RESEARCH ON THE FACTORS INFLUENCING THE DEVELOPMENT OF GREEN FINANCE IN BEIJING, TIANJIN AND HEBEI UNDER THE PERSPECTIVE OF ECOLOGICAL ENVIRONMENTAL PROTECTION

Xiao Liu*

Department of Nursing, Nanyang Medical College, Nanyang, Henan, 473000, China.

liumingdalx@163.com

Reception: 14/02/2023 **Acceptance**: 11/04/2023 **Publication**:28/06/2023

Suggested citation:

Liu, X. (2023). **Research on the factors influencing the development of green finance in Beijing, Tianjin and Hebei under the perspective of ecological environmental protection**. *3C Empresa. Investigación y pensamiento crítico, 12(2)*, 109-123.

https://doi.org/10.17993/3cemp.2023.120252.109-123

ABSTRACT

In today's world, the contradiction between people and the ecological environment is becoming more and more acute. Green finance is an effective method to resolve the contradiction between economic growth and ecological environment pollution, which has been widely recognized by all countries. This paper analyzes the level of green financial development in the Beijing-Tianjin-Hebei region through an analytical model of green financial development influencing factors constructed by simulation, combined with ecological environmental protection, and identifies the main influencing factors affecting the level of green financial development in this region. In addition, the realization path proposed in this paper from the perspective of government-led green financial development is, firstly, to improve green finance-related standards, assessment system and green financial legal system. The second is to implement green financial regulation and improve the driving force of green policy and market integration. The research results show that the comprehensive measurement score of green finance development level in Beijing, Tianjin and Hebei region shows a steady increase between 2016 and 2020, among which the comprehensive measurement score of green finance development level in Beijing is as high as 72.13 in 2020, an increase of 17.32%. It provides theoretical guidance for the improvement of green financial public policies in Beijing, Tianjin and Hebei regions.

KEYWORDS

Ecological civilization; environmental protection; Beijing-Tianjin-Hebei; green finance; public policy.

INDEX

https://doi.org/10.17993/3cemp.2023.120252.109-123

1. INTRODUCTION

In the process of survival and development, human beings excessively pursue rapid economic development, overuse and deplete resources, resulting in the destruction of the living environment [1-3]. The damaged environment in turn restricts human survival and development, and ecological and environmental problems have become a major world problem. From the perspective of the requirements of the times, the report of the 19th Party Congress clearly states that we should adhere to the harmonious coexistence between human beings and nature and treat the ecological environment as life [4-6]. The deterioration of the ecological environment has posed a serious obstacle to China's high-quality development and reduced the happiness index of residents [7-11]. In this context, in recent years, countries around the world have been vigorously developing green finance and industrial transformation to reduce carbon emissions and promote the sustainable development of economic life and the ecological environment [12-15].

In recent years, the emergence of environmental pollution phenomena represented by haze and dust storms has aroused great concern in society, signaling that the previous sloppy growth model is no longer sustainable. Ecological and environmental issues are closely related to the health of the people and must be reversed with great effort. Chen et al [19] analyzed the evolution of population, economy and groundwater exploitation based on the changes in the groundwater flow field in the Luan River delta, the heart of the Bohai economic zone. They also summarized the previous studies and analyzed the groundwater flow states in different aquifers of the delta. The results showed that the groundwater level in the delta region declined gradually, and the over-exploitation of groundwater exacerbated ecological problems such as water quality deterioration and shrinking biological habitats. Ma et al [20] considered lakes and vegetation as sensitive indicators of climate change and human activities, as well as an essential part of water ecology. Therefore, they combined lake area, vegetation cover changes, and terrestrial water storage to form a comprehensive evaluation index of ecological and environmental problems in the Nengjiang River basin. They found that human activities were the main factor causing ecological problems in lakes during 2000-2019, and during these years, frequent human activities led to a decrease in river recharge and a gradual shrinkage of the lake area. Han et al [21] applied artificial intelligence to ecological environmental protection problems and used deep learning models to identify invasive alien species as a way to target alien species prevention and control. They built and trained a Bi-LSTM model and a neural network model to identify the relevant images based on the data of reports about the invasion of Asian hornets in the United States. The results show that this model can effectively identify and prevent new species and avoid the malicious destruction of the original ecology, to achieve the purpose of protecting ecological diversity. Cheng et al [22] combined the ecological environment with the tea industry and tourism to analyze the related industries in Fujian Province. They constructed a coupled coordination model by establishing a comprehensive evaluation index system related to the three. The results showed that the comprehensive development index of Fujian Province

