Research Article

Coordination between Tourism and Ecological Environment and High-Quality development: Based on the Study of the Yellow River Basin

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The coordinated development of tourism and EE (ecological environment) is of practical significance to the HQD (high-quality development) of the YRB (Yellow River Basin), and the excellent EE provides a strong guarantee for the sustainable and healthy development of the tourism industry. Objective. To explore the coupling relationship between tourism and EE coordination and HQD in the YRB. Methods. This paper uses the improved soil moisture weight method to quantitatively measure the coupling CT (coordination between tourism) and EE and HQD in the YRB from 2014 to 2020. The results show that from 2014 to 2020, on the whole, the evaluation values of tourism economy and EE in the YRB show an increasing trend, but the growth trend of tourism economy is obviously stronger than that of EE. From the perspective of eco-environmental quality index, the overall increase of eco-environmental quality index of the YRB from 2014 to 2020 is small, and the eco-environmental quality of the YRB has improved to some extent in the recent years, but the effect is not significant. And they all passed the significance test at 1% level. During 2014–2020, the overall Moran index of the coordinated development level of tourism and EE and HQD in the YRB showed a wave-like fluctuation, and the fluctuation range increased gradually, and the overall trend was decreasing. Government control, industrial structure (proportion of tertiary industry), population size, and people’s living standard have significant positive effects on the coupling and coordination of local tourism economy and EE, while industrial R&D investors have significant negative effects on the coupling and coordination of local tourism economy and EE, while natural disasters have no significant effects on the coupling and coordination of local tourism economy and EE. Conclusion. The HQD of tourism in the YRB should establish the idea of giving priority to EE, construct the mechanism of regional coordinated development, and implement the driving strategy of scientific and technological innovation and the development model of culture + ecology + tourism.

1. Introduction

The YRB (Yellow River Basin) is an important ecological barrier and economic zone in China. The coordination and HQD (high-quality development) of tourism and EE (ecological environment) in the YRB is an important starting point to further promote the construction of ecological civilization and an important measure to cultivate new kinetic energy of HQD of economy and society [1]. Rational use of EE to develop tourism can bring positive contributions to local economic development, but excessive tourism development may lead to deterioration of EE and reduce economic and social benefits of tourism [2, 3]. HQD is used to describe the basic characteristics of China’s economic development in the new era, which is mainly high-quality economic development, while ecological protection is the promotion and protection of EE quality. There is a close relationship between high-quality economic development and EE, and the coordinated development of the two is of great significance. Tourism development can promote local economic transformation, improve social employment level, strengthen cultural exchanges in different regions, and promote regional EE construction [4].

Literature [5] pointed out that "high-quality economic development is the development that can well meet the people’s growing needs for a better life, the development that
embodies new development concepts, the development that innovation becomes the first driving force, coordination becomes an endogenous feature, green becomes a universal form, openness becomes the only way, and sharing becomes the fundamental purpose. Literature [6, 7], on the basis of constructing a five-sector economic growth model with environment as endogenous variable, empirically analyzes the mechanism of pollution damage, environmental management, and economic growth. Literature [8] regards investment as the key factor to control pollution emissions and points out that the pollution reduction activities can only occur when capital accumulates to a certain extent. Literature [9] based on the introduction of externality cost, the interactive decision-making between government environmental supervision and enterprise pollution control is discussed by using game analysis method, and it is considered that establishing measures such as increasing the reputation cost of enterprise pollution and raising the political cost of local government conniving at pollution is an important direction to improve the environmental quality. Literature [10–12] established a dynamic game model of three main stakeholders in the internalization of enterprise environmental cost based on the game among the government, enterprises, and the public, and put forward the basic ideas and measures for the government, enterprises, and the public to jointly realize the internalization of enterprise environmental cost and reduce environmental pollution and ecological damage. Literature [13] points out that the contradiction between supply and demand of water resources, the unbalanced spatial distribution of water and sediment, the risk of environmental pollution, and the lack of cross-regional comprehensive control mechanism increase the difficulty of HQD and EE protection in the YRB. Literature [14, 15] makes an empirical study on the path selection of coordinated development between tourism and EE and HQD in the YRB from the perspectives of industrial development and mineral resources development. The research conclusion shows that over-exploitation of mineral resources in the YRB can easily destroy the regional ecological balance, and then affect the quality of economic development. Literature [16] points out that using the spatial autoregressive model, this paper studies the influencing factors of the coupling and coordination relationship between urbanization and economic development in China’s provinces. Most of the influencing factors have obvious promoting effects on them.

