

Determinants of tourism attractiveness for Taiwan's offshore islands

Ji-Feng Ding

Department of Aviation and Maritime Transportation Management, Chang Jung Christian University

jfding@mail.cjcu.edu.tw (corresponding author)

Yen-Cheng Tseng

Department of Tourism, Food & Beverage Management, Chang Jung Christian University

yvonneyct@mail.cjcu.edu.tw

Tsung-Yen Wang

Program in Business and Operations Management, Chang Jung Christian University

wtyb2@yahoo.com.tw

Abstract: Evaluating the influence factors of the attractiveness of offshore island tourism will help to understand customers' motivations in choosing tourism activities, and for the travel operators to improve their promotion of tourism products. This paper employed the fuzzy analytic hierarchy process method to empirically analyze the determinants of tourism attractiveness of Taiwan's offshore islands. The results indicate that the 'substantial aspect' is the most important evaluation dimension on offshore island tourism attractiveness. Among the 16 influence factors, the 'natural resources of regional attractions,' 'cultural heritage and cultural resources,' and 'well-established and convenient transportation' are the most three determinants about the tourism attractiveness of Taiwan's offshore islands. Furthermore, some discussions concerning the key determinates are provided for Taiwan's offshore tourism.

Keywords: analytic hierarchy process, fuzzy, islands, offshore islands, Taiwan, tourism

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Introduction

With the rapid development of leisure and recreation activities, governments around the world have regarded the tourism industry as an important economic activity. The output value of tourism-related activities has an important impact on the country's economic development. However, tourism is one of the economic activities most vulnerable to global risk factors (Berbel-Pineda & Ramírez-Hurtado, 2011) because apart from tourists' characteristics and preferences for tourism activities, tourism is highly sensitive to the changes

in politics, economy, and society around the globe (Wang & Yotsumoto, 2019), for example, in January 2020, after the World Health Organization (WHO) announced that COVID-19 represented an international public health emergency. Among the global impacts of the COVID-19 pandemic and its accompanying travel bans and border controls has been a drastic drop in international tourists (Fotiadis, Polyzos, & Huan, 2021; Sigala, 2020).

The number of international inbound tourists in 2020 dropped by 60–80% relative to 2019 (UNWTO, 2020). Both global tourism earnings and the tourism industry are facing major challenges and the need to change existing business models. The pandemic has introduced uncertainties in relation to future tourism-related activities and tourism behaviors (Li et al, 2020; Reddy, Boyd, & Nica, 2020). In the early stages of the pandemic, Taiwan activated the epidemic command center system and launched various measures in line with the spread and seriousness of the virus. These measures succeeded in controlling the virus in Taiwan without the need for city lockdowns, cessation of work and school, mass cancellation of social activities, and severe economic damage. Nevertheless, while Taiwan's pandemic control had been eased by mid-May 2021, most residents cannot travel abroad for tourism. Government subsidies for domestic tourism have led to explosive growth in multiday domestic tourism over weekends and holidays. Many well-known attractions have been flooded with tourists, giving the domestic tourism industry a rare moment of glory.

Taiwan's offshore islands have rich and diverse characteristics for tourism development. In addition to marine environments, attractive geological features, forests, diving, and bird-watching activities, they also have unique sites related to human history, indigenous cultures, fisheries, and cuisine. Offshore islands have proven more widely to be an exceptionally attractive spatial form among tourist destinations (Georgakopoulou & Delitheou, 2020; Moon & Han, 2018). Because Taiwan's offshore islands are geographically isolated, they have striking differences in topography, physical environment, natural, and cultural characteristics from the main island of Taiwan, and their natural and cultural particularity represent important tourism resources (Yang et al, 2016). Visiting an offshore island can provide something resembling the experience of 'going abroad' without the need to leave Taiwan.

In order to meet the needs of a wide range of island tourists, travel companies (tour operators) must introduce various attractive tour itineraries (Ivanova & Light, 2018; Moon & Han, 2018; Parra-López & Martínez-González, 2018; Yang et al, 2016). From a marketing theory perspective (Kotler *et al*, 2018), a market or product's attractive effect is one that strengthens consumers' behavior and power for consumption. That is, attractiveness is a unique attracting inducement for consumers, which triggers their desire for the product. At the same time, attractiveness can generate power or action for consumers to proceed with an act of consumption. The present article suggests that the attractiveness of island tourism depends on whether the island tour itinerary launched by a travel company possesses sufficient factors for attracting tourists and whether those factors can prompt the tourists take a strong interest in experiencing these island tourism activities and drive them to proceed with an act of consumption.

It is important to evaluate whether the contents of island tourism activities are sufficient for attracting customers to purchase the product, as this will deepen our understanding of customer motivations when choosing island tourism activities. Greater knowledge of the

relevant influence factors can help tour operators evaluate the attractiveness of their island tourism products and thereby improve their promotional and sales activities.

Factors and criteria are important evaluation standards for decisionmaking (Chen & Hwang, 1992). In its multiple criteria decisionmaking (MCDM) evaluation process, this paper establishes an objective hierarchy structure through hierarchy analysis, thereby permitting us to determine the evaluation problem's basic elements and hierarchy structure relations (Saaty, 1980). This simplifies, clarifies, and specifies the decisionmaking problem. The present study used the above parameters to formulate the preliminary evaluation criteria for Taiwan's offshore island tourism attractiveness.

Because the research scope and levels covered by the evaluation process of the attractiveness of Taiwan's offshore island tourism are wide and complex, the Analytic Hierarchy Process (AHP) (Saaty, 1980) is a set of decisionmaking methods that systematize complex issues and is mainly used in uncertain situations and decisionmaking problems with multiple attributes, which belong to the research category of MCDM problems (Chen & Hwang, 1992; Zopounidis & Doumpos, 2017). This study uses the AHP method to evaluate the relative importance of factors influencing attractiveness of offshore island tourism. Because the influence factors of various tourism attractiveness have qualitative characteristics and change according to group decisionmaking and environment, the weights expressing the importance of these influence factors may include vague and fuzzy characteristics (Zadeh, 1965). This study thus applies fuzzy sets theory (Zadeh, 1965) and AHP method (Saaty, 1980) to construct a fuzzy AHP evaluation model, which serves as the main evaluation model for the key factors of Taiwan's offshore islands tourism attractiveness.

When assessing certain evaluation criteria in a fuzzy environment, the fuzzy AHP evaluation model developed in this paper can help decisionmakers grasp the uncertainty and imprecision of these criteria and provide quantitative weight to qualitative criteria through expert assessment. The consistency test can subsequently be used to assess through pairwise comparison whether the criteria were consistent, thereby obtaining the comprehensive weight and priority of each evaluation criterion. Because the fuzzy AHP method combines quantitative and qualitative characteristics, many qualitative criteria that are difficult to quantify can obtain comprehensive weight. Fuzzy AHP is widely used in part because it is simple to operate, because of the consensus surrounding its effectiveness among experts and decisionmakers, and because of its sound mathematical characteristics. The fuzzy AHP evaluation model developed in this paper can be improved as a practical tool for commercial business in the future, which users can apply to decision support systems to help evaluate relevant decisionmaking problems.

