Upgrading Island Tourism Value from the Perspective of the Tourist Experience—A Case Study of Tianheng Island, China

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Abstract: Although island tourism is vital to the economy of developing countries, many islands with great potential for tourism development do not plan for it adequately. The objective of this paper is to establish an island tourism value mining and promotion model from the tourist perspective by selecting the status value indicators of basic conditions, vacation tourism resources, and sightseeing tourism resources, as well as the promotion indicators of five types of recreational fisheries, including beach activities, recreational fishing, marine sports, rock climbing, and sightseeing platforms. Then, we evaluate the whole island and develop suitable areas by using an analytic hierarchy process. This study took Tianheng Island as an example and divided the study area into grids and land use types. The results indicate that the basic conditions and tourism resources of Tianheng Island are in a general level, and the vacation tourism resources are in high quality, while there is further room to improve them. We identified that the island has four areas which are suitable for scenic development, two sandy beaches, two recreation fishing areas, one marine sports area, and one island rock climbing area. Our findings are consistent with the actual situation in Tianheng Island, demonstrating that the model is practical and can provide an essential reference for the scientific protection and utilization of island tourism resources.

Keywords: tourist perspective; island tourism; value evaluation; tourism planning; Tianheng Island

1. Introduction

Island tourism refers to tourism activities developed based on regional space and cultural tourism resources of islands to meet the needs of tourists and local social, economic, and cultural development [1–3]. Islands with unique cultural heritage and natural environments can attract a large number of tourists every year [4,5]. Therefore, tourism can be an essential strategy for island economic development [6]. Tourism helps spread an island’s culture [7] and promotes the construction of its infrastructure [8]. Thus it can be a powerful engine of its economic development [9].

In recent years, with the development of the economy, the tourism industry of many developing countries has been booming [10], particularly on their islands [11,12]. Amid the impact of the COVID-19 pandemic on tourism, islands that offer more personalized travel to domestic visitors in these countries have gained attention from developers [13]. In order to cope with the impact and challenges brought by the epidemic, managers should formulate more targeted and competitive island tourism development strategies [14–16]. However, many islands in developing countries are still in the initial stages of development...
of leisure and sightseeing opportunities and exploration of their tourism potential and value [17]. Since the island natural resources stock is limited, islands with stagnant or underdeveloped economies can have a decline in tourism [18], and improper development can significantly negatively impact their environment and resources [19,20]. Therefore, an important problem for the island tourism industry in these countries is how to reasonably plan island tourism resources and explore the value of the islands that are having trouble in developing tourism [12].

Tourists are the main economic source of the tourism economy [21] and the biggest influencer in the island tourism industry [22]. Their views on tourist destinations are based on both experience and destination cognition [23,24]. The tourist experience is formed through activities conducted while visiting the destination [25,26]. Many studies have pointed out that tourists’ perception of the island destination’s image is very important, and the amusement provided by an island is the crucial factor affecting it [27–29]. Providing tourists with a wider range of tourism experiences is an important direction of development of island tourism for the future [28]. Therefore, evaluating how tourists’ amusement is developed can help improve the value of the island tourism offering. For managers, establishing an evaluation model of island tourism development from the perspective of tourists is an effective method to solve the problem of island development.

The analytic hierarchy process (AHP) was applied to identify the main influencing factors, and the weight of each factor was determined based on the results of the expert questionnaire survey. The patch division of the study area was carried out by combining the rasterization of the equal size of the surrounding sea and the patching of land use types on the islands. This paper aims to build a refined suitability evaluation model of island tourism resources based on functional orientation and overall land–sea planning, and takes Tianheng Island as an example to quantitatively evaluate its tourism value and put forward countermeasures and suggestions. Through model construction and example analysis, the paper provides a scientific basis and reference for exploring the value of island tourism, further enriching and improving the tourism suitability evaluation method of island blocks, and realizing the diversified and sustainable development of island tourism.

2. Overview of the Study Area and Data Acquisition

2.1. Study Area

Tianheng Island is one of the three inhabited islands off the coast of Qingdao in Shandong Province, China. The island is located at 36°25′ N and 120°58′ E in Heng Men Bay of the Yellow Sea and covers an area of about 1.262 km², with an east–west width of 3 km and a north–south length of 0.43 km (Figure 1). Around the island, there are nearly 700 hectares of shallow sea aquaculture and 80 hectares of beach areas; its fishery resources include abundant fish, shrimp, crabs, and jellyfish. The shorelines are mainly bedrock and gravel. There are three natural villages on the island, located separately in the eastern, central, and western part.

