1. Introduction

With the reform and development in recent decades, China’s economy keeps up with the development of science and technology and grows rapidly to the second place in the world. At the same time, environmental pollution, a by-product secretly produced behind the rapid development, gradually puzzles people’s normal work and life and hinders economic development. Because we neglected the importance of environmental protection when developing economy before, we did not pay attention to improving environmental quality. Nowadays, land desertification, earthquakes, water resources, smog, and other problems caused by rapid economic progress have led to the continuous deterioration of the environment, and people have begun to suffer the consequences and actively seek solutions. The concept of green finance is put forward in this situation. As an innovative financial development model, green finance can resolve the deep-seated contradiction between economic growth and environmental pollution and has been paid more and more attention in recent years. Based on the grey relational analysis model, this paper studies the economic coupling relationship between green finance and environmental quality. We refer to many documents as references. Literature [1] explains the development of green finance and the optimization and upgrading of industrial structure in western China. Literature [2] expounds the concept of promoting sustainable development with green financing.
2. Theoretical Basis

2.1. Green Finance Theory. Green finance is a financial policy that plays a great role in environmental protection and governance. It belongs to a kind of financing policy that emphasizes the quality of the living environment and the interests of the whole human being. When investing in peacetime, we must consider the problem of sustainable development and the potential environmental impact in the environment. Due to the rapid economic development before, many ecological environments were destroyed, resulting in a large amount of energy consumption, and the population showed a steep straight upward trend. It is also a difficult point to achieve rapid economic development on the premise of ensuring "green." This is already a problem that most countries need to pay attention to, as shown in Figure 1.

2.2. Environmental Quality and Ecological Economy. Good and bad are the quality in "quality"; degree refers to the quantity in "quality." Our existing environment has been produced by the earth since ancient times, and as a member of the earth, what we do on the earth will affect the "quality" of the earth’s environment to a certain extent.

The green finance we want to develop is closely related to ecological economy. Human beings use principles and methods to call resources within the scope of ecological environment to promote the rapid development of social economy, thus realizing the value of resources. The concept of building a green and healthy economic model coincides with the concept of green finance, as shown in Figure 2.

2.3. Coupling Coordination Theory. Generally speaking, coupling relationship refers to some kind of connection originated from physics and usually exists in electricity. Use this relationship to measure the affinity between systems. This system coupling shows a relatively balanced state of structure and function. This kind of benign state can be cycled, and the system can complement each other and finally achieve an orderly state process.

Coordination is an important point in this theory, and the coupling state of the system needs coordination very much. If the system is not coordinated, its development will not be smooth and successful. Develop in coordination and gradually reach a balanced state between things. This is the most ideal ultimate goal. Through this purpose, people evaluate and judge things, solve uncoordinated problems encountered in the process, and solve various contradictions, so as to develop scientifically and orderly.
2.4. Complex System Theory. A complex system is a system composed of a large number of units interacting with each other, and its activities are nonlinear, often forming complex organizations with numerous levels. Compared with a complex system, a simple system is a system that simplifies and describes laws with the reductionist thinking of classical physics.

Complex system theory can highlight the field characteristics of various research topics and plays a more important role than simple systems. It can help researchers to look at the problems waiting to be studied as a complete whole, in which the relationship of various elements is interrelated and interacted with each other, rather than being single, independent, and irrelevant. It can be said that the function and development of the system are the result determined by the development of each subsystem complementing each other. This theory has helped many researchers to make use of its complexity and complete the theoretical support of research topics.

We regard environmental quality as complex system A; think of green finance as complex system B. We combine A and B systems and form an A-B composite system through continuous development and change, that is, an environmental quality-green financial economy composite system. This can reflect the complex characteristics between A and B systems, support the theory of this paper, and make a good foreshadowing for the later research.

3. Study on the Coupling Relationship between Environmental Quality and Green Financial Economy

3.1. Establishment of the Index System

3.1.1. Construction Principle. When constructing the evaluation index system of environmental quality and green finance, we need to follow certain principles: (1) systematic principle, (2) dynamic principle [16], (3) typicality principle [17], (4) the principle of conciseness and scientificness, (5) principle of comparability, (6) operable principle, (7) principle of quantification, and (8) comprehensive principle. Through these principles, we can create a fair, comprehensive, scientific, and coordinated index system to help us study better.