https://doi.org/10.17993/3cemp.2023.120252.109-123

has been steadily increasing in recent years, and the degree of coupling and coordination of the three systems is changing to high-quality coordination. Jiang et al [23] concluded that the current Yellow River basin, as an open ecosystem, has a very fragile ecological environment and is very vulnerable to natural and human activities. They designed an ecological environment evolution simulation system using big data and information technology for the changing ecological environment of the Yellow River basin. This system integrates various data such as historical data, spatial geographic information as well as monitoring data to realize the functions of multi-source information synthesis, environmental monitoring and evolution simulation, and provides some emergency management measures for some critical situations. Dong et al [24] used remote sensing technology and a projection tracking model to detect and analyze the urban ecological environment of Shanghai. The results showed that the eco-environmental quality of all regions in Shanghai had improved. They found that the ecological environment of each region affects each other, so the management of the ecological environment should take into account the impact of surrounding areas.

To sum up, vigorously developing green finance is of great significance to China's realization of a green, healthy and sustainable development path. This paper studies the current situation of green finance development in the Beijing Tianjin Hebei region and analyzes the main factors affecting its development. According to the statistical data in recent years, the government expenditure in the field of green environmental protection in the three places in recent years is analyzed, which provides theoretical support for promoting the development of China's economy and ecological environment.

2. GREEN FINANCIAL DEVELOPMENT SYSTEM AND MEASUREMENT

Because green finance essentially combines the greening of energy and the environment and takes into account the protection of the environment while maintaining economic development, green finance is growing with the development of world industrialization. From the existing literature, green finance is also known as sustainable development finance. The development of green finance takes into account the development of the economy and natural environment and emphasizes that human development should follow the laws of nature and live in harmony with nature.

2.1. GREEN FINANCE DEVELOPMENT EVALUATION INDEX SYSTEM CONSTRUCTION

So far, there is no unified standard in academia to define and measure green finance. According to previous literature research, the empirical analysis of green finance is mostly measured by a single index such as green credit. Unable to adapt to

https://doi.org/10.17993/3cemp.2023.120252.109-123

today's rapid economic environment, it is necessary to propose a new evaluation index system.

2.1.1. SYSTEMATIC AND HIERARCHICAL PRINCIPLES

The construction of the indicator system needs to have sufficient coverage to determine that the constructed system is a systematic whole and can reflect the level of green finance development comprehensively, to determine that the selected indicators can fully reflect their main characteristics from different perspectives, and at the same time, the selected indicators should be representative and hierarchical and should be independent of each other and not contain each other as substitutes.

2.1.2. PRINCIPLE OF SCIENTIFICITY AND FEASIBILITY

Science is the basis in the construction of the indicator system, which should follow scientific theory, and each indicator should be consistent with the definition of green finance and show its characteristics and attributes scientifically. At the same time, the selected indicators should also be feasible, with quantifiable indicators and accessible data to guarantee accurate and reliable data and to ensure that the caliber, scope and calculation methods of each indicator data are consistent among different regions and within different periods.

2.1.3. PRINCIPLES OF RELEVANCE AND RELIABILITY

The selected indicators should satisfy the unity of relevance and reliability. Indicators that are irrelevant or unreliable to green finance cannot be selected. Irrelevant indicators are difficult to evaluate green finance, and unreliable indicators may lead to errors, so they are also not selected. It is necessary to have a standardized operation and sufficient realistic data information as support to get reliable indicators.

Based on the above principles, referring to the indicators constructed by the previous green finance level measurement research, combined with the current situation of green finance development. This paper constructs the index system shown in Table 1 from the following four aspects.

https://doi.org/10.17993/3cemp.2023.120252.109-123

Table 1. Evaluation indicators

Tier 1 Indicators	Secondary indicators	Tertiary indicators	Measurement Method
Green Finance Development Level	Green Credit	Percentage of loans to energy-intensive industries	Percentage of loans to energy-intensive industries / Interest expenses of industrial industries
	Green Securities	Percentage of market capitalization of environmental companies	Total output value of environmental protection enterprises / Total A-share market capitalization
	Green Investment	Percentage of Green Spending	Fiscal expenditure on energy conservation and environmental protection / Fiscal expenditure
	Green Insurance	Environmental liability insurance amount ratio	Amount of agricultural insurance / total insurance