In 1991, Tianheng Island was listed as one of the 26 pilot development islands in China. After six years of development from 1992 to 1997, it was awarded the national A-level scenic spot in 2001 [24]. In 2020, due to a gradual decline in tourism popularity, there arose a second round of development in Tianheng Island. Therefore, this study selected Tianheng Island as a case study according to its potential for development, despite development currently being in a state of stagnation.
2.2. Data Source

The remote sensing data used in this study were obtained from on-site unmanned aerial vehicle photogrammetry collected in January 2021, with a resolution higher than 0.5 m. Aerial images were obtained from a drone survey of the island conducted by the First Institute of Oceanography of the State Oceanic Administration of China in January 2020. The data on sediment, water quality, primary productivity, and biological quality were collected from the environmental quality survey conducted by Yan Tai Marine Environment Monitoring and Prediction Center in May 2019 and the Ocean University of China in September 2019. The remaining data were obtained from three survey visits to the island between January and September 2021.

3. Island Tourism Value Evaluation-Upgrading Model

The actual development status confirms whether the entire island has development value [30]. A reasonable division of the study area is conducive to further zoning upgrading. Thus, the model used in this study was divided into three parts: island tourism value evaluation, refinement partitioning, and upgrading. Firstly, the value evaluation of recreational fishery on the entire island was carried out to determine whether the island has development potential and the direction of future development. Then, the island and surrounding waters were divided into regions. Finally, each sub-region was evaluated, and the specific development sites of each recreational fishery project were evaluated.

3.1. Model Method

3.1.1. AHP

AHP is a combination of qualitative and quantitative methods used to determine rank weights and guide decision making. The core of the method is to classify the samples according to the degree of superiority and disadvantage. This method can be used to prioritize specific indicators and provide a decision basis for decision makers.

The specific steps are as follows:

The first step is to construct the hierarchical matrix. We usually divide the sample indicators into target layer, standard layer, and indicator layer. The highest level is the target layer, and the middle level is the standard layer. Specific indicators are classified according to the attributes of each indicator and some standards, and each attribute is an item of the standard layer. Below the criterion layer is the index layer, which is the selected specific index.

The second step is to construct the judgment matrix. From the criterion level, pairwise comparison is made on one element above K elements of the same level as the criterion, and the relative importance degree of the elements is assigned to establish the judgment matrix.
matrix. Each element of the matrix represents the index $X_{ik}$ on the horizontal axis, and the relative importance value of the index $X_i$ on the vertical axis is expressed by 1, 3, 5, 7, 9, or its reciprocal.

Thirdly, the index weight coefficient is calculated. The index weight coefficient is the eigenvector of the matrix and is denoted by $i$. The weight coefficient value of each indicator is the ranking vector of the weight of each indicator.

1. Calculate the product of the elements in each row of each judgment matrix $Z_i$ ($i = 1, 2, \ldots, k$); the formula is:

$$Z_i = \prod_{j=1}^{k} Y_{ij}$$  \hspace{1cm} (1)

2. Calculate the m-th root of $Z_i$ each row; the formula is:

$$W = \sqrt[k]{Z_i}$$  \hspace{1cm} (2)

3. Normalize the vector $W$; the formula is:

$$w_i = \frac{W_i}{\sum_{j=1}^{k} W_i}$$  \hspace{1cm} (3)

The importance of each basic index was compared pairwise based on the actual situation of the research area, and a 1–9 scale was used to construct the judgment matrix in the questionnaire. The greater the value, the greater the importance. Then, the eigenvector of the judgment matrix and the maximum characteristic root were calculated, and the consistency test was carried out. This questionnaire mainly includes 8 criterion layers and 37 factor layers, among which the criterion layer mainly includes basic conditions and tourism resources, etc., and the factor layer includes geographical location and transportation, etc.