3.1.2. Index Weight

(1) Standardization treatment of range method

\[ Y_{ij} = \frac{X_{ij} - \min (X_{ij})}{\max (X_{ij}) - \min (X_{ij})}. \]

(2) Weight calculation by entropy method

The normalized matrix is obtained:

\[ X' = (X_{ij})_{m \times n}. \]

Calculate entropy \( H_j \) [19]:

\[ H_j = -K \sum_{i=1}^{m} \left( f_{ij} \right) \ln \left( f_{ij} \right) \quad (i = 1, 2, \cdots, m; j = 1, 2, \cdots, n). \]

Among them, \( K = (\ln m)^{-1} \); at the same time, in order to avoid the meaninglessness of \( \ln (f_{ij}) \), there is

\[ f_{ij} = \frac{1 + X_{ij}'}{\sum_{i=1}^{m} \left( 1 + X_{ij}' \right)}. \]

(3) Calculate the information weight \( w_j' \)

\[ w_j' = \frac{1 - H_j}{\sum_{j=1}^{n} H_j}. \]

3.1.3. TOPSIS Evaluation Method

(1) Processing data

\[ y'_{ij} = \frac{x_{ij}'}{\sum_{i=1}^{m} x_{ij}'}. \]
\[ Y' = \left( y'_{ij} \right)_{m \times n}, \]  
\[ w_j = (w_1, w_2, w_3, \ldots, w_n). \]

Formula (7) is constructed as a normalized decision matrix of formula (8), and then, the matrix is multiplied by formula (9). After processing, we can get the weighted normalized decision matrix as

\[ A = \left( a_{ij} \right)_{m \times n} = \left( w_j \times y'_{ij} \right)_{m \times n}. \]

(2) Determine positive and negative ideal solutions

\[ a^+_j = \max \{ a_{1j}, a_{2j}, a_{3j}, \cdots, a_{mj} \}, \]
\[ a^-_j = \min \{ a_{1j}, a_{2j}, a_{3j}, \cdots, a_{mj} \}. \]

(3) Solving distance of the Euclidean formula

\[ d^+_j = \sqrt{\sum_{j=1}^{n} (a_{ij} - a^+_j)^2}, \]
\[ d^-_j = \sqrt{\sum_{j=1}^{n} (a_{ij} - a^-_j)^2}. \]

(4) Calculate closeness \( B \) [20]

\[ B_i = \frac{d^-_i}{d^-_i + d^+_i}, \quad (0 \leq B_i \leq 1). \]

Table 1: Construction of the comprehensive evaluation system.

| Comprehensive index | Criterion layer | Agent index | Attribute |
|---------------------|-----------------|-------------|-----------|
| Green finance       |                  | Proportion of interest expenses of high energy-consuming industries | Negative |
|                     |                  | Per capita energy consumption | Negative |
|                     |                  | Total energy consumption | Negative |
|                     |                  | Total energy consumption | Negative |
|                     |                  | Total industrial emissions | Negative |
| Energy consumption  |                  | Total amount of industrial solid waste | Negative |
|                     |                  | Total amount of wastewater discharge | Negative |
|                     |                  | Total green coverage area | Forward |
| Environmental quality | Environmental pollution | Per capita green area | Forward |
|                     |                  | Harassment rate of domestic garbage | Forward |
| Environmental governance |                  | Proportion of investment expenditure on environmental pollution control | Forward |

\[ \sum_{i=1}^{m} B_{ij} = 1, \quad (U_i = E_i, F_i), \]
\[ T_{EF} = \alpha E_i + \delta F_i. \]

Infer the comprehensive development, as shown in Table 3.
3.3. Coupling Model Construction

(1) Coupling degree

\[ C = 2 \left( \frac{u_1 u_2}{(u_1 + u_2)^2} \right)^{1/2}. \]  

(18)

The larger the calculated results, the stronger the coupling and the greater the mutual influence. We delimit the range of the calculation results of the coupling degree, as shown in Table 4.

