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Retraction

Retracted: Dynamic Analysis of Sustainable Development of Agritourism Based on Cluster Analysis Algorithm

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] Y. Xu, "Dynamic Analysis of Sustainable Development of Agritourism Based on Cluster Analysis Algorithm," *Wireless Communications and Mobile Computing*, vol. 2022, Article ID 2293653, 8 pages, 2022.

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Review Article

Dynamic Analysis of Sustainable Development of Agritourism Based on Cluster Analysis Algorithm

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Agricultural cultural heritage is cultivated by nature and human farming civilization together, and the historical and cultural values it contains still affect the survival and development of human beings; so, it is important to protect agricultural cultural heritage and promote its sustainable development. This paper reviews, collates, and summarizes the research on agricultural cultural heritage and sustainable development of tourism by scholars and experts at home and abroad, and on the basis of relevant theories and with reference to previous research results, adopts hierarchical clustering algorithm to cluster and decompose the attractions preferred by tourists, and then uses the improved density method to search for nearby attractions that meet the requirements in different regions with different search radii, so as to provide tourists with optimal tourism planning and thus provide the optimal tourism planning for tourists. The evaluation index system of sustainable development potential of agricultural cultural heritage tourism is established from four aspects: sustainability of heritage resources, sustainability of tourism environment, sustainability of tourism economy, and sociocultural sustainability. The evaluation index system and evaluation criteria of sustainable development potential of agricultural cultural heritage tourism established in this paper have certain reference value and universality for most agricultural cultural heritage.

1. Introduction

Agricultural cultural heritage is an emerging type of heritage, and along with its popularity, academic research on agricultural cultural heritage in China has also been developing [1]. From the results of the literature collected and compiled through literature exploration, there has been a considerable amount of research on agricultural cultural heritage and sustainable tourism development in the academic field in China, but the research on agricultural cultural heritage from the perspective of sustainable tourism development is relatively rare and mostly qualitative. In this paper, we use hierarchical analysis to establish an index system for evaluating the sustainable development potential of agricultural cultural heritage tourism and evaluate the sustainable development potential of agricultural cultural heritage tourism by scoring agricultural cultural heritage by experts and using quantitative analysis [2]. In this way, more scientific and reasonable development measures can be formulated to protect and develop agricultural cultural heritage and promote the sustainable development of rural economy [3]. The purpose of this paper is to fill some gaps in the research on agricultural cultural heritage, provide some theoretical basis and scientific guidance for the conservation and development of agricultural cultural heritage, and offer suggestions for the sustainable development of agricultural cultural heritage tourism [4].

Agriculture is the foundation of social and economic development and an important part of China's national economy. China has been an agricultural country since ancient times, with a long history of farming civilization for thousands of years, and agricultural culture is one of the cultural treasures of our Chinese nation [5]. The agricultural cultural heritage preserved to this day is not only the historical crystallization of farming culture but also a true depiction of the development of material civilization and the basis of contemporary ecological agriculture [6]. The development of agricultural cultural heritage tourism can not only inherit traditional farming civilization and promote agricultural culture but also enrich the type of tourism products, while promoting the integration of primary and tertiary industries to achieve joint sustainable development, so that economic and social benefits can obtain the maximum growth [7].

The above background analysis shows that the source of this paper is based on the conservation and development of agricultural cultural heritage and follows the concept of sustainable development [8]. The introduction of cluster analysis into the intelligent tourism planning, for example, when tourists choose a tourist attraction, the class of the attraction, the weight of the attraction, the distance of the attraction from the departure point, the proposed travel time of the attraction, and other attractions data set of multiple evaluation indicators, cannot be classified according to an indicator [9]. By introducing the cluster analysis algorithm, it is possible to cluster the scattered attraction data sets into several class clusters according to the natural attributes of the attraction sets and then analyze each class cluster to achieve the optimal tourism planning scheme. The selected topic of evaluation of sustainable development potential of agricultural cultural heritage tourism and countermeasure research is of certain significance for both theory and reality; so, this paper is chosen.