As one of the cradles of the Chinese civilization and fertile soil for the Chinese nation to strive for self-improvement, the YRB is an important foundation for the Chinese nation to strengthen its cultural confidence. On the whole, there are few studies on the coordination relationship between tourism and EE in the YRB, and there is also a lack of research on the HQD of tourism in the YRB based on the coordination relationship between them. The CT (Coordination between tourism) and EE and HQD are dialectical unity. Effective eco-environmental protection measures, efficient pollution control measures, advanced water-saving recycling technology and equipment, huge ecological restoration projects, and other eco-environmental protection methods all need a good economic foundation. Tourism, EE coordination, and HQD complement each other. To promote EE protection and HQD in the YRB, pragmatic cooperation and cooperation are needed to promote the coordinated development of tourism, EE, and HQD. Based on this, this paper takes the coordinated development and HQD of tourism and EE in the YRB as the background and takes nine provinces along the YRB as the object. And on this basis, puts forward some suggestions on the HQD of tourism in the YRB.

2. Methods and Materials

2.1. Literature Analysis Method. The integration of YRB culture and tourism is mostly limited to sightseeing tours and primary leisure tours. The channels and forms of integration are not rich enough. It is rare to realize the organic integration of cultural resources and tourism projects (products) by using artistic carriers such as movies, performing arts, design, animation, and painting. On the one hand, the introduction of international and domestic large-scale cultural tourism enterprises is insufficient; on the other hand, the cooperation between local cultural tourism and international and domestic large-scale cultural tourism enterprises is not deep, and the methods are inflexible, and there is a lack of successful experience of leading enterprises that can be popularized and replicated.

It clarifies the research purpose, research content, research methods, and research framework of this paper. It provides a clear research idea for the follow-up research on the relationship between tourism and EE coordination and HQD coupling coordination in the YRB, with a view to achieving the expected research purpose and providing suggestions for the coordinated development of tourism and EE and HQD in the YRB, which are closely concerned by the CPC Central Committee. There are many ecological and water resources problems in the YRB, such as soil erosion, serious land desertification, frequent surface mining collapse accidents, water pollution and shortage, and excessive precipitation in the lower reaches of the Yellow River, which is threatened by floods. The YRB mainly faces the problems of water resource shortage, water resource pollution, and grassland degradation caused by overgrazing. Aiming at the EE protection situation in the YRB, this paper will make a dynamic analysis from three parts: water resource situation, land resource situation, and ecological protection situation.

Heavy rain, sparse vegetation, poor soil corrosion resistance, and unscientific planning and exploitation of natural resources by human beings have led to serious destruction of soil vegetation in the YRB. At the same time, surface soil erosion caused by rain erosion has aggravated the problem of soil erosion in the YRB. In this paper, the index data of newly added comprehensive control area of soil erosion in the YRB and provinces in 2018 are organized, and the arrangement is shown in Figure 1.

Although the measures taken by the YRB and provinces to deal with soil erosion are indeed effective, it is undeniable that soil erosion in the YRB and provinces is becoming more and more serious. In order to prevent the newly added soil
erosion control area from catching up with the newly added soil erosion area, while further strengthening the soil erosion control, the YRB and local governments should pay attention to preventing the aggravation of its soil erosion problem, and strive for two-way synchronization of source control and control, so as to ensure that the soil erosion problems in the YRB and provinces can be solved with high speed, high quality, and high efficiency.