Literature reviews

This section reviews the literature on the application of the fuzzy AHP method to tourism and related fields and on the preliminary factors of offshore island tourism attractiveness.

The application of the fuzzy AHP method to tourism and related fields

In the process of the MCDM problem, decisionmakers' determination preferences (values) are significant for decision analysis (Keeney, 1982). Evaluation of the criteria weight is an

important evaluation step in constructing decisionmakers' preferences. The methods for assigning the criteria weight vary in different decisionmaking environments. There are furthermore numerous potential methods (Hwang & Yoon, 1981; Tsaur & Wang, 2007), such as regression analysis, least squares method, discrete choice models (e.g., Logit and Probit models), data envelopment analysis (DEA), rating method, ELECTRE method, LINMAP method, entropy method, geometric mean method, and AHP method.

Among the aforementioned weight evaluation methods, the discrete choice model (Eugenio-Martin, 2003; Kim & Park, 2017; Kemperman, 2021) is often used to estimate the parameters of each decisionmaking attribute in the choice of tourism demand. The behavioral model of tourism demand is then employed to establish a causal demand analysis model with better predictive ability. The theoretical basis of the tourism demand model is based mainly on the utility function of consumer behavior in economics. In this random utility choice model, the discrete choice model takes the form of the Probit model or Logit model if the assumptions of a random component were normal distribution or independent and identical distribution Gumbel (IID Gumbel), respectively. When predicting tourism demand, decisionmakers often prefer the discrete choice model on account of its high predictive ability (Kemperman, 2021). However, given that the discrete choice model requires a large amount of revealed preference data and stated preference data, it is relatively difficult to predict, plan, and operate tourism demand.

In an increasingly complex society, it is necessary to integrate the preference weights of group decisionmakers to interpret the trade-offs occasioned by decisionmakers' varying preferences. In the MCDM problem of group decisionmaking, a panel of experts can use their professional experience and value judgment to seek diverse opinions from experts in different fields regarding a specific problem in order to facilitate the evaluation of criteria weight. The AHP method (Saaty, 1980) is a particularly efficient MCDM method. According to Saaty (1980), the AHP has a wide range of applications, and it is suitable for many types of evaluation problems (Vaidya & Kumar, 2006), such as setting priorities, choosing the best policy after finding a set of alternatives, allocating resources, determining requirements, designing system, measuring performance, and optimization. Buckley (1985) extended hierarchical analysis using a consistency test method for fuzzy positive reciprocal matrices in which all elements are trapezoidal fuzzy numbers. Buckley, Feuring, & Hayashi (2001) later revisited fuzzy hierarchical analysis and proposed a new method for finding fuzzy weights. At present, research on the fuzzy AHP method has appeared in many academic journals. This method has been widely used to settle MCDM problems in fields of sustainability evaluation (Calabrese et al, 2019), factory production strategy (Karasan, Erdogan, & Ilbahar, 2018), Internet of Things (Mashal & Alsaryrah, 2020), e-commerce (Lamba *et al*, 2020), supplier selection (Laosirihongthong, Samaranayake, & Nagalingam, 2019), international logistics (Yildirim & Mercangoz, 2020), risk factor evaluation (Tseng, Ding, & Chang, 2017), etc.

The AHP or the fuzzy AHP are used in a large number of academic journal articles concerning leisure and tourism. For instance, Tsaur and Wang (2007) used the Delphi method to screen 28 sustainable tourism development indicators and then used the AHP to calculate the weight of each indicator. Park and Yoon (2011) proposed 33 sustainable rural tourism evaluation indicators using the Delphi and AHP methods. Meanwhile, Wang et al. (2016) used the fuzzy Delphi to select six evaluation dimensions and 26 indicators of sustainable

development for coastal tourism in Taiwan and then used the fuzzy AHP to calculate and sort the weight of indicators. Zhang (2017) utilized the fuzzy Delphi and the ANP to evaluate regional low-carbon tourism strategies. Liu and Ko (2018) developed a modified European Foundation for Quality Management Excellence Model and evaluation indicators for the hotel industry with the fuzzy AHP. Liu et al. (2019) discussed the sustainability indicators of festival tourism from the perspectives of multi-stakeholders, establishing 20 indicators with the Delphi method and calculating the relative weight of each indicator by the AHP. Zabihi et al. (2020) utilized the fuzzy AHP for decision evaluation suitable for ecotourism. Lee, Jan, and Liu (2021) developed an indicator framework for evaluating sustainable tourism and used the AHP to evaluate the relative weight of indicators for an eco-resort in Taiwan. In addition, taking the Dajia Mazu pilgrimage as an example, Lin (2021) applied the fuzzy AHP to religious tourism evaluation from the perspectives of different stakeholders.

In summary, given the advantages of the AHP or the fuzzy AHP, such as easy operation, simplified evaluation, practicality, and the ability to capture the opinions of many experts and decisionmakers, complex decisionmaking issues can be simplified through a hierarchical structure. Furthermore, the pairwise comparison evaluation method can be applied to make it easier for experts to conduct evaluations and comparisons. The AHP or the fuzzy AHP has thus been applied and modified continuously to make theories more complete, with more diversified applications, in tourism and other fields.

Preliminary factors influencing island tourism attractiveness

The tourism provided by the contents of the tour itinerary must be sufficiently attractive. Tourism attractiveness is the main factor for tourists to visit the destination and engage in specific activities (Faerber et al, 2021) and is the core value of tourism development (Richards, 2002). The factors that affect tourism attractiveness are usually based on the push-pull factor theory (Dean & Suhartanto, 2019; Katsikari et al, 2020). The push factor is related to the individual's perception of the destination; the pull factor is related to the attributes of the destination and the recreational infrastructure. The attributes that attract tourists to choose tourist destinations thus include tangible and intangible factors, including natural resources, cultural attributes, infrastructure, ground constructions, services, and unique local characteristics (Fadda & Sorensen, 2017; Moon & Han, 2018; Parra-López & Martínez-González, 2018; Yang et al, 2016; Yin et al, 2020; Zhuang et al, 2020). They represent the tourists' perceptions of tourist destinations and their abilities to meet tourism needs (Reitsamer, 2016). These perceptions are connected with the tourists' feelings, beliefs, and views of the destination (Girish, Park, & Lee, 2020).

Tourism attractiveness is the external pull that attracts tourists to the tourist area, and these attractions may be based on natural resources, cultures, ethnic characteristics, entertainment, and other destination images. That is, tourists' beliefs, ideas, impressions, and perceptions of tourist destinations will be recombined with the accumulation of personal experience and the updated information to attract tourists to all things they encounter when travelling (Girish, Park, & Lee, 2020; Daries et al, 2021). Weidenfeld and Leask (2013) point out that the attraction of tourism resources is the pull factor driving and attracting tourists to the destination. Shinde (2021) mention that tourism attractiveness is an inherent attractiveness that drives tourists to a destination, and this force affects tourist behavior. Tourism attractiveness also

includes the internal push generated by tourists' internal motivation to participate in tourism. Attraction and motivation often interact with one another. Tourism attractiveness can be regarded as an external force, while tourism motivation is an internal force.

