Evaluation and Improvement Path of the Economic Green Development of the Regions in Jiangsu Province

Shijie Zhu

HKU Business School, Hong Kong, China

hvchester@outlook.com

Abstract. Based on the requirements of green development, this paper takes the overall development of Jiangsu Province as the foundation and the green development of regional economy in the province as the core, searching for applicable methods for general evaluation of the level of the green development of regional economy in Jiangsu Province. In terms of specific means, by referring to relevant policies and theories, this paper selects the entropy evaluation method to construct two measurement indicators—comprehensive index of environmental pollution and green GDP index to generally evaluate the level of green development of Jiangsu Province and the selected regions in the province. Finally, this paper summarizes the improvement path of the economic green development of regions in Jiangsu Province and accordingly puts forward policy suggestions.

Keywords: Green development, Regional economy, Jiangsu Province, Entropy evaluation method

1 Introduction

Green development is an inevitable choice to solve the contradiction between economic growth and environmental pollution, and improving the efficiency of regional economic green development is an important way to achieve ecological civilization construction and economic transformation and development. It has become more important to focus on issues concerning green development in the current period of intensive economic recovery, which might contribute to the strengthening of environmental problems[8]. For policymakers, the development of a green economy presents opportunities and challenges not only for the central government, but also for provincial and city governments[10]. So, from a regional perspective, scientifically assessing the level of green development has practical meaning for promoting green development in the regions according to their local conditions.

This article hopes to evaluate the level of green development in different regions in Jiangsu Province based on the current situation in recent years, by calculating relevant green development indicators. Since a green economy depends on accessing funds and identifying institutions that will carry out and monitor the process of transition to a green economy status[9], this paper selects the entropy method as a suitable tool to

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carry out the evaluation based on sample data for various prefecture-level cities in the three major regions of Jiangsu Province to equivalently compare and analyze the level of economic development in different regions. The research considers the different levels and stages of regional economic development, which is conducive to analyzing the level of green development in Jiangsu Province from multiple perspectives and periods, clarifying the path of green development for Jiangsu Province as a whole and selected typical cities, identifying the advantages, disadvantages, and core similarities and differences of corresponding paths for different research objects in Jiangsu Province.

Overall, this article carries out a comprehensive evaluation and research on the improvement path of economic green development of the regions Jiangsu Province, and proposes corresponding suggestions, which are conducive to promoting the sustainable development of regional economies and promoting the construction of an ecological civilization.

2 Simple Measurement and Analysis of the Level of Economic Green Development in Jiangsu Province

2.1 Sample and Data Sources

The simple measurement and empirical analysis of the level of green development in the regional economy of Jiangsu Province was conducted using industrial wastewater discharge (in 100 million tons), industrial smoke (dust) emissions (in 10,000 tons), industrial sulfur dioxide emissions (in 10,000 tons), and regional gross domestic product (in 100 million yuan) data as samples for the 13 prefecture-level cities in Jiangsu Province (including the entire province), namely Nanjing, Wuxi, Changzhou, Suzhou, Zhenjiang, Nantong, Yangzhou, Taizhou, Xuzhou, Lianyungang, Huai'an, Yancheng, and Suqian.

The sample period for this phase is from 2010 to 2019. The indicator data used in the study are sourced from the China Statistical Yearbooks, Jiangsu Statistical Yearbooks, Nanjing Statistical Yearbooks, Wuxi Statistical Yearbooks, Changzhou Statistical Yearbooks, Suzhou Statistical Yearbooks, Zhenjiang Statistical Yearbooks, Nantong Statistical Yearbooks, Yangzhou Statistical Yearbooks, Taizhou Statistical Yearbooks, Xuzhou Statistical Yearbooks, Lianyungang Statistical Yearbooks, Huai'an Statistical Yearbooks, Yancheng Statistical Yearbooks, Suqian Statistical Yearbooks, and the statistical bulletins of the national economy and social development of each locality.

Regarding the processing method, based on relevant requirements of the government[5][6], this article selected the three indicators—industrial wastewater discharge, industrial smoke (dust) emissions, and industrial sulfur dioxide emissions in each region as the basis to determine the evaluation indicators and their calculation methods. Then, based on the three major regions of Jiangsu Province, an empirical analysis was conducted on the 13 prefecture-level cities' data respectively. By substituting the data into the selected method for calculation, the corresponding values of the evaluation indicators were obtained. The level of environmental pollution and green development in each region was measured and evaluated accordingly.

2.2 Evaluation Indicator Selection and Data Processing

Comprehensive Index of Environmental Pollution. The entropy evaluation method determines the index weight according to the variation degree of each index value, which is an objective weighting method that can avoid the deviation brought by human factors. Compared with most subjective valuation methods, the entropy evaluation method has higher accuracy and stronger objectivity in data processing, and the corresponding indicators obtained can better explain the results obtained[7]. The regions selected in this paper have differences in administrative levels and gaps in existing economic bases, so it is necessary to process the data for each research object with reasonable empowerment.