Although YRB cultural resources have been well protected and tourism has developed rapidly, there are still many problems to be solved. The protection and safety of cultural relics need to be further strengthened, and the government’s main responsibility for cultural relics protection, the supervision responsibility of relevant departments, and the direct responsibility of cultural relics owners and users have not been fully implemented. The archaeological investigation and research work of YR early settlement sites, the protection and maintenance of sites and relics, and the publicity and display of heritage sites need to be further improved. In addition, the league cities and counties have not yet refined the cultural tourism projects according to the resource characteristics and market segmentation, resulting in a certain degree of redundant construction and waste of resources. For example, the same follow-the-trend grassland, desert tourism projects. Due to the extensive development and operation tradition, some areas cannot focus on their own resource advantages and cultural characteristics, and cannot show their uniqueness, innovation, and leadership in the cultural tourism market.

2.2. Evaluation System of CT and EE and HQD. To promote the coordinated development and HQD of tourism and EE in the YRB, follow the three basic principles of comprehensive coordination, protection priority and regional differences, and build a long-term mechanism for protection and development based on the resources and environment carrying capacity, existing development density, and development potential of different regions in the basin [19].

Systematical principle requires that there should be a strong logical relationship among the indicators in the eco-environmental protection index system established in this paper, which should not only include indicators reflecting the comprehensive pollution control capacity of the YRB, but also include indicators reflecting the sustainable capacity of urban water resources, so as to achieve the purpose of systematically evaluating the eco-environmental protection status of the YRB. The scientific principle requires that the index system construction and index selection can ensure the objectivity and authenticity of the development status and characteristics of economy, science and technology, ecology, people, and society in the YRB. In each index system, the index data of the same index layer should have the same measurement caliber and method, and it should be ensured that each index data has strong comparability, realistic operability, and easy collection. If some index data are difficult to obtain, other easily available similar indexes can be used instead (Figure 2).

Based on the slow economic growth, uneven internal development, outdated industrial structure, insufficient innovation kinetic energy, and serious ecological damage, this paper refers to the classification standard of HQD in Reference [20], and considers the index system from five concepts, investment in science and technology, environmental pollution, resource utilization, social harmony, and basic public service level (see Figure 3).

Supplemented by official statistical bulletin, and some unavailable index data, weighted average is used to assign missing values.

2.3. Model Building. The total amount of water resources is limited and the per capita possession is low. The total amount of water resources in the Yellow River is less than 7% of that in the Yangtze River, and the per capita possession is only 27% of the national average. The utilization rate of water resources is as high as 80% [1], and the shortage of water resources is obvious. YRB is a region where China’s electric power, chemical industry, steel, building materials, nonferrous metallurgy, and other heavy chemical industries gather, which leads to increased environmental pressure of the main stream of the Yellow River and other branches, and the task of water environment control along the Yellow River cities is prominent. In addition, urban water environment problems and agricultural nonpoint source pollution caused by urbanization are also prominent problems. The tasks of river basin pollution control, water environment risk prevention, and water quality stability and compliance are all heavy. In addition, there are a series of water-related eco-environmental problems in some areas, such as ecosystem degradation, weakening of water conservation function, serious soil erosion, shrinking of wetlands, and low ecological flow.

The coordination and complementarity between tourism and EE and HQD are indispensable. High-level EE protection quality is the basic premise to realize regional HQD,
and HQD is the fundamental guarantee of EE protection and restoration. HQD promotes the construction of EE and restricts the development process of EE protection, and there is a significant interaction and coupling relationship within it. According to the above analysis, the coupling mechanism analysis diagram of tourism and EE coordination and HQD is drawn as shown in Figure 4.

Because different evaluation indexes have different dimensions and attributes, the inverse of negative data is converted to positive, and the data is standardized to eliminate the dimensional influence. Standardized range method is used for dimensionless processing, and the data is converted to the [0, 1] interval. The calculation formula is as shown in formula:

\[ X_{ij} = \frac{x_{ij} - \min x_{ij}}{\max x_{ij} - \min x_{ij}}, \quad 1 \leq i \leq n \]

(1)

The linear weighting method is used to calculate the development index of each subsystem, and the formula is

\[ U_i = \sum_{j=1}^{m} w_{ij} u_{ij}, \quad \sum_{j=1}^{m} w_{ij} = 1, \]

(2)

where: \( U_i \) is the comprehensive development index of the \( i \) system, which refers to the comprehensive index of tourism industry, urbanization and EE, respectively; \( u_{ij} \) represents the efficacy contribution value of the \( j \) th index in the \( i \) th system; \( w_{ij} \) the weight of the contribution value for the corresponding index efficacy.