1. Green Credit

Green credit is an important part of China's green finance policy. The academic circles often use the following four evaluation methods: (1) the green credit of 21 banks published by the CBRC; (2) China environmental statistics yearbook data (3) China environmental statistics yearbook data; (3) The interest expense ratio of high energy consuming industries used in Li and Xia Guang's report; (4) Loans from regional listed energy conservation and environmental protection enterprises to banks. Based on the feasibility and comparability of the data, and considering that green credit can not only support the development of green development in the positive direction but also inhibit the development of high consumption and high pollution industries in the negative direction, this paper mainly uses the fourth and fifth methods to measure green credit from the negative and positive directions respectively. Therefore, this paper measures green credit from the reverse and positive perspectives of the fourth and fifth methods respectively. The empirical data are from the Guotai'an database and China Financial Yearbook.

2. Green Securities

The green securities market can help enterprises finance green projects by issuing bonds or stocks. Given the late start of green bonds in China and the lack of audit data, and referring to the research results of several scholars, this paper chooses green stocks as the research object

3. Green Insurance

Green insurance helps to strengthen the supervision of environmental protection and clarify the responsibilities of relevant subjects. Environmental protection insurance can be expressed by environmental liability insurance. Environmental liability insurance can refer to green insurance, but considering that on the one hand,

https://doi.org/10.17993/3cemp.2023.120252.109-123

China did implement environmental pollution liability insurance at the end of 2013, which started late and lacked mandatory, on the other hand, agriculture is fragile and affected by the natural environment, agricultural insurance is most relevant to the natural environment, and has a certain public attribute. Therefore, this paper chooses agricultural insurance scale and loss rate as its proxy variables.

4. Green Investment

Green investment is an investment based on sustainable development, which can improve the financing ability of green projects and control pollution. The green investment provides comprehensive guidance and control for environmental protection. It can reflect the financing level of green industries through other ways than credit, securities and insurance, and reflect the government's support for environmental protection enterprises, which is in line with the actual situation of green investment in China. The data on green investment comes from the China Environmental Statistics Yearbook.

2.2. GREEN FINANCIAL DEVELOPMENT INDEX MEASUREMENT

In this paper, the green financial development index is measured by the entropy value method. The entropy weight method can deeply reflect the distinguishing ability of indicators and determine better weights. Empowerment is more objective, with a theoretical basis and higher credibility. In addition, the algorithm is simple and practical and does not need other software analysis. It can effectively avoid the deviation caused by subjective factors in the process of determining the weight coefficient, and eliminate the negative impact of excessive reliance on subjective feelings on the evaluation results.

The formula for calculating the weight of the indicator is as in equation (1) and equation (2).

$$P_{ij}^{t} = \frac{Y_{ij}^{t}}{\sum_{i=1}^{m} Y_{ij}} \tag{1}$$

$$\lim_{P_{ij}^{t} \to 0} P_{ij}^{t} \times \ln\left(P_{ij}^{t}\right) = 0, P_{ij}^{t} = 0 \tag{2}$$

Where, Y^t denotes the weight of the ith sample under the j indicator in year t for that indicator, and is the data after the extreme difference standardization process. P_{ij}^{t} is the indicator value after the original data is standardized by the extreme difference method.

The function to calculate the information entropy of the indicator is shown in Equation (3):

https://doi.org/10.17993/3cemp.2023.120252.109-123

$$E_j^t = -\frac{1}{\ln(m)} \sum_{i=1}^{m} \left[P_{ij}^t \times \ln\left(P_{ij}^t\right) \right] \quad (3)$$

Where, E_j^t denotes the information entropy of the j indicator in year t. Calculate the information entropy of the index, and determine the weight according to its calculated value. The greater the uncertainty of the index value, the greater the entropy, and the smaller the index weight, and vice versa, the greater the indicator weight. Calculate the indicator weights as in equation (4).

$$W_j^t = \frac{\left(1 - E_j^t\right)}{\sum_{j=1}^{n} \left(1 - E_j^t\right)} \quad (4)$$

Where, W_j^t indicates the weight of the j indicator in the comprehensive evaluation, and the larger the weight, the greater the contribution to the result.

Therefore, the green financial development index measurement calculates the comprehensive evaluation value as shown in equation (5):

$$U_i^t = \sum_{j=1}^{n} \left(W_j^t - Y_{ij}^t \right) \quad (5)$$

Where, U_i^t denotes the composite evaluation value of the i study the subject in year t.