The analysis was based on the three indicators of industrial wastewater emissions, industrial smoke (dust) emissions, and industrial sulfur dioxide emissions from 2010 to 2019 of different research objects (Jiangsu Province as a whole, Nanjing, Wuxi, Changzhou, Suzhou, Zhenjiang, Nantong, Yangzhou, Taizhou, Xuzhou, Lianyungang, Huai 'an, Yancheng and Suqian) The data were processed by the entropy evaluation method to obtain the Comprehensive Indices of Environmental Pollution to evaluate the pollution level of the studied area in each period, and to provide process values for the subsequent calculation of output variables.

The first step was to de-dimensionalize each index. According to the original data, the given three indicators industrial wastewater emissions, industrial smoke (dust) emissions, and industrial sulfur dioxide emissions (the three indicators were denoted respectively as X1, X2, and X3, where Xi = {x1,x2,...x10}) are standardized (the value of each index after standardization is Y1, Y2, and Y3)(see Equation 1).

$$Y_{ij} = \frac{X_{ij} - \min(X_i)}{\max(X_i) - \min(X_i)} \tag{1}$$

The second step was to calculate the proportion of the three standardized indicators in each period from 2010 to 2019, that is, to calculate the variation of the corresponding indicators (see Equation 2).

$$p_{ij} = \frac{Y_{ij}}{\sum_{i=1}^{n} Y_{ij}} \tag{2}$$

The third step was to find the information entropy of each index. Information entropy is the expectation of the amount of information of an index, and determining information entropy is to evaluate the probability and uncertainty of the occurrence of the corresponding index value. Generally speaking, the information entropy of an index is negatively correlated with the variation degree of the index value, that is, it is negatively correlated with the amount of information it provides, and the amount of information

can reflect the role it can play in the comprehensive evaluation and its weight. According to the definition of information entropy, the following Equation 3 was used to determine the information entropy of the selected index:

$$E_j = -\ln(n)^{-1} \sum_{i=1}^{n} p_{ij} \ln p_{ij} \tag{3}$$

where $E_j \geq 0$. If $p_{ij} = 0$, $E_j = 0$. According to the calculation Equation 4 of index weight, the weight of each index was determined:

$$w_j = \frac{1 - E_j}{k - \sum E_j} \tag{4}$$

Finally, combined with the calculated weights of the three indicators and their original values in each period from 2010 to 2019, a comprehensive score reflecting the pollution level of the research object in the corresponding period was calculated, namely, the comprehensive index of environmental pollution (see Equation 5).

$$s_i = \sum_{j=1}^{m} w_j \cdot x_{ij} \tag{5}$$

Green GDP Index. In this study, the corresponding index of each research object has been processed by the entropy method, and the comprehensive index of environmental pollution of each object has been obtained to simply evaluate the pollution level of Jiangsu Province as a whole and each prefecture-level city in different periods. To a certain extent, in order to avoid the influence of factors such as the administrative level and economic foundation of the selected regions in the empirical analysis on the comparative analysis of the green development level, that is, to improve the comparability of relevant indicators among different regions, this paper further introduced the index green GDP index on the basis of the index data processed by the entropy method, thus making it more directly to evaluate the level and trend of green development in corresponding regions.

As for the definition of green GDP index and the calculation of its value, this paper selected the GDP of each research object from 2010 to 2019 and the corresponding comprehensive index of environmental pollution in each year as the numerator and denominator respectively for calculation, that is, the ratio of the two as the final value of the green GDP index (see Equation 6).

$$Green\ GDP\ Index = \frac{GDP\ (100\ \text{million yuan})}{Comprehensive\ Index\ of\ Environmental\ Pollution} \tag{6}$$

2.3 Analysis Results

Northern Jiangsu. The annual data values of the comprehensive index of environmental pollution and green GDP index calculated by entropy method from 2010 to 2019 in five cities (Xuzhou, Lianyungang, Huai'an, Yancheng, and Suqian) in northern Jiangsu were observed and compared so as to analyze the overall green development level and the increasing and decreasing trend in each city in the ten years (see Fig. 1 and Fig. 2).