Setting out on a sightseeing tour often has a multifaceted motivation (Klenosky, 2002; Sastre & Phakdee-Auksorn, 2017; Yousefi & Marzuki, 2015). Usually, the motivation of 'push' implies that tourists plan and arrange tourism activities in advance, with the personal motivation of 'push' being derived from intangible and intrinsic expectations, such as escape, rest, entertainment, health, adventure, and reputation. Thus, the tourist's motivation is the decisionmaking factor that affects the tourist's behavior at the inner level, bringing about a phenomenon of invisible thrust in tourism. In contrast, the motivation of 'pull' comes from the destination attributes and attractiveness that mainly draw travellers' attention to particular tourist areas. The tourism factors of this type are mostly the physical characteristics of which tourists are aware, including the destination's security, accessibility, natural scenery, cultural and historical resources, consumption level, and local facilities. Therefore, if a tourist destination is attractive, it will encourage tourists to travel, bringing about a phenomenon of invisible towing force in tourism. In other words, the 'push' is the decision to travel, and the 'pull' factors explain the reasons for the travel.

Attractiveness is the driving force that constitutes the tourism system, and it is also a necessary element for tourist activities to be noticed or enjoyed by tourists. The tourism resources provided by the tourism itself must be attractive in order to encourage tourists to visit, consume, and feel continuously satisfied. In order to obtain the influence factors of island tourism attractiveness, this research thus studies relevant literature and preliminarily sorts out the factors that affect tourism attraction, as shown in Table 1 below.

Table 1. The preliminary factors affecting the tourism attraction

Preliminary factors	Authors	A	B	C	D	E	F	G	H	I	J	K	L	M
Reputation and familiarity of attractions				√	√		√	√	√		√	√		
Date of establishment				√	√							√		
Natural resources of regional attractions	√	√		√	√		√	√	√	√	√	√	√	√
Cultural heritage and cultural resources	√	√	√	√		√	√	√	√	√	√			
Specialties, souvenirs and food			√			√	√	√	√	√				
Festivals			√			√			√			√		
Diversified activities	√				√	√	√	√	√			√	√	√
Socioeconomic and background of residents					√	√								
Population density					√							√	√	
Convenience of transportation		√			√		√		√			√	√	
Local population					√								√	
Night activities			√	√			√					√		
Recreational facilities	√	√	√	√	√		√	√	√			√	√	
Tourist services and indexes	√	√	√	√	√	√	√	√	√			√	√	
Reception and public facilities	√	√	√	√	√	√	√	√	√			√	√	

Preliminary factors	Authors	A	B	C	D	E	F	G	H	I	J	K	L	M
Overall management plan		√				√		√	√		√	√	√	√
Travel environment		√		√				√	√				√	
Public space ratio		√		√		√			√			√		
Tourism policy			√											
Travel atmosphere		√	√	√			√			√				
Tourism friendliness		√		√			√		√	√				
Travel pay expense			√		√		√		√	√			√	√
Health and hygiene			√						√	√				
Travel safety			√				√		√	√				
Crowd									√				√	
Freshness									√					

The authors of **A** to **N** referred as follows:

A: Berbel-Pineda & Ramirez-Hurtado (2011)

B: Blanke & Chiesa (2011)

C: Boivin & Tanguay (2019)

D: Byun & Jang (2015)

E: Castro *et al.* (2015)

F: Chang & Chang (2015)

G: Chen *et al.* (2018)

H: Faerber *et al.* (2021)

I: Fernando *et al.* (2016)

J: Leask (2016)

K: Neuvonen *et al.* (2010)

L: Santana-Jiménez & Hernández (2011)

M: Zheng *et al.* (2017)

Saaty (1980) suggested that hierarchy was the framework of the system structure for studying the interaction of various elements in the hierarchy and the impact of the entire system. The number of levels depends on the complexity of the system and the need for analysis. Too many evaluation criteria will increase the evaluation time and costs, but if the criteria are too concise, it is impossible to clearly define their content quality and applicability. Establishment of a set of clearly hierarchical evaluation criteria is thus important for systematic evaluation.

The intended criteria must generally comply with the five principles of completeness, operability, decomposability, nonredundancy, and minimum size (Saaty, 1980). Evaluation indicators (or criteria) are usually specific, observable, and measurable accomplishments, which manifest a benchmark for achieving a specific outcome in an evaluation objective. The evaluation criteria selected by the researcher should be able to answer the questions that the researcher wants to evaluate and help the researcher determine whether the objective of the evaluation question has been achieved (Chen & Hwang, 1992; Saaty, 1980; Zopounidis & Doumpos, 2017). Therefore, in order to successfully establish an objective hierarchy structure and develop the evaluation criteria, this study reviewed the factors affecting tourism attractiveness based on the literature, involving the stakeholders for this study in the brainstorming process. Finally, based on the above concepts and to further obtain the preliminary evaluation criteria (or factors) for the attractiveness of Taiwan's offshore island tourism, this study summarized and collected four evaluation dimensions and 16 important evaluation criteria (or factors) affecting the attractiveness of Taiwan's offshore islands tourism. These evaluation dimensions and criteria were collected from the preliminary evaluation factors shown in Table 1 and the interviews and suggestions of seven scholars and experts with more than 15 years of experience. A description and explanation of the related

characteristics are summarized as shown in Table 2 (the code names of evaluation dimensions and factors are shown in parentheses).

Table 2. Preliminary factors affecting Taiwan's island tourism attractiveness. *Source:* Authors' comprehensive collation.

Dimensions	Factors	Explanation and description	Relevant literature
Substantial aspect (C ₁)	Reputation and familiarity of attractions (C ₁₁)	Reputation of attractions refers to its influence on tourists, and its connotation has a positive value in tourism. Familiarity of attractions is the number of citations of tourist attraction names in search engine search results (e.g. Google, Yahoo).	Berbel-Pineda & Ramirez-Hurtado, 2011; Blanke & Chiesa, 2011; Boivin & Tanguay, 2019; Byun & Jang, 2015; Castro et al, 2015; Chang & Chang, 2015; Chen et al, 2018; Faerber et al, 2021; Fernando et al, 2016; Leask, 2016; Neuvonen et al, 2010; Santana-Jiménez & Hernández, 2011; Zheng et al, 2017.
	Natural resources of regional attractions (C ₁₂)	Tourists participate in island tours because they want to visit the destination's natural resources (e.g. natural landscape, climate, special terrain, animals, plants, ecology).	
	Cultural heritage and cultural resources (C ₁₃)	Tourists participate in island tours because they want to visit the destination's cultural heritage and cultural resources (e.g. historical sites, architecture, cultural relics).	
	Specialties, souvenirs, and food (C ₁₄)	In order to provide tourists with precious memories after the island tourism holiday and attract tourists to buy local products (e.g. food, agricultural products, handicrafts, local specialty snacks), tourists can purchase as much as they want as gifts or personal use items.	
Social aspect (C ₂)	Local festival activities (C ₂₁)	Tourists want to visit local festivals with clear or special themes to experience how these activities are integrated into local life and culture.	Berbel-Pineda & Ramirez-Hurtado, 2011; Blanke & Chiesa, 2011; Boivin & Tanguay, 2019; Byun & Jang, 2015; Castro et al, 2015; Chang & Chang, 2015; Chen et al, 2018; Faerber et al, 2021; Fernando et al, 2016; Leask, 2016; Neuvonen et al, 2010; Santana-Jiménez & Hernández, 2011; Zheng et al, 2017.
	Diversified itinerary designs and activities (C ₂₂)	Island tourism introduces new and diverse itinerary designs (e.g. bird watching, climbing, diving, fishing, biking), all factors that attract consumers. Diversification of marketing activities can strengthen consumer selectivity in leisure and recreational activities provided by destinations.	
	Well-established and convenient transportation (C ₂₃)	Transportation accessibility from tourists' place of residence to the island destination and convenient transportation network at the destination (e.g. airports, buses, shared bicycles, rental car) enhances tourist preference for island tourism.	
	Night tours and attractions (C ₂₄)	Night tourism activities and attractions provided by island tourist destinations (e.g. stargazing, night fishing, KTV, night tours, shopping) enhance tourist preference for island tourism.	

