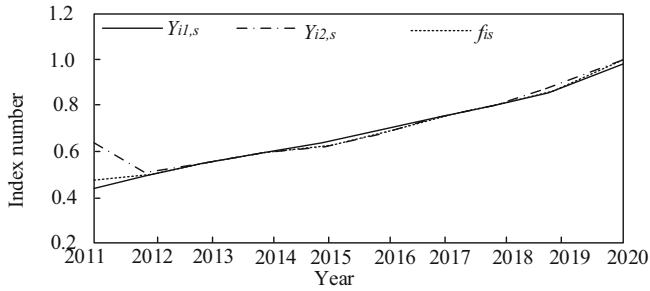
Fig. 1. Calculation Results of Development Level Index

to 2020, rising from 0.425 in 2011 to 0.927 in 2020, with a growth rate of 1.18%, showing a multiple growth pattern. It can be seen that since the 13th Five Year Plan period, Jiangsu Province has vigorously promoted the construction of new urbanization under multiple national and government policies, with significant results. The attractiveness of various cities to rural populations has increased, public service capabilities have been further improved, and the degree of urbanization development in Jiangsu Province has significantly improved. The development situation of rural revitalization in Jiangsu Province is different from that of new urbanization. From the above figure, it can be seen that there are three stages in the direction of the development level index of rural revitalization in Jiangsu Province: the first stage is from 2011 to 2012, where the rural revitalization development index showed a negative increase, with the index decreasing from 0.615 to 0.585; In the second stage, from 2012 to 2019, the development level index began to slowly rise, rising from 0.585 to 0.826, with a growth rate of 41.1%; In the third stage, from 2019 to 2020, the development exponential growth rate of rural revitalization in Jiangsu Province is relatively obvious, exceeding the growth rate of neighboring years, and reaching 0.962 in 2020.

Overall, the urban-rural development level composed of the new urbanization and rural revitalization systems in Jiangsu Province has maintained a nearly uniform growth rate from 2011 to 2020. As a pioneer in the construction of beautiful countryside and urbanization, Jiangsu Province, with strong government policy support, has maintained an upward trend in both the development level index of rural revitalization and the urbanization development level index, indicating that urban-rural development has good prospects.

4.2 The Coupling Relationship Between New Urbanization and Rural Revitalization and Development

Calculate the urban-rural coupling coordination degree d_{is} separately through the formula coupling degree analysis model_Is and urban-rural coupling coordination level a_{is}. The results of the coupling degree and coordination degree of new urbanization in major cities in Jiangsu Province are shown in Table 2.

Based on Table 2, it can be seen that overall, the coupling degree between new urbanization and rural revitalization in major cities in Jiangsu Province is relatively

Table 2. Coordination of New Urbanization and Rural Revitalization in Major Cities of Jiangsu Province

City	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Nanjing	0.489	0.532	0.556	0.621	0.681	0.725	0.782	0.823	0.885	0.912
Suzhou	0.512	0.526	0.567	0.643	0.691	0.727	0.785	0.841	0.873	0.915
Wuxi	0.511	0.523	0.564	0.641	0.689	0.765	0.786	0.836	0.862	0.931
Changzhou	0.507	0.523	0.568	0.645	0.685	0.745	0.780	0.831	0.865	0.945
Yangzhou	0.493	0.531	0.569	0.645	0.684	0.743	0.784	0.835	0.881	0.951
Taizhou	0.498	0.518	0.574	0.664	0.684	0.746	0.794	0.841	0.884	0.931
Nantong	0.489	0.420	0.473	0.653	0.682	0.741	0.796	0.845	0.851	0.922
Zhenjiang	0.492	0.426	0.476	0.651	0.687	0.733	0.798	0.861	0.865	0.914
Xuzhou	0.479	0.431	0.432	0.651	0.685	0.741	0.798	0.798	0.773	0.833
Huai an	0.476	0.437	0.431	0.657	0.684	0.745	0.795	0.797	0.799	0.826
Yancheng	0.463	0.436	0.482	0.547	0.594	0.649	0.693	0.741	0.795	0.741
Lianyungang	0.414	0.441	0.473	0.536	0.573	0.576	0.592	0.643	0.697	0.714
Suqian	0.398	0.442	0.474	0.542	0.558	0.593	0.624	0.645	0.691	0.733