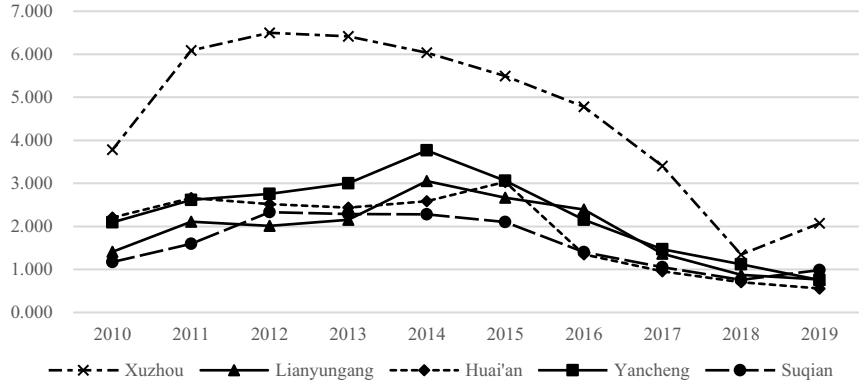

Fig. 1. Comprehensive index of environmental pollution of each city in northern Jiangsu from 2010 to 2019

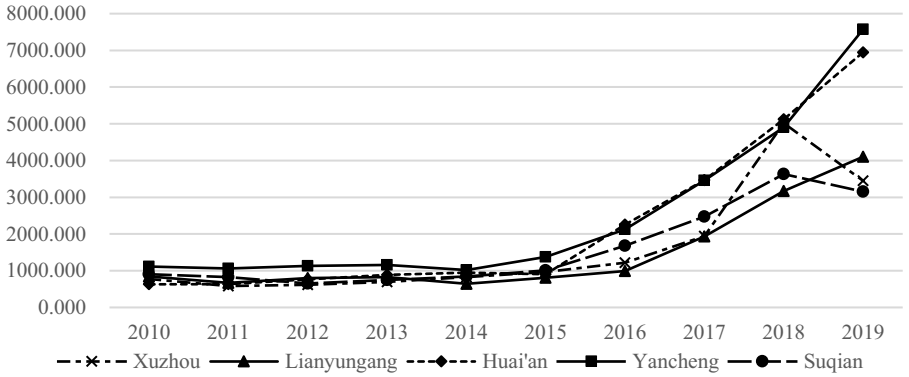

Fig. 2. Green GDP index of each city in northern Jiangsu from 2010 to 2019

According to the data performance of relevant indicators of each city, its economic green development level fluctuated greatly from 2010 to 2019. The comprehensive index of environmental pollution of the five cities showed a changing path of first rising and then falling. Among them, the comprehensive index of environmental pollution of Xuzhou was significantly higher than that in other areas, reaching the peak in 2012 and then accelerating the decline, and falling to the lowest value in 10 years in 2018 and

showing a certain recovery trend. The overall performance trajectory of the comprehensive index of environmental pollution of other regions from 2010 to 2019 was similar, reaching the peak in 2012 to 2015, and the performance of the indicators of all the cities gradually improved after 2015. In general, the five cities in northern Jiangsu were gradually developing in a direction conducive to the coordination of economy and environment.

By comparing the values of various data, it can be seen that the scale of cities in northern Jiangsu was smaller than that of selected areas in central and southern Jiangsu, and the comprehensive index of environmental pollution of all areas except Xuzhou was within the range of 0.5 to 4.0. As for the relatively large comprehensive index of environmental pollution of Xuzhou in the early stage, through the observation of the original data, we know that the industrial sulfur dioxide emissions in Xuzhou in the early and middle stages were relatively high, so it might be caused by its backward production mode compared with other cities in northern Jiangsu. Since 2011 in Xuzhou, and the other four cities since the middle term, the comprehensive index of environmental pollution has shown a downward trend, but Suqian and Xuzhou showed a certain degree of rebound in 2019. The changes in the comprehensive index of environmental pollution reflect the deterioration of environmental pollution levels in different degrees and durations encountered by cities in northern Jiangsu in the early stage—taking Xuzhou as an example, its pollutant emissions increased significantly. But all cities successfully contained the continuous rise of pollution levels in the middle and late stages. It shows the careful attitude and remarkable achievements of urban environmental governance in northern Jiangsu and reflects the strong control ability and policy implementation ability of each city for environmental problems. Comparing the data before and after the selected time span, the green development level of the five cities has made progress on the whole.

From 2010 to 2019, the green GDP index of all cities in northern Jiangsu increased significantly in general. The remaining cities have reached the highest value in 10 years and have a trend of continuous rise. In general, in recent years, the economic green development level of Yancheng has been in the leading position in northern Jiangsu and has a high speed of improvement. The overall change trend of the index in the prefecture-level cities in northern Jiangsu showed an improvement in the overall level of green development.