Dimensions	Factors	Explanation and description	Relevant literature
Environmental aspect (C_3)	Completeness of recreational facilities (C_{31})	Whether island tourist destinations provide tourists with comprehensive sightseeing, leisure, amusement and other facilities, it will increase tourist preference for island tourism.	Berbel-Pineda & Ramirez-Hurtado, 2011; Blanke & Chiesa, 2011; Boivin & Tanguay, 2019; Byun & Jang, 2015; Castro et al, 2015; Chang & Chang, 2015; Chen et al, 2018; Faerber et al, 2021; Fernando et al, 2016; Leask, 2016; Neuvonen et al, 2010; Santana-Jiménez & Hernández, 2011; Zheng et al, 2017.
	Quality tourism consulting services and indicators (C_{32})	If destinations provide comprehensive tourism consulting services, guided tour systems, indicators, and marking facilities, etc., it enhances tourist preference for island tourism.	
	Accommodation and public facilities (C_{33})	If destinations provide comprehensive tourist accommodation and hospitality services or provide convenient public facilities (e.g. travel agencies, hotels, restaurants, parks, public toilets, tourist service centers), it enhances tourist preference for island tourism.	
	Completeness of tourist environmental space (C_{34})	High-quality tourist environmental spatial attributes of island tourist destinations (e.g. renovation and repair of public service facilities, landscape greening, and environmental cleanup) enhances tourist preference for island tourism.	
Perceived aspect (C_4)	Tourist atmosphere (C_{41})	Tourists' feelings concerning destinations' overall facilities or services contribute to an atmosphere of beliefs, ideas, and impressions, strengthening tourist preference for island tourism.	Berbel-Pineda & Ramirez-Hurtado, 2011; Blanke & Chiesa, 2011; Boivin & Tanguay, 2019; Byun & Jang, 2015; Chang & Chang, 2015; Faerber et al, 2021; Fernando et al, 2016; Santana-Jiménez & Hernández, 2011; Zheng et al, 2017.
	Tourism friendliness degree (C_{42})	Residents of destinations maintain a friendly and respectful attitude toward tourists, enhancing tourist preference for island tourism.	
	Travel pay expense amount (C_{43})	Tourists use products or services provided by the destination and pay relevant expenses. If expenditure is higher, it negatively affects island tourism's attraction and competitiveness.	
	Travel safety (C_{44})	Operators seek for tourists to stay in a relaxed and pleasant environment and to achieve personal, property, and psychological safety during the travel process. A good travel safety process has an attractive effect on tourists.	

The fuzzy AHP method

The fuzzy AHP method in this article mainly follows the practices of Ding et al. (2017) and Lin (2021). What follows is a brief description of the present study's fuzzy AHP steps.

Step 1: Establishing a hierarchical structure

This article uses Figure 1 as a hierarchical structure diagram. In this structure, level L is the problem, i.e. to evaluate determinants of tourism attractiveness for Taiwan's offshore islands; level $L+1$ is the k evaluation dimension; level $L+2$ is the main evaluation factors of $s + \dots + u + \dots + v$ under each evaluation dimension.

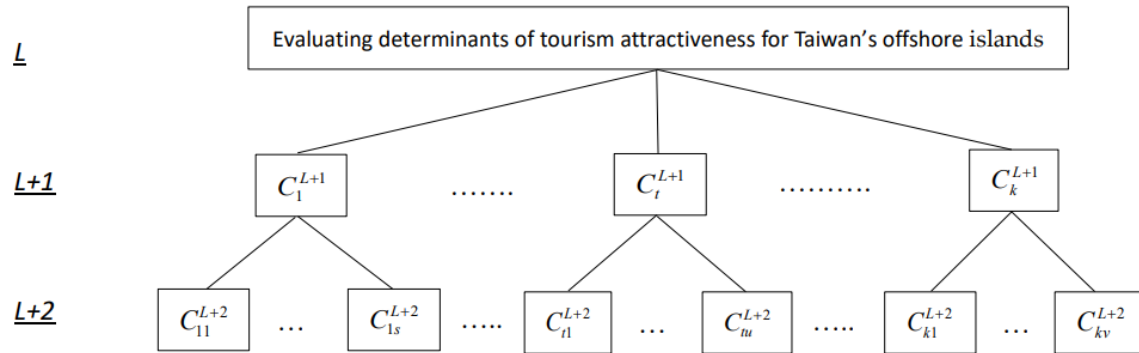


Figure 1. Hierarchical structure diagram.

Step 2: Establishing crisp values for pairwise comparison

Pairwise comparison on AHP questionnaires is used to obtain expert opinions on the relative importance of the two evaluation factors.

- (1) Let y_{ij}^E , $E = 1, 2, \dots, h$, be the relative importance of any two evaluation dimensions of i and j by the expert E on level $L+1$. The pairwise comparison matrix is defined as $[y_{ij}^E]_{k \times k}$.
- (2) Let y_{pq}^E , $E = 1, 2, \dots, h$, be the relative importance of any two evaluation factors of p and q by the expert E on level $L+2$. The pairwise comparison matrix with respect to each evaluation dimension C_1^{L+1} , C_t^{L+1} , and C_k^{L+1} of level $L+1$, are defined as $[y_{pq}^E]_{s \times s}$, $[y_{pq}^E]_{u \times u}$, and $[y_{pq}^E]_{v \times v}$, respectively.

Step 3: Establishing triangular fuzzy numbers

To integrate expert consensus (Klir & Yuan, 1995; Saaty, 1980), this paper takes the minimum value evaluated for a selected criterion by the decisionmaking members as the lower limit of the triangular fuzzy number, the maximum value of that as the upper limit of the triangular fuzzy number, and the geometric mean of all evaluation values as 1 value for the membership grade of the triangular fuzzy number.