This section composes in detail the theoretical framework for the analysis of the structure, objectives, and factors influencing the realization mechanism of green finance in Beijing, Tianjin, and Hebei Province, and the mechanism path of green finance affecting economic development is combined with the logical relationship between the two to reason out the role mechanism of green finance affecting the ecological economy of Beijing, Tianjin, and Hebei Province for role analysis. The theoretical basis is provided for the subsequent analysis.

3. ANALYSIS AND DISCUSSION

Green finance pays attention to environmental protection while developing the economy, which provides important support for promoting the construction of ecological civilization and winning the pollution war. This paper makes statistics on the data of green credit, green investment and green securities in Beijing Tianjin Hebei region in 2017. Then, it makes a statistical analysis of the pollution control and environmental protection expenditure in the Beijing Tianjin Hebei region from 2016 to 2020.

https://doi.org/10.17993/3cemp.2023.120252.109-123

3.1. GREEN FINANCE DEVELOPMENT FRAMEWORK

Green finance is a comprehensive concept, which contains multiple dimensions. To make an objective and reasonable measurement of green finance, a comprehensive index system should be established to contain information from multiple aspects. Specifically, by judging and analyzing the current financial development, multiple dimensions are established, such as green securities, green insurance, etc., and then appropriate indicators are selected to measure the development of each dimension to build a reasonable indicator system and calculate a comprehensive green finance score. At present, the academic community has not yet unified the construction of a green finance index system, and there are differences in the selection of indicators. However, most Chinese scholars use five key indicators such as green credit to evaluate. Through the statistical analysis of the existing published data, the development status of green credit, green investment and green securities in Beijing Tianjin Hebei region in 2017 is obtained. Specific information is as follows.

1. Green Credit

As of the end of June 2017, the balance of loans in the green credit sector of major Chinese banks in Beijing was RMB901.768 billion, an increase of 8.6% year-on-year, of which RMB 756.080 billion was for energy conservation and environmental protection, an increase of 9.0% year-on-year. At the end of 2016, green credit in the banking sector in Tianjin accounted for 9% of all loans in the city. 144,000 green credits were issued in the banking sector in Hebei Province in the first quarter of 2017, amounting to RMB 221.399 billion.

2. Green Securities

By the end of July 2017, Beijing enterprises, including state-owned enterprises, had issued 45 green bonds. In February, China Development Bank successfully issued 5 billion yuan of green financial bonds in the bond market, including three categories and nine projects of energy conservation, clean transportation and clean energy.

3. Green Investment

In terms of green funds, the scale of several green industry funds in the Beijing-Tianjin-Hebei region has reached the order of 100 billion. By the spirit of the State Council's approval and under the strong promotion of the Department of Industrial Coordination of the National Development and Reform Commission, the Beijing-Tianjin-Hebei Industrial Co-development Investment Fund was established in December 2016. Up to now, Beijing has set up several sub-funds of government investment guiding funds.

https://doi.org/10.17993/3cemp.2023.120252.109-123

3.2. GOVERNMENT INVESTMENT ANALYSIS

The statistical results of environmental protection expenditure in Beijing, Tianjin and Hebei Province from 2016 to 2020 are shown in Figure 1. It can be found that the proportion of environmental protection expenditure in Beijing is getting higher and higher from 2016 to 2020. From 3.25% in 2016 to 6.83%, an increase of more than 100%, indicating that the Beijing government is paying more and more attention to environmental protection. In contrast, from 2016 to 1019, the proportion of environmental protection expenditure in Tianjin remained at about 2%, but by 2020, this proportion increased to 3.23%, indicating that the Tianjin municipal government did not pay enough attention to environmental protection until 2020. On the other hand, Hebei Province pays more attention to energy conservation and environmental protection, which reached 4.28% in 2016 and increased to 6.49% by 2020. This is because the pollution situation in Hebei was relatively serious at that time. The local government attached great importance to environmental protection and took many measures to reduce the emission of pollutants.