Combined with the two indicators—the comprehensive index of environmental pollution and the green GDP index, the comprehensive index of environmental pollution of Xuzhou was different from that of other cities, while the value and change trend of the green GDP index were similar to those of the other four cities. While achieving greater economic benefits, a correspondingly higher total amount of pollution was generated, but in general, there was little difference between its green development level and other regions. Generally speaking, the green development level of the cities in northern Jiangsu has been significantly improved around 2014. Further combining with the GDP data, we can see that in the middle of the selected time span, on the one hand, each city has achieved rapid economic growth, but on the other hand, the ecological environment of each city has been damaged to a certain extent. For example, the high increase in the GDP of Lianyungang from the end of 2010 to the end of 2011 was

accompanied by a high increase in the comprehensive index of environmental pollution. After the environmental pollution reached a relatively high value, all prefecture-level cities in northern Jiangsu were able to strive to coordinate economic growth and environmental protection, maintain economic growth, reduce the impact on the environment, and effectively alleviate the problem of environmental pollution. Finally, in terms of the changing trends of the green GDP index and the comprehensive index of environmental pollution of each city, the level of economic green development was improving, but there was still a large room for improvement.

Central Jiangsu. The annual data values of the comprehensive index of environmental pollution and green GDP index calculated by entropy method from 2010 to 2019 in three cities (Nantong, Yangzhou, and Taizhou) in northern Jiangsu were observed and compared so as to analyze the overall green development level and the increasing and decreasing trend in each city in the ten years (see Fig. 3 and Fig. 4).

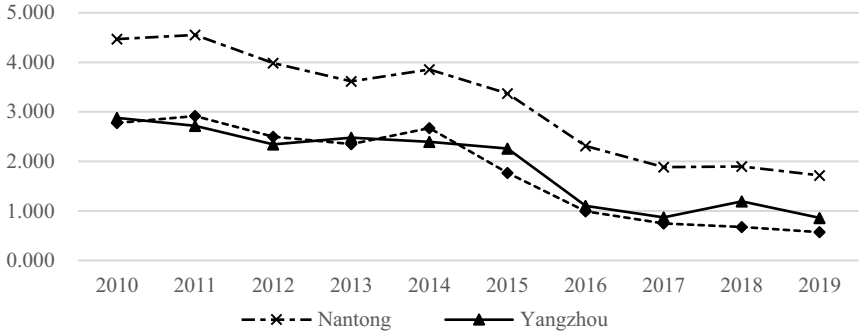

Fig. 3. Comprehensive index of environmental pollution of each city in central Jiangsu from 2010 to 2019

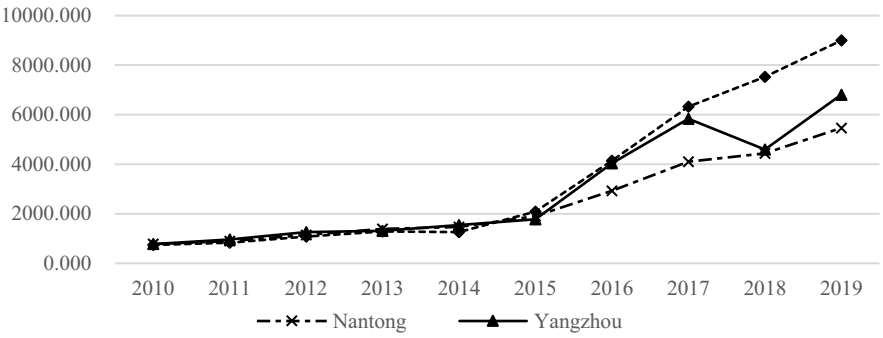

Fig. 4. Green GDP index of each city in central Jiangsu from 2010 to 2019

From the overall performance of relevant indicators, the economic green development level of the three cities steadily improved from 2010 to 2019, and the trend was positive.

By comparing the values of the comprehensive index of environmental pollution, it can be seen that the comprehensive index of environmental pollution of Yangzhou and

Taizhou was within the range of 0.5 to 3.0, while the annual data values of Nantong were higher than those of the two cities, with the minimum value of 1.717 and the maximum value of 4.552. Overall, the comprehensive index of environmental pollution of all cities in central Jiangsu showed a slow downward trend, occasionally accompanied by a short-term small recovery, such as Taizhou and Nantong from the end of 2013 to the end of 2014. Relatively speaking, the decline rate of the comprehensive index of environmental pollution of Nantong was relatively slow, but the comparison of the data at the end of the beginning of the decade showed that the comprehensive index of environmental pollution of Nantong, Yangzhou, and Taizhou decreased from 4.468 to 1.717, from 2.878 to 0.859, and from 2.774 to 0.571 respectively, with a decrease of more than 60%. Its environmental governance level has been effectively improved on the whole.

The green GDP index of Nantong and Taizhou has generally increased steadily, while the green GDP index of Yangzhou has recovered to a high value after a short-term decline at the end of 2018, and the city as a whole also showed an upward trend. From 2010 to 2014, the growth rate of the green GDP index of the three cities in Jiangsu and central China was relatively slow, and after 2015, the growth rate accelerated significantly. However, after 2018, the growth rate of this index in the three cities recovered and showed a rapid upward trend. In general, the green development level of Taizhou was in a leading position in central Jiangsu in recent years, while the green development level of Nantong was in a backward position with strong sustainability but relatively slow speed. The overall change trend of the index in the prefecture-level cities in central Jiangsu shows the improvement of the green development level in central Jiangsu.