3.1.2. Refinement Partitioning Method

At present, island study areas are divided into square grids [31], administrative regions [32], landscapes [33–35], and land use types [36]. These do not fully consider fundamental factors, such as an island’s actual development and utilization status and an island’s environmental characteristics of both land and sea. The partitioning methods have some shortcomings, such as poor applicability and weak representativeness. Therefore, in this study, the island was divided into land and sea, and the study area was refined by combining square grids and the current type of development and utilization. The land area of the island was divided according to the land plan issued by the state or the commonly used landscape classification methods. The study area was further divided into regular rectangles to avoid dealing with excessively large land types (Figure 2).

![Figure 2. Approach used to subdivide the study area.](image)

3.2. Value Evaluation

The most significant limitation of island tourism development is its basic conditions, such as location, transportation, water, and electricity. The main purposes of tourism are vacationing and sightseeing [37–39], so this model evaluates island tourism value from three aspects: basic conditions, sightseeing resources, and vacation resources. The
evaluation indexes of various aspects were determined based on referring to previous evaluation methods of island tourism [19,40–42] and discussions with experts.

According to the objectivity, representativeness, and operability principles, specific evaluation factors were selected. AHP was used to issue questionnaires to 20 experts in aquaculture [43], tourism management, and ecology to score the importance of factors. The software SPSS25 was used to analyze the questionnaire and whether the results passed the consistency test. The factor weights are shown in Table 1.

**Table 1.** Island tourism development potential index system, grading criteria, and the performance of Tianheng Island.
For quantifiable factor index items, the model can assign points according to field surveys, the GIS platform, and data, and compare them with scoring standards (Table 1). The expert consultation method was used to obtain the score of the non-quantifiable factor index using the questionnaire survey.

The result of the assignment and the score of development value in each aspect were calculated by using:

\[
A_i = \sum_{i=1}^{n} (B_{ij} \times P_j)
\]

where \(A_i\) is the calculation result of the \(i\)th evaluation aspect, \(B_{ij}\) is the weight of the evaluation factor \(j\) in the evaluation aspect \(i\), and \(P_j\) is the score assigned to the \(j\)th evaluation factor.

Using the Likert five-level scale evaluation method, the final \(E\) value range of the comprehensive evaluation model was \(1 \leq E \leq 5\). The final score \(E\) was divided into five rating scales: 4.5–5 = very good; 3.5–4.5 = good; 2.5–3.5 = medium; 1.5–2.5 points = poor; 1–1.5 = very poor.

3.3. Island Tourism Upgrading Evaluation

Different types of island tourism projects attract different people and need different development conditions [44–46]. Through a literature review, field investigation, and expert discussion, the development projects adopted in the evaluation model in this paper included five categories: beach activities [30], sightseeing platforms, rock climbing, recreational fishing [47], and marine sports [48], which comprehensively reflect the current island tourism project types.

Beach activities include sunbathing, beachcombing, beach sports, and nearshore splashing. The seawater quality around the beach is good, the surrounding scenery is beautiful, and many tourism projects can be developed. Many islands around the world have excellent beach shorelines, which are suitable for tourism development [49,50]. Therefore, beaches have a prominent position among an island’s tourism resources.

Sightseeing platforms include the viewing of natural beauty, historical sites, cultural landscapes and various wildlife, etc. With the development of ecological tourism, an island is appreciated if it presents a quiet environment, unique mountain scenery, and other features. An island should value ecosystems that are suitable for the local climate conditions and that attract sightseeing activities.

Rock climbing refers to climbing activities on the bedrock coast of an island with a significant slope [51,52]. Bedrock islands often have steep coasts and tortuous shorelines, with good rock-climbing conditions. The characteristics of an island are that it has both land and sea, allowing tourists to enjoy the view of the mountains and the sea during rock climbing and providing a pleasing sensory experience.

Recreation fishing includes activities such as fishing, catching, and fish watching. The unique natural conditions of the island make it the most abundant area in recreational fishery resources [53]. There are many fishers on the island, and many residents benefit from recreation fishing, a rapidly developing industry in the process of island fishery structure adjustment. Its contribution rate to the island’s economic development is increasing [54]. As an essential element of island tourism development, recreational fishing has a clear development prospect and great potential.

Marine sports include diving, sailing, and motorboats. As an emerging industry, marine sports are favored by sports tourists for their unique participation and experience [55], which is of great significance to national sports, social and economic development, and cultural exchanges around the world. An island is surrounded by the sea and tends to be far from the mainland, which is conducive to good water quality [56] and diverse hydrodynamic environments. These basic conditions are suitable for the exploitation of marine sports.

