

Article

Selecting Optimal Cultural Tourism for Indigenous Tribes by Fuzzy MCDM

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Abstract: Unique Indigenous cultures have become increasingly attractive and prevalent in the tourism market. More and more Indigenous tribes wish to improve their economic situation by developing a tourism industry with ethnic culture as the core attraction. The main arguments regarding Indigenous tourism involve cultural vicissitudes between the past and present, indicating that appropriate tourism development and cultural conservation should be carried out. As cultural features are characterized by symbols, complexity, shareability, and diversity, it is challenging to measure the aspects of cultural vicissitudes. This study adopted a mixed multiple-criteria decision-making (MCDM) model, in which the fuzzy analytic hierarchy process (FAHP) and fuzzy technique for order preference by similarity to ideal solution (FTOPSIS) were established to assist Indigenous tribes in selecting an optimal cultural tourism mode. Based on a literature review, a hierarchical structure for cultural vicissitude criteria selection is constructed. FAHP was applied to determine the importance and weights of criteria. Among the considered criteria, material culture, institutional culture, and spiritual culture with the values of 0.5478, 0.2791, and 0.1731 were determined as the most effective criteria for developing Indigenous tourism rankings, respectively. The optimal cultural tourism model ranking was obtained using the FTOPSIS approach.

Keywords: Indigenous tourism; cultural vicissitude; fuzzy set; analytic hierarchy process (AHP); technique for order preference by similarity to ideal solution (TOPSIS)

MSC: 91F10; 91F99

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1. Introduction

Indigenous unique cultures are a key tourist attraction for international and domestic markets [1]. The development of the tourism industry can increase economic benefits and quality of life for Indigenous people [2]. Indigenous tourism is frequently viewed as a tool for promoting socio-economic benefits in Indigenous communities and host districts, and it has become a means to improve the lives of Indigenous communities [3]. Indigenous communities can highlight their traditions, educate following generations, increase cultural awareness, and improve the local economy through diverse tourism activities. Specifically, Indigenous tourism activities should involve interaction with residents, immersion in the natural environment, and experiencing various cultural events [4].

Indigenous unique cultures have become increasingly attractive and prevalent in the tourism market [5]. Ethnicity is a key component of the identity of Indigenous people, and can help to improve the local economy through the development of tourism [6]. However, Indigenous communities in Taiwan have suffered from cultural degradation, with subsequent adverse effects on environmental quality and lifestyles, while the economic benefits from the tourism industry are low. Nowadays, traditional festivals of some tribes are changed into events for the purpose of marketing machine-made handicrafts, singing,

and dancing to please visitors [7]. Recognizing the influence of tourism development, some Indigenous tribes have focused their efforts towards a commitment to conserving cultural heritage.

Culture is the creative expression of a community, developed through a long period of living together and adapting to social changes [8]. Culture significantly influences an individual, who acts as a passenger and carrier of cultural behavior [9]. It not only consists of tangible products, but also involves intangible components such as language, education, beliefs, and rituals, which are difficult to measure accurately. Individuals usually have certain perceptions toward culture, depending on their preferences, viewpoints, and roles in the process (tourists/residents). Previous studies have found that cultural reproduction and vicissitudes are novel in tourism research, viewing tourism development as a changing cultural field and discussing the associated internal mechanisms [9]. Based on Indigenous tourism, Liang and Chan [10] have examined how cultural vicissitudes theory provides a sociological viewpoint for analyzing the cultural impact on tourism.

As cultural features are characterized by symbols, complexity, shareability, and diversity, it is challenging to measure cultural vicissitudes. Selecting suitable culture vicissitude indicators is a multi-criteria decision-making (MCDM) problem, wherein selected criteria must be completely screened to determine the appropriate choice. MCDM has been broadly applied in diverse assessment and selection problems and has shown marvelous assessment performance under various constraints. Compared with other statistical methods, MCDM does not require basic assumptions for variables or criteria. Several calculated formulations for MCDM have been developed in order to process various complex data and provide sound management information and, thus, support decision-makers in formulating more suitable strategies [11].