Combined with the values of the comprehensive index of environmental pollution, GDP, and green GDP index of the three cities, Nantong's GDP was overall higher than that of other areas in central Jiangsu, and the city size is comparatively large. With the production of more pollution, it has gained higher economic benefits. Observing the original data, it can be found that the short-term decline of Yangzhou's green GDP index in 2018 was caused by the short-term increase in the emissions of various pollutants, and this process can also be reflected by the slight increase in the value of the comprehensive index of environmental pollution of the city in 2018. On the whole, during this period, the cities in central Jiangsu could effectively coordinate the contradiction between environmental problems and economic development.

Southern Jiangsu. The annual data values of the comprehensive index of environmental pollution and green GDP index calculated by the entropy method from 2010 to 2019 in five cities in northern Jiangsu were observed and compared so as to analyze the overall green development level and the increasing and decreasing trend in each city in the ten years (see Fig. 5 and Fig. 6).

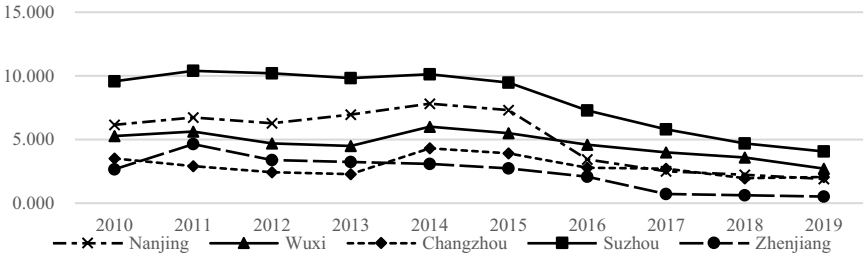

Fig. 5. Comprehensive index of environmental pollution of each city in southern Jiangsu from 2010 to 2019

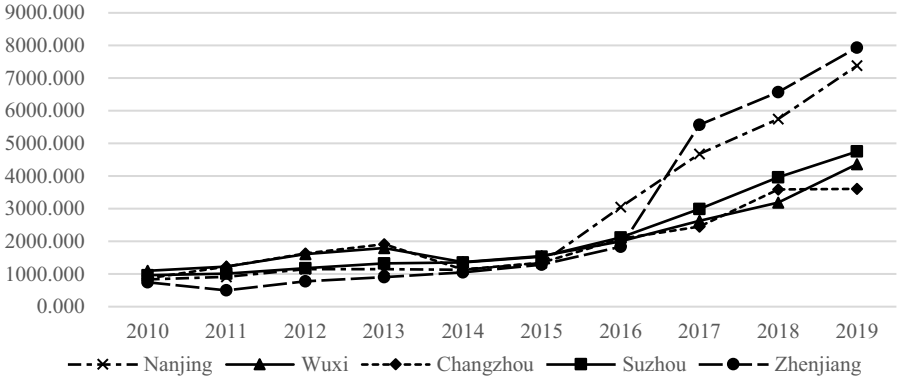

Fig. 6. Green GDP index of each city in southern Jiangsu from 2010 to 2019

According to the data performance of relevant indicators of the cities in southern Jiangsu, in general, from 2010 to 2019, the level of economic green development fluctuated greatly, and overall improvement was achieved, and the trend continued to improve in recent years.

Comparing the values of the comprehensive index of environmental pollution, it can be seen that the index value of the five cities in southern Jiangsu was in the range of 0.500 to 10.500, and the gap between cities was large. For example, the comprehensive index of environmental pollution in Suzhou was the lowest at 4.061, and the highest at 10.394. The index in southern Jiangsu has a larger numerical span and a higher upper limit than that in northern and central Jiangsu. The comprehensive index of environmental pollution of cities in southern Jiangsu fluctuated greatly from the end of 2010 to the end of 2014, and the trend of change in most cities was not obvious. By the end of 2014, the comprehensive index of environmental pollution of all cities in southern Jiangsu Province had achieved a significant decline. Based on the large data values of most cities in southern Jiangsu, the decline of the comprehensive index of environmental pollution in this region was comparatively slow.

The green GDP index of the five cities in southern Jiangsu has generally increased, with strong vitality. In 2014, the growth rate of this indicator accelerated significantly

and was at a relatively high level. The change of the index, its development, and trend show that the green development level of each city has been significantly improved during the selected period of study. The green GDP index of most cities in southern Jiangsu showed a relatively gentle change from 2010 to 2014, among which the values of Nanjing were relatively stable, those of Suzhou and Zhenjiang rose slowly, and those of Changzhou and Wuxi declined in 2014 after a relatively rapid increase from 2010 to 2013. After 2015, the green GDP index of cities in southern Jiangsu has shown an obvious trend of improvement, among which Zhenjiang has a relatively fast growth rate and a significant improvement in the level of economic green development. The improvement of this index in Nanjing was obvious and the trend was stable, which was also at a high level in southern Jiangsu. The overall change trend of the index in the prefecture-level cities in northern Jiangsu shows the improvement of the green development level in northern Jiangsu.