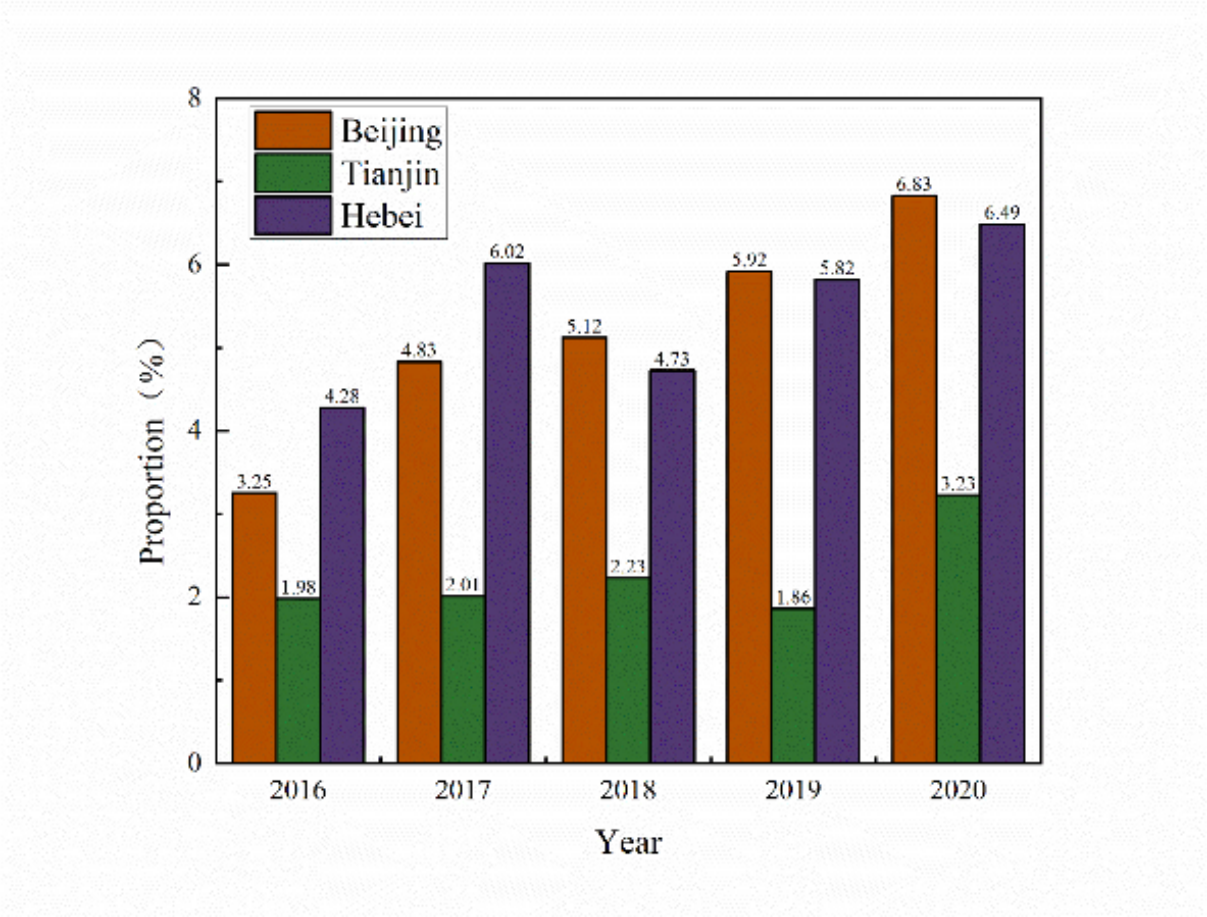

Figure 1. Proportion of fiscal expenditure on energy conservation and environmental protection in the Beijing-Tianjin-Hebei region to total fiscal expenditure, 2016-2020

Figure 2 shows the proportion of investment in environmental pollution control in Beijing, Tianjin and Hebei Province from 2016 to 2020. As can be seen from Figure 2, Tianjin's regional investment in environmental pollution control continues to take the

https://doi.org/10.17993/3cemp.2023.120252.109-123

lead, reaching a maximum of 10.12% in 2018, only 11.2% lower than that of Hebei Province in 2020. The proportion of investment in environmental pollution control in Hebei Province has increased steadily year by year, from 5.68% in 2016 to 11.2% in 2020, with a relative increase of 97.18%. In contrast, from 2016 to 2020, Beijing's investment in environmental pollution control accounted for a relatively low proportion, only about 2%. This is because Beijing's regional GDP base is larger than that of Tianjin and Hebei.