The range standard method is used to dimensionless the positive index and negative index, respectively, and the \( u_{ij} \) value is obtained. In order to avoid meaningless assignment, the normalized value is processed by adding 0.001. When determining the weight \( w_{ij} \), the objective entropy weighting method is adopted. This study uses panel data for analysis, so \( w_{ij} \) is the average weight of 11 prefecture-level cities.

Need to know whether the development between the systems is coordinated. The coupling degree is measured by the following formula \([21, 22]\):

\[ D = \sqrt{C \times T}, \]

(3)

where \( D \) is the coupling coordination degree, \( D \in (0, 1) \). The larger the value of \( D \), the higher the level of coordinated development between tourism economic system and EE system.

The classification standard of coupling coordination degree is constructed, as shown in Table 1.

3. Results and Analysis

3.1. Evaluation of Economic and EE Development. After averaging the data of 9 provinces and regions in the YRB by index, and then the evaluation value of tourism economic system and EE development level is obtained according to the coupling coordination degree model (Figures 5 and 6).

On the whole, the evaluation values of tourism economy and EE in the YRB show an increasing trend, but the growth trend of tourism economy is obviously stronger than that of EE.

3.2. Time Series Evolution Analysis of the Overall Coupling and Coordinated Development of the YRB. The entropy weight method is used to process the panel data of provinces in the YRB from 2014 to 2020, and the economic HQD index, EE quality index, comprehensive development index,
Table 1: Classification of coupling degree grade.

| Coupling degree | Grade                  | Coupling degree | Grade                  |
|-----------------|------------------------|-----------------|------------------------|
| 0.00–0.09       | Extreme disorder       | 0.50–0.59       | Reluctantly coordinate |
| 0.10–0.19       | Severe maladjustment   | 0.60–0.69       | Primary coordination   |
| 0.20–0.29       | Moderate disorder      | 0.70–0.79       | Intermediate coordination |
| 0.30–0.39       | Mild maladjustment     | 0.80–0.89       | Good coordination      |
| 0.40–0.49       | On the verge of maladjustment | 0.90–1.00   | Quality coordination   |

Figure 4: Analysis diagram of coupling mechanism between tourism and EE and HQD.

Figure 5: Evaluation value of tourism economic system in nine provinces of the YRB.

Figure 6: Evaluation value of eco-environmental system in nine provinces of the YRB.
coordination index, and relative development index are calculated, respectively (Table 2).

From Table 2, the perspective of eco-environmental quality index, the overall increase of eco-environmental quality index of the YRB from 2014 to 2020 is small, and the eco-environmental quality of the YRB has improved to some extent in recent years, but the effect is not significant.

3.3. Spatial Autocorrelation Analysis of the Coupling Coordination Degree between Tourism and EE and HQD. The results are shown in Table 3, and the trend chart of the global Moran index and Z score of the coordinated development of tourism and EE and HQD coupling in the YRB from 2014 to 2020 is drawn as shown in Figure 7.

From Table 3, the global Moran index of the coupling and coordination of YRB tourism with EE and HQD from 2014 to 2020 is positive, and all of them have passed the significance test of 1% level, which means that the coupling coordination development level between these two systems in the YRB is characterized by significant aggregation in space.

However, Moran index is always between 0.100 and 0.300, that is, there is a weak positive spatial correlation, which shows that regions with high level of tourism and EE coordination and HQD are adjacent to each other, while regions with low level of coupling coordination are adjacent to each other.

Figure 7 shows that from 2014 to 2020, the global Moran index of the coordinated development level of tourism, EE, and HQD in the YRB fluctuates in a wave shape, and the fluctuation range is increasing gradually, and the overall trend is decreasing.

However, the growth rate is different, and the order of the coupling coordinated development level to a higher stage is different, and the continuous decrease of the overall Moran index value in the YRB.

3.4. Analysis of Influencing Factors of Coupling Degree. Each evaluation index element influences and interacts with each other, which makes the tourism economy and EE show
the corresponding pattern and evolution law. In this paper, Eviews software is mainly used to make regression analysis on the data of six major factors. These factors include government control, industrial structure, natural disasters, population size, people's living standard, and industrial R&D investment (Table 4).