According to all types of indicators, including the comprehensive index of environmental pollution, GDP, and the green GDP index, Suzhou obviously has the largest economic volume and its comprehensive index of environmental pollution was relatively high, while Zhenjiang has a small economic volume, which could also be reflected by its low environmental pollution comprehensive index. As mentioned above, Nanjing and Zhenjiang had a relatively high level of economic green development during the period. In terms of the changing trend of various indicators at the end of 2019, the green development levels of Nanjing, Wuxi, Suzhou, and Zhenjiang all have a trend of continuous and rapid improvement, while Changzhou needed to analyze and solve problems as soon as possible to restore the growth momentum of economic green development level as soon as possible.

Comparative analysis of the three regions. The comprehensive index of environmental pollution and the green GDP index of the three regions from 2010 to 2019 calculated according to the entropy method can be observed above, and the levels of green development in the three regions during the ten years were further analyzed by comparing the regional indicators (see Fig. 7 and Fig. 8).

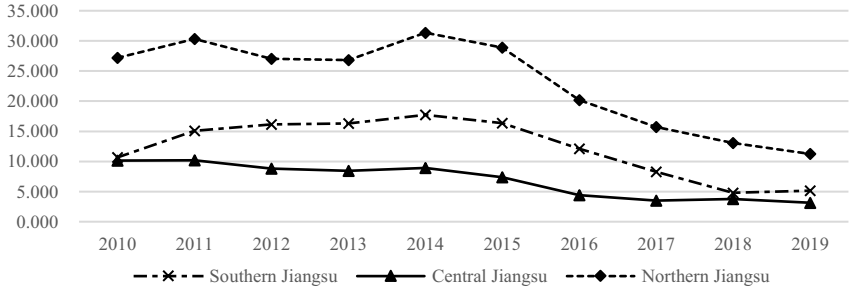

Fig. 7. Comprehensive index of environmental pollution of the three regions in Jiangsu and Jiangsu Province as a whole from 2010 to 2019

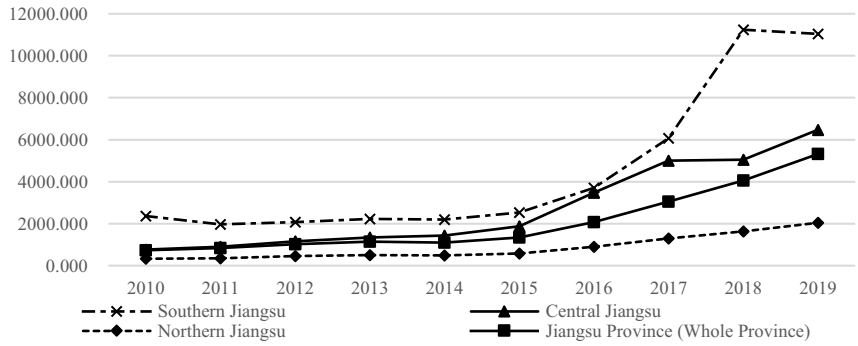

Fig. 8. Green GDP index of the three regions in Jiangsu and Jiangsu Province as a whole from 2010 to 2019

The data show that the values of the comprehensive index of environmental pollution of the three regions all declined before and after the selected ten years, and the downward trend was especially obvious after 2014. Among them, the change of the index in the central region of Jiangsu was slow, and the overall decline was steady. In terms of the objective value of the comprehensive index of environmental pollution, due to the regional differences in economic volume caused by the number of cities, industrial structure, and other factors, there was a large gap in the index value of the three regions. In terms of the speed of change of this index in recent years, the decline rate in northern Jiangsu was relatively the fastest. From the perspective of the changing trend in the later period of the selected period, the changing pattern of the index of northern and central Jiangsu had a continuous downward trend, while the downward trend of southern Jiangsu had a recession in 2019. In general, there were obvious differences in the level and ability of environmental governance in the three regions. Among them, the pollution level and control ability of southern Jiangsu were always comparatively better, while the total pollution of central Jiangsu was low and the pollution control situation was stable and improving. Central Jiangsu could steadily promote the continuous progress of green development and coordinate the contradiction between ecological protection and economic development continuously and effectively. Compared with central and southern Jiangsu, the environmental pollution level in northern Jiangsu had some obvious short-term recovery before and during the middle period of the research. However, according to the change in the value of the comprehensive index of environmental pollution in recent years, the overall ability of northern Jiangsu to control pollution was strong, and the pollution level could be greatly reduced in a short period of time. To a certain extent, it shows the relatively strong action and execution power in the process of economic green development. Although there might be a bad situation of sacrificing "ecology" for "economy" in northern Jiangsu in a short period of time, the region effectively recognized the related problems of environmental pollution in the later period, timely restrained the development of related indicators in the adverse direction, and gradually turned the pollution level to a state of continuous and high-speed reduction.