Let $y_{ij}^E \in [\frac{1}{9}, \frac{1}{8}, \dots, \frac{1}{2}, 1] \cup [1, 2, \dots, 8, 9]$, $E = 1, 2, \dots, h$, $\forall i, j = 1, 2, \dots, k$, be the relative importance of any two evaluation dimensions of i and j by the expert E on level $L+1$. After integrating the opinions of all h experts, the integrated triangular fuzzy numbers can be expressed as $\tilde{M}_{ij}^{L+1} = (a_{ij}, b_{ij}, c_{ij})$, where $a_{ij} = \min\{y_{ij}^1, y_{ij}^2, \dots, y_{ij}^h\}$, $b_{ij} = (\prod_{E=1}^h y_{ij}^E)^{1/h}$, $c_{ij} = \max\{y_{ij}^1, y_{ij}^2, \dots, y_{ij}^h\}$.

As above, we can integrate the opinions of all h experts on level $L+2$, and the integrated triangular fuzzy numbers can be expressed as $\tilde{M}_{pq}^{L+2} = (a_{pq}, b_{pq}, c_{pq})$, $\forall p, q = 1, \dots, s; \dots; \forall p, q = 1, \dots, u; \dots; \forall p, q = 1, \dots, v$, where $a_{pq} = \min\{y_{pq}^1, y_{pq}^2, \dots, y_{pq}^h\}$, $b_{pq} = (\prod_{E=1}^h y_{pq}^E)^{1/h}$, $c_{pq} = \max\{y_{pq}^1, y_{pq}^2, \dots, y_{pq}^h\}$.

Step 4: Establishing the fuzzy positive reciprocal matrix of each level

For the integrated fuzzy numbers, after the pairwise comparison of all h experts at each level, a fuzzy positive reciprocal matrix is established. The fuzzy positive reciprocal matrix for level $L+1$ (the evaluation dimension level) is as follows:

$$M_k^{L+1} = [\tilde{M}_{ij}^{L+1}]_{k \times k} = \begin{bmatrix} \tilde{1} & \tilde{M}_{12}^{L+1} & \dots & \tilde{M}_{1k}^{L+1} \\ 1/\tilde{M}_{12}^{L+1} & \tilde{1} & \dots & \tilde{M}_{2k}^{L+1} \\ \vdots & \vdots & \ddots & \vdots \\ 1/\tilde{M}_{1k}^{L+1} & 1/\tilde{M}_{2k}^{L+1} & \dots & \tilde{1} \end{bmatrix},$$

where $\tilde{M}_{ij}^{L+1} \otimes \tilde{M}_{ji}^{L+1} \cong 1, \forall i, j = 1, 2, \dots, k$.

In order to save space, the equations of fuzzy positive reciprocal matrices are omitted by reason of analogy on level $L+2$ (the evaluation factor level).

Step 5: Calculating the fuzzy weights of the fuzzy positive reciprocal matrix of each level

Assume $\tilde{Z}_i^{L+1} \cong (\tilde{M}_{i1}^{L+1} \otimes \tilde{M}_{i2}^{L+1} \otimes \dots \otimes \tilde{M}_{ik}^{L+1})^{1/k}, \forall i = 1, 2, \dots, k$, is the geometric mean of the triangular fuzzy number of the i^{th} evaluation dimension for level $L+1$, then the fuzzy weight of the i^{th} evaluation dimension can be expressed as

$$\tilde{W}_i^{L+1} \cong \tilde{Z}_i^{L+1} \otimes (\tilde{Z}_1^{L+1} \oplus \tilde{Z}_2^{L+1} \oplus \dots \oplus \tilde{Z}_k^{L+1})^{-1}.$$

The symbol is used for the sake of convenience, and the triangular fuzzy number is represented by $\tilde{W}_i^{L+1} = (w_i^a, w_i^b, w_i^c)$.

To save space, the equations of fuzzy weights are omitted by reason of analogy on level $L+2$.

Step 6: Defuzzifying the fuzzy weights

This paper uses the graded mean integration representation (GMIR) method (Chen & Hsieh, 2000) to defuzzify. The GMIR method is effective and easy to use in the defuzzification process.

Assume $\tilde{W}_i^{L+1} = (w_i^a, w_i^b, w_i^c), \forall i = 1, 2, \dots, k$, is the triangular fuzzy weights, then the k^{th} crisp weighted value after defuzzification is $G(\tilde{W}_i^{L+1}) = (w_i^a + 4w_i^b + w_i^c)/6, \forall i = 1, 2, \dots, k$.

The same can be also analogized in level $L+2$.

Step 7: Normalizing the crisp weighted values

To facilitate comparison of the relative importance of the evaluation dimensions and evaluation factors at each level, it is planned to normalize the k^{th} crisp weighted values after

the aforementioned defuzzification as $NW_i^{L+1} = \frac{G(\tilde{W}_i^{L+1})}{\sum_{i=1}^k G(\tilde{W}_i^{L+1})}$.

Step 8: Calculating the integrated weights of each evaluation factor

Assume the crisp weighted values at level $L+1$ and level $L+2$ after normalization are respectively shown as NW_i^{L+1} ($\forall i = 1, 2, \dots, k$) and NW_p^{L+2} ($\forall p = 1, \dots, s; \dots; \forall p = 1, \dots, u; \dots; \forall p = 1, \dots, v$), respectively, then

(1) The weight of each evaluation dimension at level $L+1$ itself is still as NW_i^{L+1} , that is

$$IW_i^{L+1} = NW_i^{L+1}, \quad \forall i = 1, 2, \dots, k.$$

(2) The weight of each evaluation factor at level $L+2$ is respectively shown as

$$IW_p^{L+2} = NW_i^{L+1} \times NW_p^{L+2}, \quad \forall i = 1, 2, \dots, k; \quad \forall p = 1, \dots, s; \dots; \forall p = 1, \dots, u; \dots; \forall p = 1, \dots, v.$$

Empirical study

This section includes two subsections: questionnaire survey and data collection, and results.

Questionnaire survey and data collection

The AHP expert questionnaire in this study takes the four evaluation dimensions and 16 important factors in Table 2 as the basis for the pairwise comparison matrix. In order to confirm whether the text or grammatical description of the AHP questionnaire is clear or whether the important content of the attractive factor is missed, this study invited three scholars and experts to conduct a preliminary test. In the end, these experts and scholars have completed the formal AHP expert questionnaire after two text revisions.

When applying the AHP in evaluating the relative weight of criteria, it is often necessary to rely on professional judgments and assistance from experts in different fields. Therefore, to make the survey data more objective, this study focused on the evaluation factors of the attractiveness of Taiwan's offshore island tourism and evaluated the relative weight of these attractiveness factors through the experiences and views of a 'balanced' panel of experts (Wheeller, Hart, & Whysall, 1990; Tsaur & Wang, 2007). The 'balanced' panel of experts includes domestic tourists, tour operators, government representatives in charge of tourism policies, and scholars researching the tourism industry. Evaluation of the influencing factors of the attractiveness of island tourism helps shed light on consumer motivations and demands when choosing island tourism activities. Conformance with the views of tourists, operators, government, scholars, and other experts and stakeholders on the development of offshore island tourism furthermore enhances the authority and typicality of the evaluation process and the results of this study. According to this study's expert selection principle of the expert

questionnaire (Devaney & Henchion, 2018; Falcón et al, 2020), the formal survey is to issue an AHP questionnaire to the ‘balanced’ panel of experts to assess the relative importance of tourism attraction factors in Taiwan’s offshore islands.