It can be seen that government control, industrial structure (proportion of tertiary industry), population size, and people's living standard have significant positive effects on the coupling and coordination of local tourism economy and EE.

Natural disasters have no significant influence on the coupling CT economy and EE in this region. Industrial R&D investment has a significant negative impact on the coupling and coordination of local tourism economy and EE ($\beta_6 = -0.127, p < 0.001$).

Industrial R&D investment promotes local economic development. Although it can provide indirect support for tourism economy, the most fundamental input of industrial R&D lies in the expansion of production scale, which will lead to the increase of pollution and emissions and affect the EE. This investment in industrial R&D will inhibit the coordinated development of tourism economy and EE.

### 3.5. Specific Promotion Strategies for the Coordination and HQD of Tourism and EE in the YRB

Promoting industrial upgrading and green development, ensuring that the key ecological functional areas provide high-quality ecological products, and strengthening the construction of infrastructure system with water as the core are the main strategies for the YRB to give full play to the comparative advantages of various regions and promote the coordinated development of EE protection and economy and society.

Strengthen the protection of key ecological function areas. The YRB is rich in natural resources and has magnificent and beautiful scenery. Need to deepen the implementation of CT and EE requirements and HQD strategy in YRB, strengthen the protection of key ecological function areas, and lay a solid foundation for providing high-quality ecological products. Under the guidance of modern river basin development thought, fully consider the national land spatial pattern, as well as the natural, and rationally demarcate EE protection zones. Fully consider the differences between the upper, middle, and lower reaches and the different requirements of ecological functions of spatial patterns, determine the zoning protection objectives, and realize the goal of harnessing the Yellow River ecology in the upper, middle, and lower reaches and different spatial patterns according to the local conditions. Actively explore the R&D and integration of eco-environmental protection technology and provide support for systematically solving the whole basin eco-environmental protection problems.

Strengthen the construction of infrastructure system with water as the core. Improve the construction of flood control and disaster reduction system to ensure the safety of river basin. The hidden danger of water disaster in the Yellow River is like a sword hanging over his head, and he cannot let his guard down at all. Strengthen the comprehensive improvement and management of rivers and beaches; strengthen the protection works of key river sections to ensure the safety of key areas. Improve urban water supply and drainage and agricultural water conservancy infrastructure and promote the economical and intensive use of water resources. Take water resources as the biggest rigid constraint, rationally plan the development of population, cities and industries, resolutely curb unreasonable water demand, vigorously develop water-saving industries and technologies, vigorously promote agricultural water saving, implement water-saving actions of the whole society, and promote the transformation of water use mode from extensive to intensive.

Following the principle of difference and cooperation, the YRB still needs to vigorously develop its own cultural resources. For cities in the stage of barely coordinated, optimizing the comprehensive space environment, improving public facilities and services, and effectively marketing tourism resources are important ways to improve the system coordination. Build a multi-level cooperation platform. Through major project construction, tourism route expansion, cooperative marketing and promotion, and academic seminar on the Yellow River culture, need to deepen the continuous cooperation between YRB enterprises, and gradually establish a benign cooperative relationship of information exchange, product complementarity, marketing interaction, and mutual exchange of tourists among regions, thus forming a situation of close connection and virtuous circle among regions. Shape the brand image of the Yellow River culture, build a series of unique cultural tourism circles with the Yellow River culture as the core, and turn the YRB into a cross-regional, comprehensive, thematic, and influential cultural tourism destination at home and abroad.