Previous research has studied tourism-related issues using MCDM, such as exploring sustainable sports tourism criteria [12], selecting bloggers for hotels [13], and exploring the obstructions to tourism growth in rural areas in India [14]. According to the literature review, an evaluation system for the cultural vicissitudes of Indigenous tourism has not yet been established. In response, this study aims to establish the evaluation criteria for the cultural vicissitudes of local tribes in order to develop Indigenous tourism through the use of fuzzy MCDM. Furthermore, this study explores the mutual impacts among the criteria. This evaluation model brings several contributions and innovations to Indigenous tourism development for local tribes.

2. Literature Review

In this section, we provide a review of previous studies concerned with the research topic and explain the concept of cultural vicissitudes to develop evaluation aspects and criteria for indigenous tourism.

2.1. Indigenous Tourism Affects Cultural Vicissitudes in Taiwan

Culture is the creative expression of a specific community, developed through a long period of cohabitation and adapting to social changes. Cultural reproduction explains cultural change, including how it replaces old cultural aspects and reproduces itself over a long period of social development [8]. Culture significantly affects an individual, who acts as a passenger and carrier of cultural behavior [9]. Cultural change results from the struggle to distinguish between cultural producers and consumers. Cultural vicissitudes aim to firm the external social forces that interfere through these internal competitive struggles, fundamentally transforming the cultural sphere.

According to the observations of anthropologists in Taiwan, more and more ingenious peoples and cultures have been affected by the external environment; for example, Indigenous Harvest Festivals may lose their original function through transformation into leisure- and tourism-based activities. Taiwanese Indigenous tribes are usually located in areas that have a rich natural and ecological environment. Indigenous people and their cultural distinctiveness are the best cultural tourism resource; hence, Indigenous tribes

are increasingly using their cultural resources to develop tourism activities, including Indigenous handicrafts, architecture, clothing, dance and music, and cultural traditions [7].

Indigenous tourism can offer opportunities to promote better cultural understanding. Due to their unique cultural features, visiting Indigenous villages has become popular. Thus, Indigenous tourism has become prevalent, involving experiencing Indigenous daily life and activities (e.g., dancing, clothing, hunting, living vernacular architecture). The external environment affects the change in traditional culture and social relations among Indigenous tribes. The development of Indigenous tribal tourism may cause alteration in the compliance, contradiction, and opposition of residents [15]. However, residents and community leaders trust that developing Indigenous tourism can provide chances and turning points for economic development, Indigenous culture, and ecological protection [16]. In response, Liang and Chan [10] have addressed three critical aspects of cultural vicissitudes affecting Indigenous tourism. Hence, the concept of cultural vicissitudes is introduced in this paper, in order to obtain the selection criteria for Indigenous tourism development.

2.2. Evaluation Aspects and Criteria

In a multi-criteria evaluation, a set of feasible alternatives is considered, with more than one criterion used for ranking the alternatives. According to Keeney et al. [17], five principles must be considered while formulating criteria: completeness, operationality, decomposability, non-redundancy, and minimum size.

Numerous studies have explored the cultural aspects of Indigenous tourism. Yao and Zhao [18] have categorized cultural impacts with respect to tourism destinations into material, behavioral, and spiritual. Chen [19] has classified cultural impacts with respect to Indigenous tourism as having material, institutional, and spiritual dimensions. Richards [20] has reviewed articles from the past decade and found more and more studies concerned with the shift of Indigenous heritage from tangible to intangible in the coverage of cultural tourism. This situation reflects several “turns” in social science, including mobilities, performance turns, and creative turns. Despite scholars having divergent perceptions of culture, Liang and Chan [10] have addressed that local culture should include life resources and a living environment, social systems, and spiritual components (e.g., perceptions, value systems, and ethnic features).

In addition, cultural reproduction and vicissitudes are novel to tourism field, facilitating the view of tourism development as a converting cultural domain and discussion of the internal mechanisms [9]. Hence, this study incorporates the cultural vicissitudes theory proposed by Chen [19] and Liang and Chan [10], in order to investigate the traits of cultural change, by considering different impacts through material, institutional, and spiritual aspects. Material culture mainly corresponds to instrumental actions that satisfy survival needs, such as housing, food, clothing, equipment, and transportation; spiritual culture mainly complements the value of rational actions, such as language, belief, morality, and the pursuit of spiritual meaning; and institutional culture is a combination of both.