2. Related Work

At present, the comprehensive evaluation of agricultural cultural heritage has not yet formed a unified standard. Agricultural cultural heritage is a kind of heritage resource that contains both natural and human factors [10]. When agricultural cultural heritage resources are combined with tourism and the evaluation of its tourism sustainable development potential, a scientific method needs to be applied to the study. The construction of the evaluation index system about the sustainable development of tourism is usually studied by using hierarchical analysis [11]: using hierarchical analysis to study the current situation, characteristics, and management mechanism of tourism resources in Wutai Mountain to construct an evaluation model, so as to propose countermeasures for the sustainable development of cultural tourism in Wutai Mountain.

Using Delphi techniques and hierarchical analysis, 33 measurable indicators of sustainable development of rural tourism were developed from four perspectives: service quality, facilities, management systems, and expenditures. [12] used a modified Delphi technique to develop a total of 125 measurable regional tourism sustainable development indicators in six dimensions: political, social, ecological, economic, technological, and cultural dimensions. [13] proposed a system of indicators to evaluate the sustainable development of tourism in cultural tourism destinations in three dimensions: social, economic, and environmental, a composite indicator constructed based on a goal-based planning approach and illustrated with the example of a cultural tourism destination in the Andalusian region of Spain [14]. Based on the index system of literature search, a preliminary list of indicators was compiled and then validated by the Delphi method to establish a local level tourism sustainability evaluation index system including social

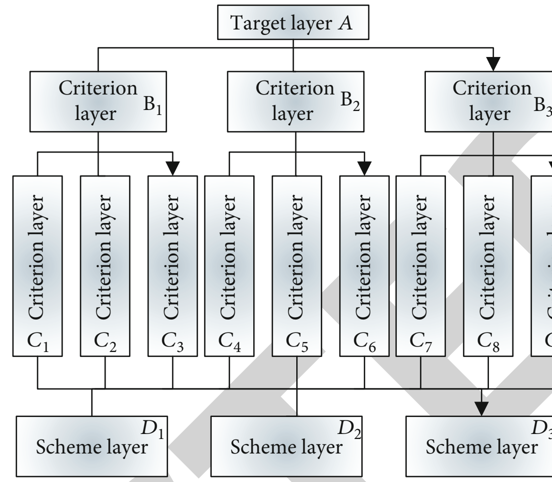

Figure 1: Hierarchy of indicators.

Table 1: Judgment matrix.

A	B_1	B_2	...	B_{1n}
B_1	B_{11}	B_{12}	...	B_{1n}
B_2	B_{21}	B_{22}	...	B_{2n}
...	...	...	...	...
B_n	B_{n1}	B_{n2}	...	B_{nn}

and economic as well as environmental dimensions. [15] used the fuzzy Delphi method to identify key dimensions and indicators, examined the relative weights of these dimensions and indicators using hierarchical analysis, and identified 141 indicators of sustainable wetland tourism. [16] concluded that there are already more static composite indicators to evaluate sustainable tourism development and thus improved the static indicators on this basis by proposing a vector composite indicator, called the Differential Dynamic Index (DDI) to assess the level of sustainable tourism development in tourism destinations. [17] established a tourism sustainability evaluation index system through hierarchical analysis to evaluate the tourism sustainability power of Qingdao and also proposed strategies for its development. [18] elaborated the relationship between the tourism sustainable development system and its constituent elements and established the system evaluation factor index system of tourism sustainable development [19]. On the basis of the sustainable development of tourism in the ancient town, a total of 27 evaluation indicators from four levels of resources, society, economy, and environment are used in the hierarchical analysis method to constitute the evaluation index system of sustainable development of tourism in the ancient town of Walking Horse, Chongqing [20]. From the perspective of industrial economics, the hot spring tourism sustainable development evaluation index system was established from four aspects: resource endowment, social economy, industrial economy, and market potential, and an example analysis was conducted for Xianning Hot Spring.

Table 2: Judgment matrix 1-9 scales and definitions.