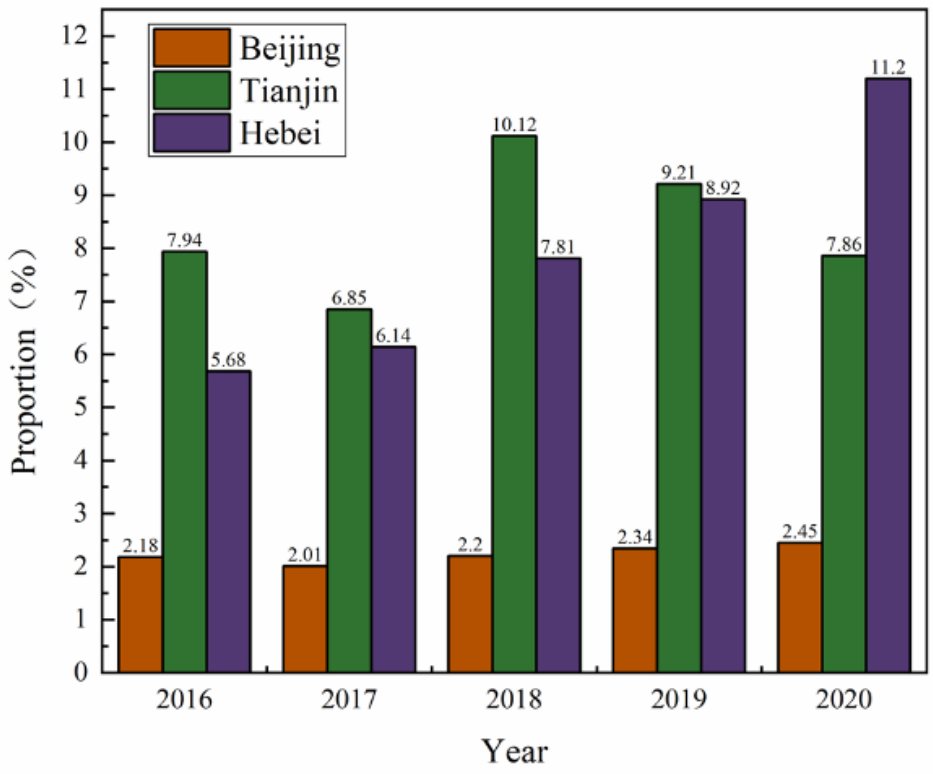

Figure 2. Investment in environmental pollution control in Beijing-Tianjin-Hebei region as a proportion of regional GDP, 2016-2020

3.3. MEASUREMENT OF GREEN FINANCIAL DEVELOPMENT LEVEL

Based on the data from 2016 to 2020, under the framework of the evaluation indexes of green financial development level in Table 1, the weights measured by the entropy weighting method (39% for green credit, 26% for green securities, 18% for green investment, 10% for green insurance, and 7% for carbon finance, all the results are retained to integers) are calculated in The results are kept to the whole number), and the strict integration from the third-tier indicators to the first-tier indicators is gradually completed by the established method under the principle of "progressive indicators", and the results are finally output. The scores of green financial

https://doi.org/10.17993/3cemp.2023.120252.109-123

development levels of Beijing, Tianjin and Hebei from 2016 to 2020 are shown in Table 2.

Table 2. Tianjin and Hebei Green Finance Development Level Score

City	2016	2017	2018	2019	2020	Average Development Level
Beijing	61.48	64.03	67.29	69.26	72.13	66.84
Tianjin	47.95	51.23	54.67	56.38	59.84	54.01
Hebei	42.61	44.97	48.33	51.21	54.19	48.26

According to the comprehensive measurement of the green financial development level of Beijing, Tianjin and Hebei, it can be found that the highest green financial development level of Beijing was 61.48 in 2016, and increased to 72.13 in 2020, an increase of 17.32%. The green financial development level of Tianjin has increased from 47.95 to 59.84, while that of Hebei has increased from 42.61 to 48.26. In terms of the macro pattern of synergistic development, the overall green financial development level of Beijing, Tianjin and Hebei has shown positive growth.

3.4. POLICY RECOMMENDATIONS

The development of green finance in the Beijing-Tianjin-Hebei region cannot be achieved without the support of good public policies, and the improvement of public policies mainly starts from the following aspects.

1. Increase financial investment. In the initial stage of green financial development, local governments should increase financial investment in regional economic development to promote the development of the local economy and raise the actual income level of residents. In addition, the relevant departments should introduce green financial reward and punishment policies and improve relevant laws and regulations as soon as possible.