This study synthesizes previous studies and considers the practical situation for the establishment of evaluation criteria, including the three aspects and 11 cultural vicissitude sub-traits provided in Table 1.

Table 1. The evaluation criteria for cultural vicissitudes.

Aspect	Sub-Trait	Reference
Material culture	Souvenirs and handicraft heritage	[21]
	Wearing traditional clothes and accessories	[22]
	Teaching traditional farming	[23,24]
	Habitation feature heritage	[25,26]
	Architectural heritage conservation	[27,28]
Institutional culture	Education on cultural identification	[29]
	Tribal taboos (hunting, food, resident, spiritual taboos)	[30,31]
	Rituals and festivals	[32–34]
Spiritual culture	Indigenous language heritage	[35]
	Literature and art (songs, dance, painting, music)	[36]
	Tribal religious beliefs	[37]

3. Research Methods

This study designed a cultural vicissitude evaluation questionnaire, which was mainly composed of questions for evaluating the comparative importance of the criteria, as well as the tourism development performance of the tribe corresponding to each criterion. Sixteen experts from the Indigenous people's development foundation, the Indigenous education resource center, and the Indigenous community development association were required to fill in the questionnaire, in order to analyze the tribal cultural vicissitudes in the context of Indigenous tourism. Experts are expected to have knowledge of all attributes in order to make precise judgments, but it is not practical for them to learn all of them. A pairwise comparative analysis would become increasingly complex as the number of attributes, alternatives, and experts increases. Due to the heavy workload, pairwise comparative judgments are perfect for small sample sizes [38].

This study carried out our evaluation procedure in several steps, as shown in Figure 1. First, to identify cultural vicissitude aspects from a literature review and design questionnaires. Second, to construct the evaluation criteria and calculated the weights using the fuzzy analytic hierarchy process (FAHP) method. Then, the measurement of each criterion was conducted under the setting of fuzzy set theory, which is derived from [39]. As for the performance corresponding to the criteria of each tribe, this study used linguistic expression to measure tourism development performance. Finally, it conducted a fuzzy technique for order preference by similarity to ideal solution (FTOPSIS) analysis to obtain conclusive ranking results.

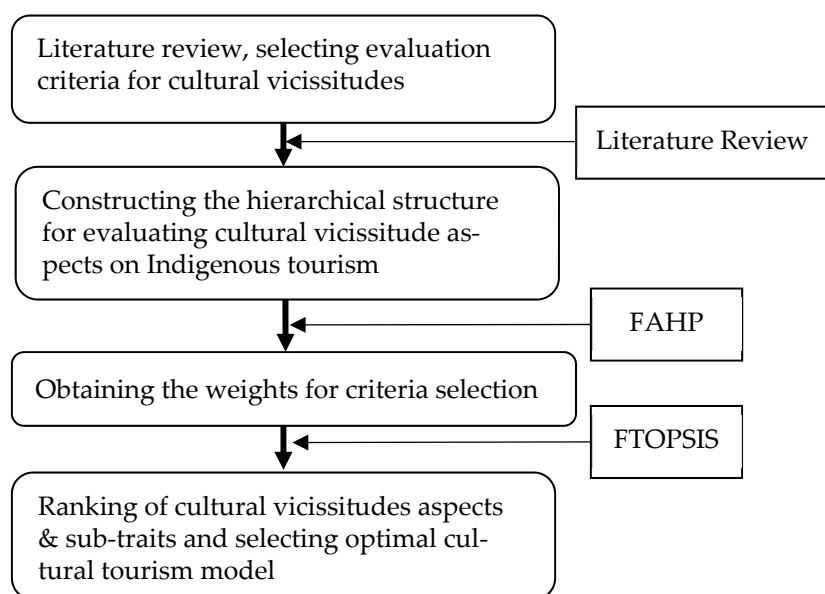


Figure 1. Evaluation framework for cultural vicissitude in Indigenous tourism.