Importance scale	Definition
1	i and j are equally important when compared
3	i and j factors are compared, and the former i factor is slightly more important than the latter j factor
5	i and j factors are compared, and the former i factor is more important than the latter j factor
7	The former factor is obviously more important than j factor
9	i and j factors are compared. The former i factor is absolutely more important than the latter j factor
2, 4, 6, 8	i and j are compared, which is the middle value of the above two adjacent judgments
If the importance ratio of factor i to factor j is an, then the importance ratio of factor j to factor i is	
Reciprocal	$a_{ji} = 1/a_{ij}$

3. Evaluation Index System

Analytic Hierarchy Process (AHP) was proposed by Professor T.L. Salty, an American operations researcher, in the 1970s, which applied mathematical methods to social sciences and combined the accuracy of mathematical analysis with the thinking process and laws of human decision-making, i.e., the method of combining qualitative and quantitative analysis. The process of hierarchical analysis is as follows: select evaluation indexes, establish index hierarchy, construct judgment matrix, then ask experts to compare the importance between two factors, calculate weights, conduct consistency test, and finally analyze the results.

3.1. Selecting Indicators to Establish Hierarchical Structure. The following indicators can be seen in Figure 1.

3.2. Construction of Judgment Matrix. Experts were asked to compare the importance of each influencing factor (Table 1), and the importance scale was assigned according to the scale of 1-9 (Table 2).

When filling in the 1-9 judgment matrix, one generally fills in the $a_{ij} = 1$ part first and then just compares and fills in the upper or lower triangular part (i.e., the $n(n-1)/2$ term factor). The completed judgment matrix is $A = (a_{ij})_{n\times n}$ and satisfies $a_{ij} > 0, a_{ij} = 1/a_{ji}, a_{ii} = 1$.

3.3. Calculation of Weights. After the expert fills in the judgment matrix, some mathematical method needs to be applied to calculate the weight of each factor of each judgment matrix. The calculation methods of weights usually include sum-product method, square root method, and power method. In this paper, the sum and product method is mainly used to solve the problem. The principle of the sum-product method is to normalize each column of the judgment matrix to get the corresponding value and then normalize it again by row summation to get the weight and calculate the maximum characteristic root.

The specific steps are as follows.

First, each column of the matrix is normalized to obtain.

$$\overline{w_{ij}} = a_{ij} / \sum_{i=1}^{n} a_{ij}. \tag{1}$$

Second, for the judgment matrix, which has been normalized by column, each row is summed.

$$\overline{w_i} = \sum_{j=1}^{n} \overline{w_{ij}}. \tag{2}$$

Then, the summed vectors are normalized again as follows.

$$\overline{w_i} = \frac{\overline{w_i}}{\sum_{i=1}^{n} \overline{w_i}}. \tag{3}$$

The resulting $W = [W_1, W_2, \cdots, W_n]^T$ is the desired eigenvector.

Finally, the maximum eigenroot is calculated as

$$\lambda_{\max} = \frac{1}{n} \sum_{i=1}^{n} \frac{(Aw)_i}{w_i}. \tag{4}$$

3.4. Consistency Test. Each judgment matrix needs to be tested for consistency, only the logic of the judgment matrix that has passed the consistency test is reasonable, and only then can the results be analyzed subsequently. The specific steps of the consistency test are as follows.

First, calculate the consistency index C.I..

$$\text{C.I.} = \frac{\lambda_{\max} - n}{n - 1}. \tag{5}$$

Then, the corresponding average random consistency index R.I. was obtained by querying the table of average random consistency indexes R.I. (Table 3).

Finally, the consistency ratio C.R. is calculated while making the judgment that

$$\text{C.R.} = \frac{\text{C.I.}}{\text{R.I.}}. \tag{6}$$

If C.R.<0.1, the consistency test of the judgment matrix is passed, and if C.R.>0.1, the consistency test of the judgment matrix is not passed, and the judgment matrix needs to be revised until the judgment matrix can pass the consistency test.

Table 3: Table of average stochastic consistency metrics R.I. (1000 times positive and negative matrix calculation results).