high. By 2020, all cities have reached the level of intermediate coordination or above, with high-quality coordination areas accounting for 61.5% of the entire Jiangsu Province. However, the coupling and coordination level of cities such as Suqian, Lianyungang, and Yancheng in northern Jiangsu is relatively low, and their urbanization development speed is higher than that of rural revitalization. Urban development is still the leading development, and the feedback effect of cities on rural areas is weak, leading to a lag in rural development level, which to some extent reduces the level of urban-rural coupling. Among the 13 prefecture level cities in Jiangsu Province, Yangzhou City achieved the highest level of coordinated growth in the coupling of emerging urbanization and rural revitalization from 2011 to 2020, with a growth rate of 93% and a strong development momentum. Among the three cities of Suqian, Lianyungang, and Yancheng, which are in an intermediate coordinated state of urban-rural development, Suqian has experienced rapid urban-rural development in the past decade, rising from the lowest level of 0.398 in the province in 2011 to 0.733 in 2020, with a growth rate of 84.2%. However, Yancheng still has a slow development level, with the lowest growth rate of only 60.1% among the 13 prefecture level cities.

The results of the overall coupling and coordination of new urbanization in Jiangsu Province are shown in Fig. 2.

As shown in the figure, from 2011 to 2020, the calculated values of the coupling coordination degree between new urbanization and rural revitalization in Jiangsu Province were all greater than 0.9, almost stable at around 1. This indicates that the new urbanization and rural revitalization in Jiangsu Province are in a high-quality coordination state, indicating that there is a strong mutual force in the development of various regions within
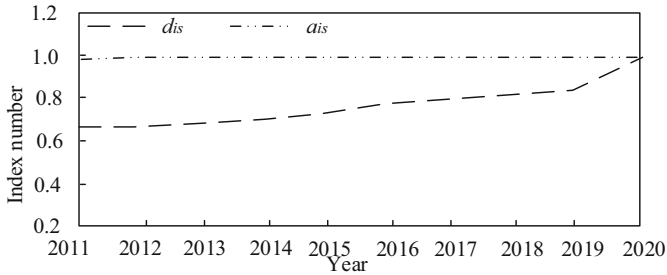
Fig. 2. Calculation Results of Coupling Degree and Coupling Coordination Degree

Jiangsu Province. As for the calculation results of the coupling coordination degree, it can also be clearly seen in the figure that it has gone through three stages, and the change form of the rural revitalization coordination development level index is relatively close, but it has also reached an intermediate coordination state. With the progress of the year, starting from 2019, the coupling coordination degree of urbanization and rural revitalization is in a high-quality coordination state, indicating that the urban-rural coordinated development situation in Jiangsu Province is constantly improving, And it has entered a new chapter in the coordinated development of new urbanization and rural revitalization in Jiangsu Province, moving towards a better direction.

5 Research Conclusion and Suggestions

Coupling evaluation is to find the influence relationship between different systems under the interaction of multiple systems. As two more complex systems in the economic field, rural revitalization and new urbanization development have a more complex coupling relationship between them. This article conducts a coupling analysis of the development of new urbanization and rural revitalization in Jiangsu Province through a coupling model. Relevant indicators in the two economic systems are calculated, and the research results show that the level of new urbanization and rural revitalization in various regions of Jiangsu Province, as well as the level of coupling development between the two, has shown an increasing trend year by year from 2011 to 2020. By 2020, Jiangsu as a whole has reached a high-quality coordinated state between urban and rural areas, However, some northern regions are still in a state of primary and intermediate coordination, and the level of rural revitalization cannot keep up with the development of new urbanization.