2. Raise the awareness of environmental protection. The environment should not only be protected by the masses but also by the national government, which should introduce relevant laws and regulations to restrain people's unreasonable behavior. Through the news media to strengthen the environmental protection education concept of publicity, the residents of the community regularly organized environmental protection activities, and the relevant law enforcement departments to increase environmental protection enforcement efforts. Only when each unit has its responsibility can the whole society gradually raise awareness of environmental protection.

3. Improve the risk prevention and control mechanism, for the prevention of green financial risks, it is imperative to establish a sound green financial risk warning mechanism. The first line of defense of risk management is prevention, and it is

https://doi.org/10.17993/3cemp.2023.120252.109-123

essential to improve the management capacity and prevention and control of green financial risks, so green financial risk early warning should be taken as part of the systemic financial risk monitoring and warning system.

4. DISCUSSION

Green finance, as an innovative financial development model to resolve the contradiction between economic growth and ecological pollution, has been rapidly developed under the promotion of development concepts such as green, sustainable and high quality. This paper counts the green finance evaluation indicators such as green credit, green investment and green securities in Beijing Tianjin Hebei region from 2016 to 2020. During this period, the proportion of local government expenditure on energy conservation and environmental protection and the proportion of investment in environmental pollution control were analyzed. Integrate the measured scores of green finance development in various regions. The following conclusions can be drawn.

1. The indicators of green credit, green securities, and green investment in Beijing, Tianjin, and Hebei regions are steadily increasing and account for a larger share of the country. In 2017 alone, green credit in Beijing increased by 8.6% year-on-year, and the scale of green securities financing was close to 30% of the country.

2. From 2016 to 2020, the government of Beijing Tianjin Hebei region invested more and more in energy conservation, environmental protection and environmental pollution control. The proportion of environmental pollution control investment in Hebei Province increased from 5.68% in 2016 to 11.2% in 2020, with a relative increase of 97.18%.

3. Comprehensive analysis of green financial development level evaluation indexes for the comprehensive measurement of green financial development level in Beijing, Tianjin and Hebei reveals that the measurement scores of the three regions show a steadily increasing trend, with Beijing's comprehensive measurement score of green financial development level in 2020 being as high as 72.13 points.

4. According to the measurement results, it can provide theoretical guidance for the improvement of green financial public policies in Beijing, Tianjin and Hebei. Green financial public policy should increase financial investment, raise people's awareness of environmental protection, improve risk prevention and control mechanisms and increase green financial innovation.

This paper has achieved the research purpose on the whole, but there are still the following deficiencies. For example, the data sources are relatively limited, and only the Beijing Tianjin Hebei region and the lack of objective explanations of relevant

https://doi.org/10.17993/3cemp.2023.120252.109-123

economic theories are discussed. In the future, we can further improve the model from the Beijing Tianjin Hebei region.

REFERENCES

(1) Yang, Z., & Li, Q. (2021). Research on the construction of social co-governance system of ecological environment protection. IOP Conference Series: Earth and Environmental Science, 632(5), 052060 (5pp).

(2) Chen, Z., & Wang, Z. (2019). A Summary of Ecological Environment Protection and Ecological Civilization Construction in Jiangxi Province in the Past 40 Years of Reform and Opening-Up. Jiangxi Science.

(3) Emmanuel, O., Sanjay, M., Maskeliūnas, R., Robertas, D., & Luis, F. S. (2017). Optimizing green computing awareness for environmental sustainability and economic security as a stochastic optimization problem. Sustainability, 2017(9).

(4) Junghanns, J., & Beery, T. (2020). Ecological sanitation and sustainable nutrient recovery education: considering the three fixes for environmental problem-solving. Sustainability, 12.

(5) Abalansa, S., Mahrad, B. E., Icely, J., & Newton, A. (2021). Electronic waste, an environmental problem exported to developing countries: the good, the bad, and the ugly. Sustainability, 13.

(6) Thoren, H., Soininen, N., & Kotamaki, N. (2021). Scientific models in legal judgments: the relationship between law and environmental science as problem-feeding. Environmental Science & Policy, (124-), 124.

(7) Bocking, E. (2019). "Surviving Global Warming: Why Eliminating Greenhouse Gases Isn't Enough" by Roger A. Sedjo [book review]. The Canadian Field-Naturalist, 133(4), 390-391.

(8) Lin, Chen, Jinsong, Jin, Zhifeng, & Quan, et al. (2018). Impacts of human activities on coastal ecological environment during the rapid urbanization process in Shenzhen, China. Ocean & Coastal Management.