Matrix order	1	2	3	4	5	6	7	8	9	10	11	12	13
R.I.	0	0	0.55	0.91	1.13	1.27	1.42	1.45	1.51	1.49	1.53	1.55	1.57

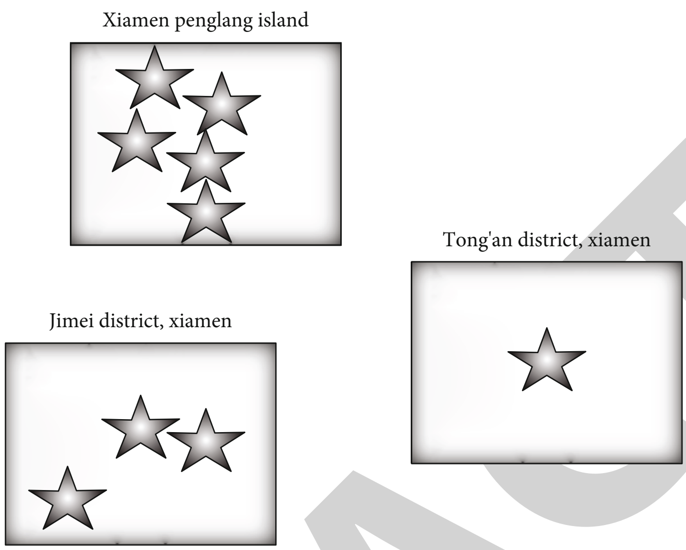

Figure 2: A simple diagram of the distribution density of Xiamen attractions (where the pentagram represents the attractions, and the size of the pentagram indicates the size of the attraction weights).

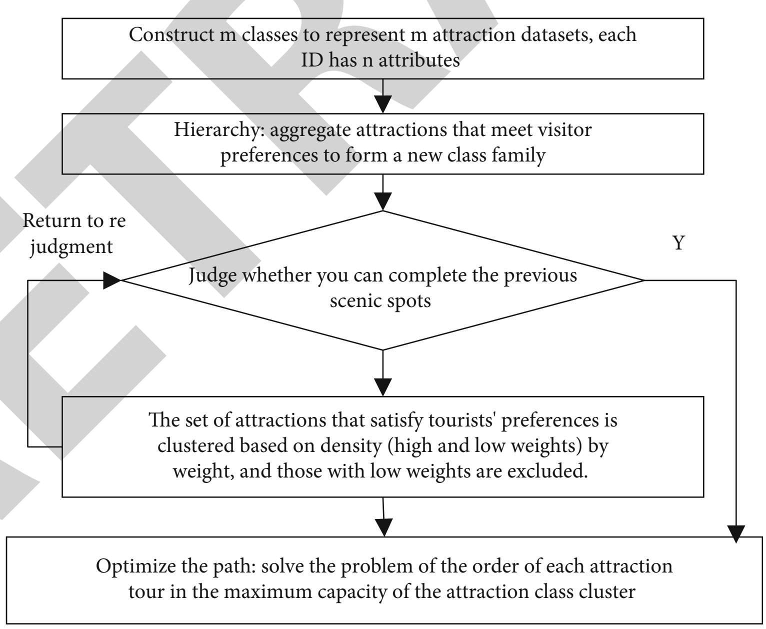

Figure 3: Flow chart of algorithm implementation.

4. Clustering Analysis Algorithms

4.1. Environment Deployment Using Clustering. For intelligent tourism planning, the set of classes is the dataset of each attraction, for example, there are m attraction datasets (X_1, $X_2, X_3, \cdots, X_m$). Each dataset has n variable attributes, including the class of the attraction (belonging to one or more of heritage sites, nature, museums and exhibitions, leisure and recreation, etc.), the weight of the attraction in the class, and the proposed stay time of the attraction. The clusters of attraction sets and their variable attributes can be represented in the following matrix:

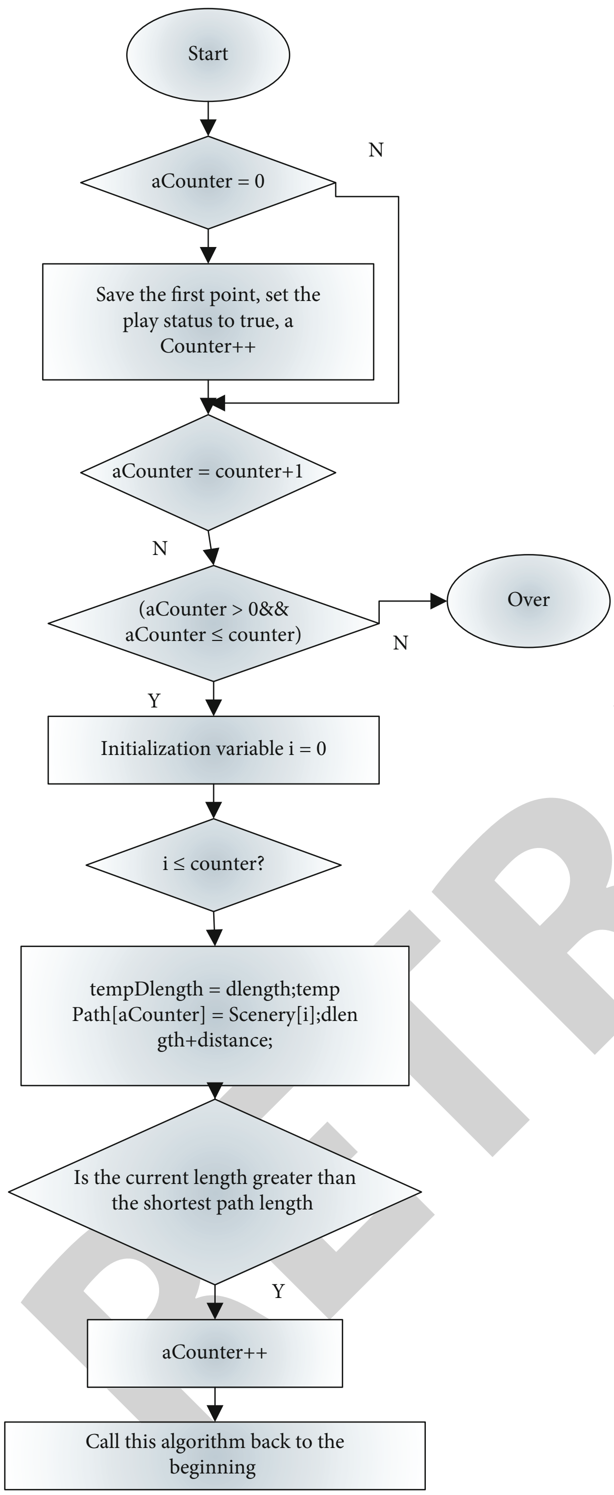

Figure 4: Algorithm flow chart of realizing optimized path.

$$X = \begin{bmatrix} X_{11} & X_{12} & \cdots & X_{1n} \\ X_{21} & X_{22} & \cdots & X_{22} \\ \cdots & \cdots & \cdots & \cdots \\ X_{m1} & X_{m2} & \cdots & X_{mn} \end{bmatrix}, \quad (7)$$

where X_{mn} denotes the n-th attribute of the m-th attraction.

Table 4: The scale change of leisure agriculture and rural tourism market in China.

Year	Total revenue/10000 yuan	Number of receptionists/10000 people
2012	130	3.5
2013	138	3.6
2014	155	4.2
2015	>155	6.5
2016	185	7.5

Table 5: The scale change of leisure agriculture and rural tourism market in Langya Mountain.