According to the green GDP index data, the economic green development level of all regions in Jiangsu Province has been significantly improved in the past 14 years, and remarkable achievements have been made. Among them, the value of the green GDP index of central and southern Jiangsu was higher than the overall level of the whole province, while that of northern Jiangsu was relatively low. Before 2015, the changes in the green GDP index in all regions were relatively moderate, and after 2015, they all showed a relatively obvious upward trend. The value of the green GDP index of southern Jiangsu leads and rises rapidly, but at the end of 2018, the increasing trend of the index disappeared and there was a small decline.

By combining the regional GDP and other relevant data, the relationship between pollution and economic development in each region could be further analyzed. After comparing and analyzing the data, it is safe to conclude that the industrial structure of southern Jiangsu could be regarded as the standard example in the field of regional economic green development in Jiangsu Province, which has good reference value, that is, it effectively abated environmental pollution while achieving high-level economic development. The pollution level of central Jiangsu was well controlled, the pollution control situation was relatively stable, the level of coordinating ecological construction and economic construction was relatively high, and the industrial structure was reasonable, which could effectively promote economic growth. The values of pollution-related indicators of northern Jiangsu were generally higher than those of other areas and the situation was comparatively unsatisfactory—the green GDP index was lower than the average level of the whole province and the economic aggregate was relatively low. It showed that industrial production activities with high pollution levels contribute relatively more to its economy, that is, the more traditional industrial structure has led to relatively low green development efficiency in the region. While promoting economic development, there was still a large space for improvement of industrial structure in northern Jiangsu. It was basically good in coordinating economic growth and green ecology during the ten years and was in a similar situation now, where more progress is required.

3 Conclusions

The pollution level in central Jiangsu was relatively low. Generally speaking, the control path of its environmental pollution level was stable, and the governance capacity was sustainable and effective. The changes in the pollution indicators of prefecture-level cities in southern Jiangsu and central Jiangsu were mainly manifested in the decrease of fluctuations, and due to the influence of city size, the changes in southern Jiangsu were slower than those in central Jiangsu. The overall indicators of the Central Jiangsu region were stable in the early stage, and their performance was average, slightly higher than the average level of the province. In the middle and later stages, the indicator level maintained a slow rise after a short-term stagnation, reflecting the stable economic green development level and ability of the Central Jiangsu region. Cities at

all levels in central Jiangsu were showing an obvious positive trend. Among them, although Yangzhou experienced a short-term decline in indicators in 2018, it quickly rebounded to a relatively high level in 2019.

Due to the large size of most prefecture-level cities in southern Jiangsu, the pollution base was relatively large. But the values of the pollution level in this region were able to change obviously in a short period of time, with strong pollution control ability. At the same time, the overall comprehensive index of environmental pollution in this area was not high, reflecting its relatively high-quality industrial structure. The southern Jiangsu region has a good economic foundation, and a high level of economic development, and the region's overall green GDP index had a leading value. The growth trend was obvious before 2019, and there was a slight recession in 2019, which reflects the region's strong economic green development ability and also reflects that in recent years, the southern Jiangsu region has generally encountered some obstacles in the continuous improvement of economic green development capabilities. The changes in the corresponding indicators of the prefecture-level cities in southern Jiangsu were more unstable, which may be affected by the relatively higher GDP and large changing range in the corresponding regions.

The gaps in pollution level indicators among the cities in northern Jiangsu were relatively obvious. Although the pollution bases of most smaller cities were correspondingly small, the values of the comprehensive index of environmental pollution index were relatively high, revealing its relatively lagging economic level and green development level. However, the region has effectively suppressed the unfavorable development trend of pollution control in the later stage, and the overall situation has turned into a state of continuous decline. The corresponding indicators of the prefecture-level cities in northern Jiangsu showed a rise first and then a decline, which may be caused by the upgrading, adjustment, and transformation of traditional industries in the corresponding areas. On the whole, the preliminary indicators in northern Jiangsu were slightly lower than the average level of the province, and the numerical growth rate was relatively slow, reflecting the large room for improvement in the level and capacity of economic green development in this region. The economic green development level of most prefecture-level cities in northern Jiangsu has maintained an upward trend, that is, the green GDP index of most cities has maintained good growth, but Xuzhou and Suqian have experienced significant declines in 2019. This phenomenon may be caused by economic development and industrial structure problems. Further combined with the analysis of the economic volume and city scale of the two cities, this study believes that the reason for the former city's problem was more inclined to be the increase of pollution under large-scale production, while the reason behind the latter city’s problem was more inclined to be the relatively traditional and lagging modes of production and economic development models.