Five kinds of activities interact with each other to form an island’s recreational fishery. Factors affecting the development of each project are the same, so this paper used the circle model to reflect the evaluation system (Figure 3).
After processing the data according to Table 2, the results were calculated as:

$$M_{ij} = \sum_{i=1}^{n} (N_{ij} \times Q_j)$$  \hspace{1cm} (5)$$

where $M_{ij}$ is the result of the indicator layer $j$ in the $i$th criterion layer, $N_{ij}$ is the weight of the indicator layer $j$ in the $i$th criterion layer, and $Q_j$ is the score of the indicator layer $j$ in this grid.

To unify the results and compare the regional suitability of project development, the results were standardized in the range 1–5 by using:

$$E_i = 1 + \frac{(M_{ij} - M_{imin}) + 4}{(M_{imax} - M_{imin})}$$  \hspace{1cm} (6)$$

where $E_i$ is the normalization result of the indicator layer $i$, and $M_{imax}$ and $M_{imin}$ are the maximum and minimum values in the calculation results, respectively.
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<tr>
<td></td>
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</tr>
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</table>
4. Results

4.1. Evaluation of Tourism Value of Tianheng Island

The calculated tourism development value scores of Tianheng Island are 2.607 for basic conditions, 2.768 for tourism resources, and 3.556 for resort tourism resources.

Tianheng Island is close to the mainland and has an adequate water and electricity supply. However, there is a single entry to the island. Except for the islanders’ private small speedboats, there is only one fixed shuttle boat that ships twice a day. The island has three hotels and five restaurants with outdated facilities and few beds. Given the poor reception and transportation conditions owing to poor development, it is essential to improve access to the island and improve accommodation and food. The island is tiny, so its development should focus more on the rational use of space.

Tianheng Island has a rich history and extensive cultural landscape. While the island has little shade, the air quality is high. Thus, the sky view is of high value. Human activities and natural, historical relics on the island are scarce, so the humanistic and landscape views should be the main aspects to be highlighted in its tourism promotion and development.

Vacation tourism resources scored the highest among the three. The water quality around the island is excellent, and the fishery resources are relatively abundant. However, with the same problems faced by other middle and high-latitude islands in tourism development, Tianheng Island has a wide variation in average annual temperature. There are restrictions on the number of months suitable for tourism. Despite a long sandy shoreline, erosion and argillization of the sandy shoreline are more severe due to a lack of development planning, and restoration work needs to be done along with vacation tourism development. The vegetation coverage on this island is low, and the ecological condition of the island can be improved through afforestation.

In general, Tianheng Island has mild basic conditions and tourism resources, and decent vacation tourism resources. All three aspects have high potential for improvement.

4.2. Partitioning Result

The island land types were divided by referring to various land classification methods and field survey data, and the boundary of the island’s land area was defined. Then, a square grid of 300 m × 120 m (the same length to width ratio as that of Tianheng Island) was used to divide the study area, forming a grid useful for zoning (Figure 4).

![Figure 4. Island partitioning result.](image)

4.3. Tourism Value Enhancement of Tianheng Island

4.3.1. Sightseeing Platforms

There are four suitable sightseeing platforms for development (Figure 5a). Area no.1 (Figure 6a) is located at the highest point of the island, overlooking the whole island, with the existing attractions “Tianheng Summit” and “Tianheng Statue”. This area can be
developed in combination with existing attractions, such as “Tianheng Seaview”, and the statue can be developed into a viewing platform. Area no. 2 (Figure 6b) is located in the west of the island, facing Laoshan Mountain, which is suitable for sunset viewing; Area no.3 (Figure 6c) is located in the southeast of the island, facing the Yellow Sea, which is suitable for sunrise viewing. Both Areas 2 and 3 are currently not developed, which can be combined in the exploration of the tourism project. Area no. 4 (Figure 6a) is located in the garden of the villa area, where people can view the sea and sky through a wooden gate; thus, it is suitable for taking photos.

Figure 5. Evaluation of each tourism project: (a). Development value of sightseeing platforms; (b). Development value of island rock climbing; (c). Development value of beach activities; (d). Development value of marine sports; (e). Development value of recreational fishing.