(2) Coupling coordination degree

\[ T = \alpha u_1 + \beta u_2, \]  

(19)

\[ D = \sqrt{CT}. \]  

(20)

(3) Coupling priority

\[ p = \frac{u_1}{u_2}. \]  

(21)

3.4. Analysis of the Grey Relational Analysis Model

(1) Reference sequence and comparison sequence

\[ Y = \{Y(q), q = 1, 2, \cdots, n\}, \]  

(22)

\[ X_i = \{X_i(q), q = 1, 2, \cdots, n, i = 1, 2, \cdots, m\}. \]  

(23)

(2) Dimensionless data

\[ Y^* = \frac{Y(q)}{Y(l)}, \quad q = 1, 2, \cdots, n, i = 1, 2, \cdots, m, \]  

(24)

\[ X_i^* = \frac{X_i(q)}{X_i(l)}, \quad q = 1, 2, \cdots, n, i = 1, 2, \cdots, m. \]  

(25)

(3) Absolute difference

\[ \Delta_i(k) = |Y_i^* - X_i^*|, \quad i = 1, \cdots, n, k = 1, \cdots, m. \]  

(26)

4. Experimental Analysis

4.1. Comprehensive Benefit Index Analysis

4.1.1. Single-City Analysis. We choose the data of a total of ten years from 2012 to 2021 to analyze and evaluate this certain city. Examine its environmental quality and green financial development index. The main purpose of this test is to do a pretest, so as to explore the accuracy of the two indicators, as shown in Figure 3.

The overall trend of the two development indicators is on the rise. Only from 2013 to 2014, the development of environmental quality was relatively unstable, and there was a certain decline in development; the development of green finance in 2015 is excellent. This shows that the development of the city is very good, and the two indicators complement each other and influence together.

4.1.2. Multicity Analysis. In this section, we choose three cities with different development situations from 2017 to 2021. After collecting relevant statistics, the experimental data are processed. Finally, the evaluation value is calculated by the TOPSIS comprehensive evaluation method, and then, the comprehensive benefit index is calculated by using a
coupling model. Among them, we set the environmental quality evaluation index as $E$ and set the green financial evaluation index as $F$. The corresponding indexes of A city are set as $E_1$ and $F_1$; correspondingly, those of city B are $E_2$ and $F_2$; those of city C are $E_3$ and $F_3$. This paper investigates the environmental quality and green financial development index of A, B, and C cities and judges the lagging types of the three cities.

We use chart data to show the economic development level relationship between environmental quality and green finance in A, B, and C cities. The processed data of the three cities are judged according to the lag type discrimination table, as shown in Figure 4.

We can find that the development and changes of environmental quality and green finance in the three cities are very uneven, unbalanced, and unstable. For A city, the index in $E_1$ index in 2018 is as high as 0.5347, which is the year with the highest development level in five years; except for 2018, the overall environmental quality level shows a slow upward trend. From 2017 to 2020, the $F_1$ index showed an upward trend, but by 2021, the development of green finance showed a cliff-like decline, and the index level was even lower than that in 2019, showing a retrogressive state. Therefore, combined with $E_1$ and $F_1$ index data, we can judge that city A belongs to the type of lagging development of green finance.

For city B, the $E_2$ index is generally balanced, without much development and change; the development of the $F_2$ index in five years is fast and slow, and the data is very unstable. In view of this, we can judge that city B belongs to the lagging type of environmental quality development.

The $E_3$ index first gradually declined from 2017, and then, the index level began to rise in 2021. The $F_3$ index is to continuously improve the development level of green finance in five years. It gradually increased from the lowest of only 0.3143 to 0.5087. We judge that city C belongs to
Figure 5: Coupling coordination degree—A city.

Figure 6: Coupling coordination degree—B city.

Figure 7: Coupling coordination degree—C city.
the type of lagging development of green finance from 2017 to 2018. From 2019 to 2021, it belongs to the type of lagging development of environmental quality.

4.2. Coupling Coordination Degree Analysis. After analyzing the comprehensive benefit index of A, B, and C cities from 2017 to 2021, similarly, we need to calculate their coupling degree and coordination degree and then make a further analysis of urban economic development. Set the comprehensive economic index as $T$, the coupling degree is $C$, and the coupling coordination degree is $D$, as shown in Figures 5–7.