Thirty questionnaires were distributed for this study, with 24 effective retrievals, an effective response rate of 80%. Regarding the assessment on the AHP valid questionnaire, it is decided by this study’s AHP operating procedure. If the consistency index (C.I.) value is less than or equal to 0.1 (Saaty, 1980), it shows that the pairwise comparison matrix accords with consistency, meaning that the expert judgment is consistent, and the questionnaire will be regarded as a valid expert questionnaire. The judgment of the pairwise comparison matrix of each questionnaire should meet the requirements of consistency. If a pairwise comparison matrix does not meet the consistency, it shows that the expert’s judgment is confused. At this time, the expert must judge the matrix again until it meets the requirements of consistency. The questionnaire of the AHP survey in this article is an expert questionnaire. Robbins (1994) suggests that the five to seven experts are required for group decisionmaking problems, which shows that the present study’s valid response questionnaire provided representative views. As a result, after the 24 questionnaires were checked for validity, the number of responses was deemed acceptable.

Table 3 contains basic information concerning the respondents who completed valid questionnaires. Males accounted for roughly 42% of respondents and females for roughly 58%. Participants aged between 51 and 60 accounted for one-half of the total sample, and those over the age of 41 accounted for four-fifths of the sample. With regard to the level of education, approximately 40% of respondents had an undergraduate degree, while those holding master’s and Ph.D. degrees respectively accounted for around 30%. In terms of professional background, roughly 25% each were respectively involved in government and business, while academia and tourists accounted for roughly 30% and 20% of the respondents.

Table 3. Profiles of the group experts.

Basic information	Distribution	Number of experts	Percentage
Gender	Male	10	41.67%
	Female	14	58.33%
	Total	24	100%
Age	31-40	5	20.83%
	41-50	6	25%
	51-60	12	50%
	Over 61	1	4.17%
	Total	24	100%
Education	Bachelor	10	41.67%
	Master	8	33.33%
	PhD	6	25%
	Total	24	100%
Professional background	Governments	6	25%
	Scholars	7	29.17%
	Companies	6	25%

Basic information	Distribution	Number of experts	Percentage
	Tourists	5	20.83%
	Total	24	100%

Results

After sorting out 24 valid response questionnaires, the paper applies the fuzzy AHP method to calculate the relative weights of four evaluation dimensions and 16 evaluation factors. The final summary results are shown in Table 4.

Table 4. The relative weights of evaluation dimensions and factors. *Note:* The parentheses after the weight number mean the ranking.

Dimensions	Weights (A)	Factors	Weights (B)	Weights of integration (C)=(A)*(B)
Substantial aspect (C_1)	0.315 (1)	Reputation and familiarity of attractions (C_{11})	0.242 (3)	0.0762 (5)
		Natural resources of regional attractions (C_{12})	0.290 (1)	0.0914 (1)
		Cultural heritage and cultural resources (C_{13})	0.288 (2)	0.0907 (2)
		Specialties, souvenirs, and food (C_{14})	0.180 (4)	0.0567 (10)
Social aspect (C_2)	0.271 (2)	Local festival activities (C_{21})	0.249 (3)	0.0675 (8)
		Diversified itinerary designs and activities (C_{22})	0.285 (2)	0.0772 (4)
		Well-established and convenient transportation (C_{23})	0.287 (1)	0.0778 (3)
		Night tours and attractions (C_{24})	0.179 (4)	0.0485 (12)
Environmental aspect (C_3)	0.264 (3)	Completeness of recreational facilities (C_{31})	0.246 (3)	0.0650 (9)
		Quality tourism consulting services and indexes (C_{32})	0.191 (4)	0.0504 (11)
		Accommodation and public facilities (C_{33})	0.275 (2)	0.0726 (7)
		Completeness of the tourist environment space (C_{34})	0.288 (1)	0.0760 (6)
Perceived aspect (C_4)	0.150 (4)	Tourist atmosphere (C_{41})	0.210 (4)	0.0315 (16)
		Tourism friendliness degree (C_{42})	0.231 (3)	0.0347 (15)
		Travel pay expense amount (C_{43})	0.244 (2)	0.0366 (14)
		Travel safety (C_{44})	0.315 (1)	0.0472 (13)

According to the information in Table 4, the important selected factors for the tourism attractiveness of offshore islands mainly include:

1. In terms of evaluation dimensions, the 'substantial aspect' is the most important link in Taiwan's offshore islands' tourism attractiveness. The 'social aspect' is the second most important link, followed by 'environmental aspect', and 'perceived aspect.' Although the data of each evaluation dimension shows the priority order, the weights of 'social aspect' and 'environmental aspect' are 0.271 and 0.264 respectively, showing that expert opinions rate these two evaluation dimensions as almost equally important. Overall, 'substantial

aspect', 'social aspect', and 'environmental aspect' are considered by experts as importantly selected evaluation dimensions of the attractiveness of offshore island tourism.

2. In terms of the evaluation criteria belonging to the four evaluation dimensions:
 - (1) In the 'substantial aspect', the 'natural resources of regional attractions' is the most important evaluation factor.
 - (2) In the 'social aspect', 'well-established and convenient transportation' is the most important evaluation factor.
 - (3) In the 'environmental aspect', the 'completeness of the tourism environmental space' is the most important evaluation factor.
 - (4) In the 'perceived aspect', 'travel safety' is the most important evaluation factor.
3. Daniel (1961) pointed out that most industries have two to six key factors that determine their success. If an industry is to succeed, these key factors must be performed very well. Therefore, this article uses a total of six key evaluation factors as determinants to evaluate the tourism attractiveness of Taiwan's offshore islands. The total weight of these six key determinants accounts for about half the overall weight. The empirical research results show that the six most important factors for the tourism attractiveness of Taiwan's offshore islands respectively are: 'natural resources of regional attractions (0.0914)', 'cultural heritage and cultural resources (0.0907)', 'completeness and convenience of transportation (0.0778)', 'diversified itinerary designs and activities (0.0772)', 'reputation and familiarity of attractions (0.0762)', and 'the degree of perfection of the tourist environmental space' (0.0760).

In addition, for the questionnaire distributed among the above 'balanced' panel of experts in this research, this study integrated expert preferences with the 'pool first' geometric mean method to obtain the comprehensive weight of each evaluation factor by facilitating the integration of expert preferences. The 'pool first' method integrates the pair-comparison values of all experts that meet consistency in geometric mean (Saaty, 1980; Buckley, 1985), and the pair-comparison matrices are the comprehensive judgment value of all experts' opinions. Thus, the last obtained comprehensive weight values of each evaluation criterion cannot be statistically analyzed to determine whether the mean values among the expert groups have a significant difference. The 'pool last' method involves obtaining a pairwise comparison matrix from each expert questionnaire. If used for expert preference integration, the 'pool last' method will be beneficial for the statistical analysis in determining whether there is a significant difference among the mean values of the expert groups. Based on the reasons above and as Saaty (1980) mentioned that the geometric mean method is more effective in expressing the consensus of decisionmaking group, this study carried out the integration of expert preferences in the pre-integration method rather than conducting a statistical analysis to determine whether the mean values of each key factor are significantly different among the expert groups.