The integration of urban and rural areas is an important factor in promoting national economic development. Continuously narrowing the urban-rural gap is the main measure to build a socialist modern economy. In order to achieve the coupling and coordinated development of new urbanization and rural revitalization, based on the urban-rural development situation in Jiangsu Province, future macro development policies in Jiangsu Province should pay attention to the following aspects: (1) In response to the integrated development of new urbanization and rural revitalization in Jiangsu Province, We should strengthen the coordination of its development and provide more development policies to rural areas, such as providing them with corresponding and more favorable credit, to

assist in the development of the rural economy in the area. Cities should also strengthen their efforts to provide feedback and introduce a series of policies to encourage urban talents to provide feedback to rural areas and assist in rural modernization construction. (2) Pay attention to the integration and development of various aspects between urban and rural areas. The key to urban-rural integration development is the two-way flow and integration of social development factors between different regions of urban and rural areas. We should encourage and guide the flow of population, capital, and other factors between urban and rural areas, and balance the allocation of public services between urban and rural areas; At the same time, by expanding the multiple functions of rural industries, enhancing the characteristics and advantages of rural industries in urban-rural economic integration, and promoting the coordinated development of urban-rural regional economy, we aim to improve the level of urban-rural integration development from aspects such as industrial structure and ecological level. (3) Taking counties as the entry point for urban-rural integration development. The coordinated development of urban and rural areas involves various aspects of economy, society, politics, culture, and ecology. Industrial economy, public services, ecological protection, infrastructure, as well as urban and rural planning are all based on the county as the basic unit. Therefore, the bidirectional flow of factors between urban and rural areas, balanced allocation, spatial planning, and economic development should all be based on the county as the basic carrier and basic spatial unit.

References

1. Wu Fenghua, Han Wenlong. Urban Rural Relations in the Forty Years of Reform and Opening up: Historical Context, Stage Characteristics, and Future Prospects [J]. Academic Monthly, 2018, 50 (04): 58-68.
2. Zhang Yaguang. Research on Institutional Obstacles to the Development of Urban Rural Integration in the New Era [J]. Theoretical Monthly, 2021 (10): 78-87.
3. Xiao Li. Exploration of the Integration Path of "Industry Urban Rural" in Urban Suburban Towns Based on Land Elements [J]. Planner, 2021,37 (S1): 93-97.
4. Gong Qinlin, Zou Donghan. Research on the measurement and improvement of the coordination level of industrial and agricultural urban-rural coupling under the background of rural revitalization [J]. Soft science, 2020, 34 (06): 39–45.
5. Liu Xichao, Li Xiaoshun, and Wei Kang, et al. Research on Man-Earth Coupling Coordination and "Three Lives" Spatial Configuration: Taking Jiangsu Province as an Example [J]. Modern Urban Research, 2022 (10): 66-72.
6. Shu Taiyi, Zhang Ziwei, Zhao Tiantian, et al. Research on the space-time coupling coordination of green finance and rural revitalization [J]. Modern Management Science, 2022 (05): 3-13.
7. Dai Jun, Feng Nianhua, Wang Dawei. Research on the Coupling Relationship between Agricultural Modernization and Agricultural Green Development: Taking Jiangsu Province as an Example [J]. Journal of Jinling University of Science and Technology (Social Science Edition), 2022,36 (03): 1-8.
8. He Xiangmin, Zheng Changfu, Xiong Miao. A study on the coupling of rural revitalization and new urbanization and their impact on rural ecological environment: an empirical analysis based on 11 provinces and cities in the Yangtze River Economic Belt [J]. Journal of Henan University of Science and Technology, 2022, 42 (09): 29-37.

9. Dai Jun, Feng Nianhua, Wang Dawei. Research on the Coupling Relationship between Agricultural Modernization and Agricultural Green Development - Taking Jiangsu Province as an Example [J]. Journal of Jinling University of Science and Technology (Social Science Edition), 2022, 36 (03): 1-8. DOI: https://doi.org/10.16515/j.cnki.32-1745/c.2022.03.001.

10. He Yujing, Zhang Weiwei. Analysis of the Coupled and Coordinated Development and Influencing Factors of Basic Public Services and Rural Revitalization in Provincial Rural Areas of China: Based on the Perspective of Multidimensional Relative Poverty in Rural Areas [J]. Chongqing Social Sciences, 2022 (08): 48-68.

11. Zhang Liyuan, Yang Xiaoqi. Analysis of the correlation between the diffusion effect of urban economy and the level of rural revitalization and development in China [J]. Statistical Theory and Practice, 2022 (06): 36-42.

12. Zhang Fengyun, Chen Ming. Discussion on the Coupled and Coordinated Development of Rural Revitalization and New Urbanization [J]. Journal of Beijing Institute of Printing and Technology, 2022,30 (04): 70-73.