(9) Ye, H. (2022). Analysis on ecological environment change of Kalajun-Kurdening World Natural Heritage Site from 2006 to 2019. Polish Journal of Environmental Studies, (1 Pt.2), 31.

(10) Li, S. (2020). An analysis of the value of sports park construction based on the concept of ocean ecological environment. Journal of Coastal Research, 104(sp1).

(11) Li, Y. (2020). The influence of manufacturing export trade on marine ecological environment in China. Journal of Coastal Research, 115(sp1), 631.

(12) Volz, U. (2018). Fostering Green Finance for Sustainable Development in Asia. ADBI Working Papers.

(13) Sari, Intan, Maya, Paavola, Jouni, & Fatorelli, et al. (2017). Climate policy integration in the land use sector: mitigation, adaptation and sustainable development linkages. Environmental Science & Policy.

(14) Zhou, J. (2022). Analysis and Countermeasures of Green Finance Development under Carbon Peaking and Carbon Neutrality Goals. Open Journal of Social Sciences, 10(2), 8.

(15) Lv, C., Bian, B., Lee, C. C., et al. (2021). Regional gap and the trend of green finance development in China. Energy Economics, 10, 105476.

https://doi.org/10.17993/3cemp.2023.120252.109-123

(16) Yi, L., Chen, J., Jin, Z., et al. (2018). Impacts of human activities on coastal ecological environment during the rapid urbanization process in Shenzhen, China. Ocean & coastal management, 154, 121-132.

(17) Wang, Y., & Liu, Y. (2018). Pollution and restructuring strategies of rural ecological environment in China. Progress in Geography, 37(5), 710-717.

(18) Dong, Y. (2021). A Multi-Criteria Evaluation of the Urban Ecological Environment in Shanghai Based on Remote Sensing. ISPRS International Journal of Geo-Information, 10.

(19) Chen, S., Liu, F., Zhang, Z., et al. (2021). Changes of groundwater flow field of Luanhe River Delta under the human activities and its impact on the ecological environment in the past 30 years. China Geology, 4(3), 455-462.

(20) Ma, F., Chen, J., Chen, J., et al. (2021). Evolution of the hydro-ecological environment and its natural and anthropogenic causes during 1985–2019 in the Nenjiang River basin. Science of The Total Environment, 799, 149256.

(21) Han, H. (2021). Using deep learning to protect the diversity of the ecological environment Based on the prevention and control of alien species. IOP Conference Series: Earth and Environmental Science, 781(5), 052007.

(22) Cheng, Q., Luo, Z., Xiang, L. (2021). Spatiotemporal Differentiation of Coupling and Coordination Relationship of the Tea Industry–Tourism–Ecological Environment System in Fujian Province, China. Sustainability, 13(19), 10628.

(23) Jiang, R., Shi, T., Xie, J., et al. (2020). Research on the Simulation System for Irrigated Area Ecological Environment Evolution in the Yellow River Basin. Yellow River.

(24) Dong, Y. (2021). A Multi-Criteria Evaluation of the Urban Ecological Environment in Shanghai Based on Remote Sensing. ISPRS International Journal of Geo-Information, 10.

(25) Wang, J. (2019). Driving Factors and Progress of Green Finance Development in China. Reform of Economic System.

(26) Bai, X., Zhou, W. K., Chen, Z. Y., et al. (2021). How Green Finance Sparks Sustainability: Using Big Data Analysis and Visualization Software to Unite Future Economic and Social Value Potential. In ICIEB'21: 2021 2nd International Conference on Internet and E-Business.

(27) Dong, S., Xu, L., Mciver, R. P. (2020). China's financial sector sustainability and "green finance" disclosures. Sustainability Accounting, Management and Policy Journal, ahead-of-print(ahead-of-print).

(28) Ivanova, N. G., Katsyuba, I. A., Firsova, E. A. (2021). Green finance. In 2021:012003.

(29) Yin, X., Xu, Z. (2022). An empirical analysis of the coupling and coordinative development of China's green finance and economic growth. Resources Policy, 75, 102476.

(30) Zhou, H., Xu, G. (2022). Research on the impact of green finance on China's regional ecological development based on system GMM model. Resources Policy, 75, 102454.

(31) Zheng, G. W., Siddik, A. B., Masukujjaman, M., et al. (2021). Green finance development in Bangladesh: The role of private commercial banks (PCBs). Sustainability, 13(2), 795.

https://doi.org/10.17993/3cemp.2023.120252.109-123