4 Suggestions

The government can solve these problems which restrict the high-quality and green development of the regional economy through policy improvement, system reform, scientific and technological innovation, and administrative optimization[3]. Considering regional green development, that is, there are differences among areas in development levels and improving paths, it is necessary to grasp the theoretical connotation of green development in the context of China's real national conditions, and to closely combine the regional natural resource endowment and industrial structure characteristics to further promote regional green development. Governments in different regions need to closely integrate the regional natural resource endowment and industrial structure characteristics, and clarify the main direction of economic and social green transformation and policy focus[2]. As the mutual influence between regions is deepening, the design of industrial development strategies should not be limited to their own needs but should strengthen the strategic thinking of regional integration, and coordinate the design of urban agglomeration development plans to avoid duplicated layouts[4]. The government should strengthen the green development synergy between regions in Jiangsu Province, and try to reduce the differences in pollution control capabilities while balancing the economic development levels of the three major regions. The regions should coordinate the allocation of manpower, resources, and capital among regions, and based on different stages of economic development and levels of green development, actively share development cases and provide path references to each other[1], so that the pioneers try their best to find a feasible way out for development, and the latecomers quickly follow up the development progress.

Specifically speaking, areas with relatively backward economic development stage and industrial structure in Jiangsu Province, such as some cities in northern Jiangsu, should pay attention to ecological construction and environmental protection while using relatively traditional methods to achieve industrial development and economic growth during the period of industrial growth, and at the same time, learn from the development experience of advanced areas. In the cities and regions with stable economic development and middle-level indicator values, based on their existing good foundation in related fields, the level of economic green development should be steadily improved, and the contradiction between environmental problems and economic development should be continuously and effectively coordinated. The Areas in Jiangsu Province that are at the forefront of economic development, such as some cities in southern Jiangsu and central Jiangsu, should efficiently make use of their better economic foundation and corresponding mobility, conduct rigorous but bold explorations on the feasible paths of coordinating green development and economic growth, strengthen the research and analysis of relevant theories and methods at home and abroad in this field, and reduce or avoid decision-making mistakes while maintaining the stability and progress of the large-scale economy, realize the innovation of the path to improve the level of green development.

REFERENCES

1. Juntao Zhang, Yue Zhu, Bin You. Research on the Influence of Industrial Collaborative Agglomeration on the Green Development of Urban Economy [J]. Urban Problems, 2021, (02): 66-74+94.
2. Yuansheng Li, Jing You. The Main Direction and Policy Focus of Regional Economic Green Development—Taking Fujian as an Example [J]. Fujian Tribune (Humanities and Social Sciences Edition), 2022, (05): 66-75.
3. Zhenyu Ye, Fengbo Li, Ning Wang. Stage Achievements and Problem Solution of High Quality Development of Regional Economy in China [J]. Regional Economic Review, 2022, (01): 52-58.
4. Lili Wei, Yuqi Hou. Research on the Effect of Specialized and Diversified Industrial Agglomeration on Regional Green Development [J]. Management Review, 2021, 33(10): 22-33.
5. People's Government of Jiangsu Province. Provincial Government's Opinions on Promoting Green Industry Development [EB/OL]. http: //www. jiangsu. gov.cn/ art/ 2020/ 4/1 /art _46143_9029775.html, October 2022 March 31st.
6. People's Government of Jiangsu Province. Provincial Government's Implementation Opinions on Accelerating the Establishment and Improvement of a Green, Low-Carbon and Circular Economic System [EB/OL]. http:// www. jiangsu. gov. cn/art/ 2022/1/25/ art_ 46143_10331301.html, October 31, 2022.
7. Min Wang, Xianli Zhao, Qunxi Gong, Zhigeng Ji. Measurement of Regional Green Economy Sustainable Development Ability Based on Entropy Weight-Topsis-Coupling Coordination Degree-A Case Study in Shandong Province, China [J]. Sustainability, 2019, 11(1): 280.
8. Volodymyr, H., Mariia, B., Valerij, S., Uliana, M.,Volodymyr, D. Economic and Legal Measures for Ensuring the Economy Greening in Post-pandemic Period [J]. Amazonia Investiga, 2021, 10(44): 252-260.
9. Batrancea, L., Pop, MC., Rathnaswamy, MM., Batrancea, I., Rus, MI. An Empirical Investigation on the Transition Process toward a Green Economy [J]. Sustainability, 2021, 13(23): 13151.
10. Hongtao Yi, Yuan Liu. Green Economy in China: Regional Variations and Policy Drivers [J]. Global Environmental Change, 2015, (31): 11-19.