Discussions

This study discusses and summarizes the six key determinants as follows:

Natural resources of regional attractions

This determinant is the most important evaluation factor that affects the tourism attractiveness of offshore islands because different regional attractions have regional differences in tourism resources, causing tourists to display different tourism behaviors. The attraction of tour bases is regarded as the most important element in the supply side of the tour system and is also the driving force of the tour system. The natural resources of the unique regional attractions on an island are natural landscapes. In a specific natural environment, the environment or a characteristic landscape is often a resource formed by a variety of complex, diverse, interrelated, and interdependent scenes. Therefore, the tourism resources related primarily to natural resources of regional attractions will be extremely attractive for tourists.

Taiwan is located on the eastern edge of the Asian continental shelf, at the junction of the Eurasian plate and the Philippine plate. This special geographical location and plate compression cause frequent geological activities, creating complex and diverse topographies for not only the main island of Taiwan but also its offshore islands (such as Penghu basalt topography and Matsu granite cliffs), diverse ecological environment (such as migratory birds and intertidal ecology), and the landscape of very special topographies and landforms (such as coral reef topography and volcanic island topography). Since the characteristics of these natural resources have great tourist attractiveness, when developing the offshore island tourism industry, the government should focus on the characteristics of regional resources and evaluate the potential development on those resources in order to obtain future demand from current and potential consumers, and then advance the suitability of regional resources combined with tourism activities to enhance opportunities for attracting tourists to island tours and recreation.

Since tourism attractiveness is the basic motivation for tourists to go to tourist destinations, if the tourism content of a destination is valued and liked by tourists, its attractiveness for tourists will be stronger. The government and industry should thus establish these regional resources as a strategic asset and build regional tourist attraction using the charms and characteristics of recreational scenic spots, then provide tourists with appropriate tourism services to meet their leisure and tourism needs. Expected benefits that increase tourists' willingness to revisit are the core focus of future tourism marketing.

Cultural heritage and cultural resources

Tourists travel for cultural features. They may visit historical and cultural buildings and relics or participate in special festivals and other cultural tourism resources. Tourism allows tourists to leave their hometown culture and temporarily expose themselves to a different cultural environment. This kind of cultural tourism is essentially a tourist activity based on cultural motives, and its products can be described as cultural tourism collection travel.

Cultural relics and heritage resources are a way of showing how people and things in local history connect with local culture, economy, and social life and are also a tourism resource formed by local social activities, artistic creations, and cultural relics. The integration of local cultural resources can effectively convert these historical and cultural resources into tourism resources. Tourists commonly visit historical sites, historical buildings, participate in cultural festivals, lifestyles, historical events, and appreciate traditional values, and other creative cultural exchanges. Through their participation, tourists can recall the past and extend

cultural care. These historical and cultural resources demonstrate the characteristics of the region and can become key elements of tourism attractiveness.

Many of Taiwan's offshore islands have retained unique cultural features due to long-term military control and restrictions on outbound traffic. For example, the unique folk customs and situation as well as the seasonal rituals of the Tao tribe on Lanyu are their local characteristics; the post-World War II military facilities in both Kinmen and Matsu display special battlefield cultural features. As Taiwan's offshore island tourism shows the historical memory of tourist destinations, these cultural relics and cultural resources not only represent times past but also create an important link in the construction of the outlying islands' self-perceptions. By inheriting the core values of intangible traditional culture, the region uses cultural tourism and recreational activities to further exhibit the historical significance of tourist destinations and the value of traditional arts. Tourists can expand their knowledge and broaden their horizons through cultural tourism as well as enjoy themselves and meet their spiritual needs. The diversity of these cultural heritage sites and cultural resources are among the most important attractions in island tourism.

Well-established and convenient transportation

Transportation provides a bridge between tourist attractions and markets, playing an important role in the accessibility of tourist attractions. Traffic accessibility refers to transportation routes and accessibility, transportation software and hardware facilities, transportation tools, and their comfort and convenience. Usually, transportation itself is not the purpose of tourism but is a necessary condition for tourism. Well-established and convenient transportation are thus important for users. In addition, since comprehensive transportation is usually connected to tour spots, a well-established tourism transportation plan will benefit from reducing transportation costs for tourists and increasing tourism utility. Therefore, well-established transportation should include external transportation that links with local tourist attractions. The former includes the necessary tools and facilities for transporting incoming tourists from their place of departure to the tourist destination while the latter includes the traffic connection of the various attractions in the tourist area.

The geographical and topographical isolation of Taiwan's offshore islands has become a key influence factor for tourists to travel to these island destinations. If effective transportation can be provided, it will activate the tourism industry and local economy, attracting more tourists to visit. Transportation planning of island tourism should thus provide seamless transportation services through the link with major transportation stations as well as connect the tour spots and tourist markets in various regions, so as to improve the accessibility and connectivity of transportation to tourist attractions. In addition, the carrying capacity of tourism transportation is regarded as an important evaluation item for tourism development and tourism attraction. Only by completing the construction of basic transportation for tourist destinations, allowing tourists to smoothly visit tourist attractions and fully experience the connotation of the attractions, can they achieve tourist attractiveness qualification.

Diversified itinerary designs and activities

The core issue of island tourism planning is tourism products. Its purpose is to research and design competitive and differentiated tourism products with the correct market positioning,

and to continuously upgrade, combine, and innovate the tourism products within the development of offshore island tourist destinations. While tourism products are a tour experience on which visitors spend a certain amount of time and money, the experience includes the entire tourism process, from leaving one's usual residence to returning when the trip ends, and comprehensive feelings about the tourism experience and the services one enjoyed. For the tourism industry, tourists are the market, and the tour experience is a marketable product. Therefore, among the components of tourism products, attractiveness is the basis for tourism to survive, and tourist attractiveness refers to the magnetism that can provide tourists with reasons to travel. This attractiveness helps promote tourism, induce travel, and maintain the tourism industry.

In this research, 'diversified itinerary designs and activities' is the fourth attractive factor. The present study suggests that this is an important item of tourist attractiveness, as the energizing power that constitutes an island tour and as a tour product that attracts tourists. It is also a key factor that attracts tourists to experience and consume tour products. When promoting island tourism, tourism operators should start from the attractiveness and marketing elements of island tourism, take advantage of the characteristics of local resources and local tourism resources, and then plan 'diversified itinerary designs and activities' for the island tour activity area. It is expected that various tourist activities in offshore islands will be used to combine culture and resource systems to create diverse island tour experience activities, enhance the island tourism experience, and cater to the market needs of different tourists.