Year	Total revenue/10000 yuan	Number of receptionists/10000 people
2012	85	3
2013	240	7.5
2014	355	13.4
2015	475	27
2016	645	43

4.2. Improved Algorithm. For the intelligent tourism planning system, a hierarchical and density-based clustering algorithm is used. The improved algorithm has the following two outstanding advantages: firstly, it solves the memory and I/O overhead problems by using hierarchical clustering to decompose the given attraction dataset in a hierarchical way, for example, if a cultural monument is selected according to the attraction's genus, the attraction dataset satisfying this attribute is firstly decomposed in the attraction dataset and further clustered to output a hierarchical classification tree. Secondly, different Eps values are used for different regions. For example, in Xiamen, a famous tourist city on the west coast of the Taiwan Strait, the densely populated areas are Gulangyu Island and the vicinity of the island road, where the Sunlight Rock, the Peasant Garden, the Xiamen Museum and the South Putuo, Xiamen University, the White City Beach, and the Huli Mountain Fortress near the island road are all famous attractions in Xiamen, while the attractions in Tongan and Xiangan outside the island are relatively sparse, and only Tongan Film City and Fantian Temple in Tongan have large tourism weights [21–23]. The only attractions in Tongan are Tongan Film City and Fantian Temple. In areas with a large density of attractions, if you choose too large Evps value, then the closer and the weight (MinPts) of the larger attractions are likely to be treated as the same attraction, resulting in some of the larger weight of important attractions in the tourism program is ignored; so, you can search for attractions in areas with a greater density of attractions in accordance with the smaller Eps value, such as the island of Gulangyu can use 0.5 km as Eps. For example, on Gulangyu Island, the Eps of 0.5 km can be used to search for nearby attractions, the Eps of 1 km can be used to search for attractions on the first line of Huandao Road, and the Eps of other areas can be used. The following

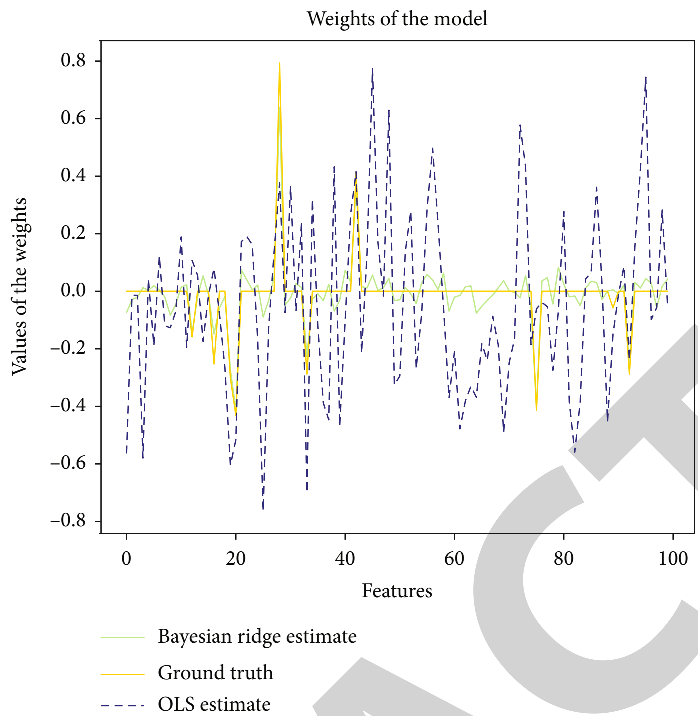

Figure 5: Clustering effect.

is a schematic diagram of the distribution density of attractions in Xiamen Gulangyu Island, Jimei District, and Tongan District as shown in Figure 2.

The basic steps of algorithm implementation are shown in Figure 3.

Figure 4 shows a subdiagram that implements the final step of the flowchart to optimize the path.

As the tourism planning involves more factors, such as the different ways of arrival of tourists, the different levels of consumption of tourists, the different stars of hotels, how to find the right restaurant to eat in the vicinity when visiting various attractions, and how to arrange the meal time, all these factors will affect the final tourism plan given by the tourism plan; so, we can only say that the plan given is feasible, and the better plan needs to further optimize the system to give a better tourism planning plan.