The coupling and coordination curve of A city grows slowly until 2020 and then begins to decline in 2021. The curve of city B is very unstable, and the overall trend is "W," and the curve shows a downward and upward trend alternately. The overall trend of the C city curve has been rising. After calculating the corresponding data of the coupling degree and coordination degree of A, B, and C cities, we summarize the coupling level and coordination type of these three cities, respectively, as shown in Tables 5–7.

| Year | Coupling level         | Coordination type          |
|------|------------------------|----------------------------|
| 2017 | Low-level coupling stage| Mild disorder              |
| 2018 | Antagonistic stage     | Mild disorder              |
| 2019 | Antagonistic stage     | On the verge of maladjustment |
| 2020 | Antagonistic stage     | On the verge of maladjustment |
| 2021 | Antagonistic stage     | Mild disorder              |

| Year | Coupling level         | Coordination type          |
|------|------------------------|----------------------------|
| 2017 | Antagonistic stage     | Mild disorder              |
| 2018 | Low-level coupling stage| Moderate disorder          |
| 2019 | Antagonistic stage     | Mild disorder              |
| 2020 | Low-level coupling stage| Moderate disorder          |
| 2021 | Low-level coupling stage| Mild disorder              |

| Year | Coupling level         | Coordination type          |
|------|------------------------|----------------------------|
| 2017 | Antagonistic stage     | Mild disorder              |
| 2018 | Antagonistic stage     | On the verge of maladjustment |
| 2019 | Antagonistic stage     | On the verge of maladjustment |
| 2020 | Antagonistic stage     | On the verge of maladjustment |
| 2021 | Antagonistic stage     | On the verge of maladjustment |

4.3. Grey Relational Analysis. Here, we aim to explore the grey correlation between environmental quality and green finance. It is mainly divided into 9 indicators according to environmental quality. For convenience, they are named Z1, Z2, Z3, Z4, Z5, Z6, Z7, Z8, and Z9, respectively. Green finance is divided into three indicators, namely, Y1, Y2, and Y3, respectively. After calculating the grey relational degree, we need to divide the strength and weakness of the grey relational degree, as shown in Table 8.

We calculate the grey correlation degree of each index of the city. The higher the correlation degree, the closer the relationship between the two indexes and the greater the influence on each other. We can find that there is a strong correlation between Z1 and Y3. There is a strong correlation between Z2 and Y2; Z3 was moderately correlated with Y1; there is a strong correlation between Z4 and Y3; there is a strong correlation between Z5 and Y2; there is a strong correlation between Z6 and Y3; there is a strong correlation between Z7 and Y3; there is a strong correlation between Z8 and Y2; there is a strong correlation between Z9 and Y2, as shown in Figure 8.

Finally, the average grey correlation degree of each index is sorted. Among them, except the Y3 index is a strong
correlation index, other indexes are medium correlation indexes. The correlation between \(Y1\) and \(Z3\) is the least, which is 0.55 and 0.552, respectively. The correlation of the \(Y3\) index is as high as 0.655, as shown in Figure 9.

5. Conclusion

The environmental quality problem following the economic growth is an inherent contradiction and an urgent problem to be solved. In this article, we focus on environmental quality, explain the relevant methods and concepts in theory, and sort out the index system of green finance and environmental quality that adapts to the actual situation. Evaluate and judge the coupling relationship between the two economies. The results show the following:

(1) Investigate the environmental quality and green finance comprehensive benefit development index of A, B, and C cities, judge the lagging types of the three cities, and evaluate the specific development status of the cities

(2) Calculate the coupling degree and coordination degree of A, B, and C cities. Summarize the coupling level and coordination type

(3) The higher the correlation between urban environmental quality and green financial indicators, the closer the relationship between the two indicators and the greater the mutual influence

(4) Rank the grey relational grade. Except \(Y3\) is a strong correlation index, the rest are moderately correlated indexes. The correlation between \(Y1\) and \(Z3\) is the least, which is 0.55 and 0.552, respectively. \(Y3\) can be correlated up to 0.655

Facts have proved that while realizing green finance, the ecological economy of the environment can be protected and developed. It can achieve effective circulation promotion.
effect. Of course, the research in this paper is still worthy of optimization and improvement by relevant staff. For example, our research on references and related data is not thorough enough. The amount of green financial data is small, and it still needs to expand the field. The integration of old experience and innovation is low. Therefore, we need to raise more funds to support green finance and improve environmental quality. In addition, we need to strengthen exchanges and cooperation between regions, optimize the development of an innovation pattern, and invest more green innovation ideas.

Data Availability

The experimental data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declared that they have no conflicts of interest regarding this work.

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