Reputation and familiarity of attractions

Tourists' feelings, thoughts, and opinions about destinations will differ due to different personal recreational needs through travel experience, information collection, and personal recognition of the area. Tourists will also have different degrees of knowledge and understanding of tourist attractions. Generally speaking, the main determinant of attracting tourists to a particular tourist destination is its tourist image, and the connotation of tourist image has the concept of familiarity. It is not only included in the measurement of tourist destination image but also regarded as a key component of tourist attraction. The reputation and familiarity of a tourist spot is a combination of the beliefs, concepts, and impressions of the attraction's attributes or activities. These can help tourists develop a sense of identity with the local area or region, attracting the attention of potential tourists and becoming tourists' general impressions, perceptions, and opinions of tourist areas.

The reputation and familiarity of tourist spots are important features of island tourism. When tourists plan their travel, they frequently use a search engine to undertake a preliminary investigation, inspired by the name and popularity of a known tourist destination or attraction. Through the users' personal experience and comments in reviews of the attraction, tourists make a preliminary decision on whether to travel to and within offshore islands. Tour operators can thus benefit from investigating and analyzing the characteristics of important tourist spots on the offshore islands, so as to understand the potential market supply and demand affecting the development of these tour spots. In addition, the industry can also collect and sort out the tourists' experience and traveling intentions to the offshore island attractions and then plan the tourism marketing with the island's complete image, so as to preserve their unique local landscapes to promote the tourism development.

Completeness of tourist environmental space

Tourism attractiveness is composed of multiple features. In addition to relying on the tourist area's unique local resources, it includes various facilities and services (e.g. accommodation facilities, catering services, and travel agencies) that satisfy tourists during their visit. A high-quality tourist environmental space is important to tourism attractiveness and for meeting the needs of tourists and the goals of service quality in the industry.

In order to provide the basic living necessities required by tourists, tourist destinations must construct recreational and leisure spaces, shopping facilities, and auxiliary equipment, depending on their specific geographical conditions and environments. This can help provide word-of-mouth publicity for offshore island tourism and establish a deeper image of quality. Since the attractiveness of tourist destinations is mainly about providing a satisfying tourist experience, it is necessary to provide good environmental and visual quality. Establishing a safe and secure tourism environment (including balancing the needs of tourist environmental space and service facilities) can encourage tourists to carry out various tourist activities with peace of mind. This is an important issue for creating tourism attractiveness. The renovation of public service facilities, the greening of landscapes, and the cleaning of the environment are important auxiliary service facilities for tourists. It is significant that the offshore island attractions retain their original state due to historical development. To increase the intensity of island tourism marketing, strengthening the completeness of tourist environmental space of the offshore island attractions will affect the extent of the island's tourism attractiveness.

Summary

This study found that three of the top six key factors fell in the 'substantial aspect' category, two key factors fell in the 'social aspect' category, and one key factor fell in the 'environmental aspect' category. These findings show that the main factors in tourism attractiveness are the substantial elements of tourist attractions, the itinerary design of tourism activities, the facility completeness of local transportation, and tourist space. These key factors of attractiveness can stimulate tourists' motivation and attract them to travel when they have tourism expectations and demands, thereby affecting their tourism behaviors and stimulating their demands and desires to form an invisible towing force in tourism. This towing force will exist in the form of tourism charm, which affects tourists' decision to choose a destination, making them willing to spend time and money on tourism.

If any travel company plans to market offshore island tourism products in the future, these key attractiveness factors can be considered important factors in development and marketing. The tourism industry is moving rapidly toward business models adapted to digital marketing, which differs completely from traditional tourism marketing models. In order to strengthen the marketing abilities of offshore island tourism, all tourism company staff should have the ability to plan and handle social media and digital content. In this way, they can inspect relevant tourism information regarding the distinctive natural landscapes, cultures, and history as well as the tangible and intangible cultural assets of Taiwan's offshore islands, and then market tourism products by strengthening the use and integration of digital media (big data analysis and digital marketing tools, combined with digital action applications, web design

techniques, digital display, and open-source code) after completing the planning and building of comfortable, convenient, and friendly tourism products. User-generated content (UGC) and related marketing methods are becoming more active and fully developed. Tour operators should encourage users of brands and tourism products to produce media content and share it in their networks. Operators can thereby draw attention to, enhance the popularity of, or increase discussion concerning their brands and products, which is beneficial for marketing and may contribute to the effective spread effect.

Conclusions

Tourism attractiveness is the attractive feature that drives tourists to a tour destination, and it can generate a push-pull force for tourists to consume at the tour destination. Taiwan's offshore island attractions are attractive to tourists who are interested in unique natural scenery, cultural and historical sites, folk customs, ecosystems, and recreational experiences. It is an important research topic that can help the tourism industry improve its promotion and sales of island tour products and evaluate the attractiveness of its island tourist activities. The main purpose of this article has been to apply the fuzzy AHP method to analyze the key factors of Taiwan's offshore island tourism attractiveness, hoping that the results can provide a reference for evaluating offshore island tourism's future competitiveness.

Through a literature review and expert opinions, this study preliminarily researched the important factors influencing the attractiveness of Taiwan's offshore islands for tourism, including four major evaluation dimensions and 16 evaluation factors. AHP expert questionnaires were then issued to industry representatives and scholars, and the relative weight of each evaluation factor was obtained using the fuzzy AHP method. Finally, the main findings of this study were as follows: (1) 'Substantial aspect' is the most important evaluation dimension of Taiwan's offshore islands tourism attraction. (2) The first six key determinants for the tourism attractiveness of Taiwan's offshore islands are: 'natural resources of regional attractions', 'cultural heritage and cultural resources', 'well-established and convenient transportation', 'reputation and familiarity of attractions', 'diversified itinerary designs and activities', and 'completeness of tourist environmental space'.

The generation of tourism attractiveness is contingent upon whether the charm of the recreation area meets tourists' needs. Providing consumers with appropriate tourism and recreation resources and services is thus the focus of local governmental tourism units. Since tourism attractiveness is a measure of the relative strength of a tourist attraction, five of the aforementioned research results are related to local government, which shows that local government plays an important role in the tourism attractiveness of offshore islands. In addition, although Taiwan's offshore islands are rich in tourism resources, outbound traffic is often affected by weather factors. In order to increase the intensity of island tourism in the future, building a well-established transportation and tourist environmental space is an important task for the tourism authority.

This research has focused mainly on factors that influence the attractiveness of offshore islands. Follow-up research could focus on topics such as (1) factors affecting willingness to

revisit, destination image, tourism satisfaction, and recreational experience (2) and comparing the travel characteristics of different types of tourists in order to explore the key demands for tourists to offshore islands and how to develop strategies for improving offshore island tourism in the future. (3) In the future, island sustainable development must be evaluated and discussed in order to facilitate sustainable tourism. (4) In the midst of a pandemic, certain factors, such as the health and sustainability of both tourist destinations and hotels, may weigh heavily on travel decisions. These can be further researched as related issues in the future.

It is believed that the Covid-19 pandemic will calm down one day. As life slowly recovers and the tourism industry returns to its previous levels, it is believed that island tours and other tourist activities will subsequently flourish. This article's research results will serve as a helpful reference for enhancing the attractiveness of island tourism.

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