Strengthen energy management and reduce energy consumption. Energy shortage is one of the main factors that

### Table 4: Regression results of influencing factors of coupling coordination degree between tourism and EE.

| Variable                  | Coefficient of regression | Standard error | T value | P value |
|---------------------------|---------------------------|----------------|---------|---------|
| Constant                  | 0.332***                  | 0.041          | 8.214   | 0.000   |
| Government control power  | 0.217***                  | 0.044          | 4.425   | 0.000   |
| Industrial structure      | 0.046***                  | 0.051          | 5.016   | 0.000   |
| Natural disaster          | 0.168                     | 0.053          | 3.017   | 0.427   |
| Population size           | 0.155***                  | 0.040          | 4.418   | 0.000   |
| The standard of living of| 0.157***                  | 0.047          | 3.369   | 0.000   |
| Industrial R&D investment | −0.127*                   | 0.058          | −2.019  | 0.411   |

Note. "***" and "**" are also significant at 0.001 and 0.05 levels, respectively.
hinder the HQD of the YRB, and excessive use or even abuse of energy resources is a bad behavior that needs urgent treatment in the process of HQD at present [23]. The degree of energy utilization is gradually increasing. If it is not controlled, the energy resources reserve in the YRB and even the energy resources stock in China will be exhausted. Therefore, local governments in the YRB should strengthen the right to control and control the usage of energy resources, require enterprises to use nonrenewable resources such as coal, oil, and fossil fuels scientifically and rationally, carry out in-depth work on energy conservation and consumption reduction, reduce energy consumption, strengthen energy recycling, reduce energy consumption from the source, and ensure that there are enough energy resources reserves in the YRB.

Promote the deep integration of culture and tourism. First, carry out the general survey of cultural tourism resources in the whole region, dig deep into Inner Mongolia’s excellent traditions and national essence, create excellent tourism products with national cultural heritage and the spirit of the times, develop tourism products with cultural connotations, and promote tourism to become an important channel for spreading excellent traditional national culture. The second is to build a number of autonomous regional cultural parks, such as the Yellow River Cultural Park, and combine the construction of cultural parks with the promotion of Chinese excellent traditional culture, and with the protection, inheritance, and utilization of cultural relics and relics resources to create high-end cultural tourism business cards along the Yellow River [18]. Third, vigorously develop red tourism, focus on developing YRB red resources, and build YRB red education base. The fourth is to build a number of Yellow River cultural and tourism development demonstration projects, support the development of cultural tourism complexes, promote the development of tourism performing arts in cities and scenic spots, and launch a number of special cultural tourism routes such as rock painting tours and Great Wall hiking tours.

4. Conclusion

In this paper, by constructing the evaluation index system of tourism and eco-environment coordination and HQD, the comprehensive measurement of tourism and eco-environment coordination and HQD level in nine provinces and regions in the YRB is made, and its temporal and spatial evolution characteristics are analyzed. The following main conclusions are drawn:

(1) From the evaluation value and comprehensive evaluation value of tourism economy and EE in nine provinces and regions of the YRB, from 2014 to 2020, the evaluation values of tourism economy and EE in the YRB show an increasing trend, but the growth rate of tourism economy is obviously higher than that of EE. The ecological evaluation value fluctuates up and down, the level of EE rises slowly, and the comprehensive evaluation index of tourism economy-EE has experienced the growth process of “fast-slow-fast”.

(2) On the whole scale, the HQD level of economy, the quality level of EE, and the coupling and coordinated development level of the two in the YRB have been improved in different degrees during the inspection period, showing the coordinated development and evolution trend of “antagonism-running-in” and the relative development and evolution trend of “HQD of economy-simultaneous development-EE lag”.

(3) EE and HQD coupling in the YRB during the investigation period has significant spatial agglomeration characteristics, but there is a weak spatial positive correlation. Locally, the spatial agglomeration modes of the coupling coordination degree between tourism and EE and HQD in most areas of the YRB are mainly high-high agglomeration and low-low agglomeration, and the local spatial positive correlation is gradually increasing. Government control, industrial structure (proportion of tertiary industry), population size, and people’s living standard all have significant positive effects on the coupling and coordinated development of local tourism economy and EE.

4.1. Shortcomings. The index system of coupling CT and EE and HQD in the YRB needs to be improved. Due to the availability of data, some indicators cannot be included. In the follow-up research, 10,000 patents, the proportion of enterprise R&D investment in operating income, the environmental quality compliance rate of surface water, the annual average concentration of inhalable fine particles, and the proportion of environmental pollution control investment in GDP will be included in the YRB index system of coupling coordination between EE protection and HQD.

Data Availability

The figures and tables used to support the findings of this study are included in the article.

Conflicts of Interest

The author declares that are no conflicts of interest.

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