5. Rural Tourism Revenue

In recent years, Chinese consumers have further rationalized their understanding of tourism and have become more rigorous in their choice of leisure and vacation modes. Under the conditions of the new development period, the emergence of rural tourism and leisure agriculture can precisely meet the psychological requirements of domestic consumers. The development of leisure agriculture and rural tourism products is very strong, the scale of operation of established leisure agriculture and rural tourism areas in China is expanding, and new leisure agriculture and rural tourism projects are competing to start and gradually improve their infrastructure (Table 4). Rural tourism and leisure agriculture in China have been born in response to the current situation and have become a new driving force for the development of the tourism economy in recent years. In addition, in terms of spatial layout, rural tourism and leisure agriculture are mainly located in the suburbs of cities, remote scenic areas far away from tourists, and remote and poor areas where the old and young populations are concentrated, and the development of the economy in these areas is important for solving the "three rural" problems that have existed in China for a long time and to which the country attaches great importance [24–26]. Therefore, the rapid development of rural tourism and leisure agriculture in China has become inevitable.

With the beautiful scenery and the historical heroic story of the "Five Heroes of Wolfram and Teeth Mountain," the Wolfram and Teeth Mountain Leisure Agricultural Park in Yi County, Baoding City, Hebei Province, attracts tourists' eyes. Wolfram and Teeth Mountain Leisure Agricultural Park is one of the 100 red classic scenic spots in China. Since the beginning of the 21st century, the people of Wolfram and Teeth Mountains area, based on the unique resource advantages of Wolfram and Teeth Mountains and with the construction goal of "carrying forward the red culture and building a tourism boutique", have persistently relied on Wolfram and Teeth Mountains Zhongkai Group to vigorously develop diversified and modernized new tourism modes and new industries. With the gradual completion of the 10,000 mu flower sea leisure agriculture park project, the tourism characteristics of "seeing mountain flowers in spring and feeling green in summer, enjoying red leaves in autumn and playing snow in winter" have been formed. The development of rural tourism and leisure agriculture in Wolf Tooth Mountain in Yi County has brought many benefits to the local people. It has boosted the overall economic growth of Yi County, solved the employment problem of migrant workers, promoted the local employment of migrant workers, and attracted many aspiring young people to start their own businesses back home. The development of rural tourism and leisure agriculture in Wolf Tooth Mountain of Yi County plays a major role and an irreplaceable role in adjusting the rural industrial structure of Yi County, transforming the way of realizing the economic function of agriculture, and pulling the development of tourism service industry in the third industry of Yi County. In the past five years, the sales and tourist arrivals of Wolverhampton tourism have been increasing (Table 5). According to statistics, the total business income of Wolverhampton's leisure agriculture business entities reached 6.4 million yuan in 2016, receiving 420,000 visitors and driving nearly 20,000 farmers to benefit.

With the rapid development of science and technology, agricultural modernization, and economic development, traditional farming civilizations in many places are threatened to be replaced and gradually become extinct. China was one of the first countries to respond to and actively participate in this heritage project. A total of 15 projects were subsequently inscribed on the list, making China the first country in the world in terms of the number and type of projects inscribed. After the Ministry of Agriculture started the excavation and protection of China's important agricultural cultural heritage in 2012, the first batch of 19 Chinese important agricultural cultural heritage has been attached great importance to its protection, and in this context, it is practical and meaningful to research, protect, develop, and utilize the agricultural cultural heritage, see Figure 5.

6. Conclusion

The development of tourism is an effective way of dynamic conservation and adaptive management of agricultural cultural heritage. Combining agriculture with tourism can not only bring into play the economic value of agricultural cultural heritage resources beyond its agricultural production value through exploitation but also enable the promotion and protection of its historical and cultural values and promote its sustainable tourism development. The development of agricultural cultural heritage tourism is also conducive to optimizing and adjusting the industrial structure, promoting the integration of local primary, secondary, and tertiary industries, accelerating the synergistic development of rural and urban economies, increasing employment opportunities for farmers, widening income generation channels, helping farmers in heritage sites to escape poverty, and promoting the sustainable economic development of heritage sites.

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 author declares that he/she has no conflicts of interest regarding this work.

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