Figure 6. Tourism function and field photos for each project. The (a–g) is just for order, no other meanings.
4.3.2. Island Rock Climbing

One suitable area for rock climbing on the island was evaluated by the model (Figure 5d), showing that the most suitable area is small, but the slope and soil quality of the area connected to it were found to be suitable for rock climbing after field investigation (Figure 6d). The attraction “Yishi Well” can be developed as a “Spirit Climbing Project” to enable visitors to experience Tianheng culture.

4.3.3. Beach Activities

There are two areas suitable for the development of beach activities (Figure 5c). Area no. 6 (Figure 6e) is a broad beach with a gentle slope, available for further development. Fieldwork revealed that this area is currently used for mooring of fishing boats on the island, and that there are problems with household garbage and muddification of the beach. A new fishing port should be provided for fishermen to focus on the stakeholders and the island’s garbage disposal capacity and beach maintenance should be carried out to improve its quality. Area no.7 is a mud beach (Figure 6g), an abandoned breeding pond with high biomass, suitable for developing fishery projects.

4.3.4. Marine Sports

There is one area suitable for marine sports (Figure 5d), located in the southeast of the island. The water depth is 7–9 m and the current speed is slow, making it suitable for diving programs that attract tourists who aim to experience leisure sports and sightseeing. However, the space for its development is small and limited in practice.

4.3.5. Recreational Fishing

There are two areas suitable for the development of recreational fishing (Figure 5e). Area no.9 is located in the southeast of the island and is large enough for marine fishing and beachcombing. Although Area no.10 does not present the highest suitability for development, this area has the highest rating among the coastal areas (Figure 6f) and is currently an abandoned mariculture pond with many reefs that are suitable for rock fishing.

The most suitable areas for each tourism development project in Tianheng Island are summarized in Figure 6. The area suitable for recreational fishing is the largest and can be the main tourist project developed on Tianheng Island. Since the areas suitable for marine sports and recreational fishing are connected, they can be developed simultaneously.

5. Discussion

Although the system of international island development evaluation is more mature, most of the evaluations do not outline specific development methods and study only the islands overall [57–60], with few quantitative studies [61]. In addition, most of the research on island tourism development only points out the development direction and strategy [6]. Grilli pointed out that future tourists are interested in a wider range of tourism experiences, and managers of small islands should more carefully manage each part of the island’s natural resources to achieve sustainable development of island tourism [18]. The evaluation model proposed in this paper can fill this shortcoming to a certain extent, as each patch of the islands is more accurately assessed and managed.

In this paper, a model was proposed to enhance the development of island tourism value from the tourist perspective. In the model, the patch division of the study area was carried out by combining the rasterization of the equal size of the surrounding sea and the patching of land use types on the islands, an innovative research method that has rarely been used in previous studies. The study area was divided into more detailed areas, which means the model can obtain more accurate judgment results.

The overall tourism development potential was evaluated and analyzed using Tianheng Island as an example; the model also identified the areas suitable for the development of each type of tourism activity, proving the model applicability and accuracy. For many small islands with immature development, tourism development should provide
tourists with more diversified projects and services in order to obtain better economic benefits [62,63]. The evaluation model proposed in this paper integrates a variety of characteristic island tourism projects. Based on the comparison of evaluation results and fieldwork, this division method can obtain more realistic results, especially when the simultaneous evaluation of sea and land is required.

6. Conclusions

Since 1992, Tianheng island has experienced several stages of development, glory and decline. At present, Tianheng Island is in a secondary development stage and needs sound planning. The results of this study can provide a reference for this. The model established in this study can be used to evaluate recreational fishing in small islands and determine areas suitable for development. The evaluation results of the model were verified by field investigations and found to be accurate, confirming the practical value of the model. However, the natural conditions of the intertidal zone were interpolated from marine data and accuracy needs to be improved. We have issued 20 questionnaires to experts in the field of tourism, and there is still much room for improvement in the number of questionnaires and the audience [64,65].

In this paper, the model was constructed in consideration of how tourists think of island development, so less consideration was given to the environmental capacity of the island. The ecological structure of an island is fragile, so further studies will need to include ecological factors in the evaluation system. In the world, there are many islands with rich resources and a good development foundation; this model will be used to evaluate the development of other islands to improve its applicability, which will give the model broader application and room to improve. Furthermore, the model will add the evaluation of environmental carrying capacity in the future to realize the sustainability of island tourism development.

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