This study chose three major tribes which had been developing Indigenous tourism for some time as the research objects. Tribe A, the Torik, is an Amis tribe located in Taitung County, which has a rich history with unique cultural characteristics and folkways. Tribe B, the Saviki, is a Tsou tribe located in Chiayi County, which has excellent forest resources and is famous for its Danaiku ecological environment and fishing and hunting culture. Tribe C, the Smangus tribe, is located in the high mountain of Hsinchu County, which possesses Atayal culture and ancient endangered trees.

3.1. Fuzzy Analytic Hierarchy Process (FAHP)

The analytic hierarchy process (AHP) is one of the most common multi-criteria decision-making (MCDM) methods, which considers a set of evaluation criteria and alternatives to determine the best decision to be made [40]. Through pairwise comparison between

the decision criteria, the AHP method is applied to identify each criterion's weights, in terms of how they affect the decision. It is a strict method of mathematically translating the subjective judgment of decision-makers into serial results with numbers [41]. In MCDM scenarios, the fuzzy analytical hierarchy process (FAHP) has become popular for addressing fuzziness [32], which can compensate for an unbalanced scale of judgment and uncertainty involved with mapping judgments to numbers [42]. This study computes the weights of the identified cultural aspects and sub-traits using the FAHP approach. Experts are required to make a pairwise comparison between sub-traits by individual judgment based on a 0–9 scale. Experts' comparison with themselves is no longer counted to eliminate the error caused by the expert's assessment [43]. After establishing pairwise comparison matrices, geometric means are proposed to determine expert weight.

Constructing Pairwise Comparison Using Eleven Criteria

In order to compare the eleven criteria of Taiwanese Indigenous cultural sub-traits, experts should indicate whether they have equal importance, moderate importance, vital importance, demonstrated importance, or extreme importance. In this study, equal importance is represented by the numbers 1, 1, 3; moderate importance, 1, 3, 5; vital importance, 3, 5, 7; demonstrated importance, 5, 7, 9; and extreme importance, 7, 9, 9. The element x_{kij} in Equation (1) represents the linguistic scale received from the expert k , regarding the degree of preference of the i criterion over the j criterion. A single matrix was constructed by taking the geometric average of the fuzzy numbers in the binary comparison matrices of the 16 experts, in order to calculate the weights for the sub-trait. Adding up the sub-total of each criterion respectively in the target set comes to be the fuzzy value.

$$A_{kij} = \begin{bmatrix} x_{k11} & x_{k12} & x_{k13} & \dots & x_{k1n} \\ x_{k22} & x_{k23} & \dots & x_{k2n} \\ x_{k33} & \dots & x_{k3n} \\ \dots & & & & \\ x_{knn} \end{bmatrix} \quad (1)$$

3.2. Fuzzy TOPSIS

Hwang and Yoon [44] addressed the technique for order of preference by similarity to ideal solution (TOPSIS), which is a multi-criteria decision-making approach. This method is applied to evaluate alternatives against multi-selected criteria and sub-criteria. TOPSIS generates an alternative ranking based on the closeness to an ideal solution [45]. Any best-chosen substitute has the closest Euclidean distance to a positive ideal solution as well as the farthest Euclidean distance from a negative ideal solution. Positive ideal solutions are the best scores that can be achieved for each criterion, while negative ideal solutions are the worst scores. As TOPSIS represents rational human choice and offers simple calculations, it has been applied in a wide range of research applications [46].

Six Steps to Calculating FTOPSIS

Step 1: Calculate the fuzzy normalized matrix

The process of transforming attributes into non-dimensional attributes is created by a normalized decision matrix, which allows comparisons across criteria. Assume x_{ij} is the score of tribe i based on sub-trait j , a matrix $A = x_{ij}$ of $m \times n$ matrix. The normalization process is as follows:

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^m x_{ij}^2}} \quad (2)$$

Step 2: This study assumes a set of weights for each sub-trait w_j for $j = 1, \dots, n$ for constructing the weighted normalized decision matrix. Each column of the normalized decision matrix times by its associated weight, and the element becomes:

$$v_{ij} = w_j r_{ij} \quad (3)$$

Step 3: Establish the ideal and negative ideal solutions:

Consider J as a set of benefit sub-traits, and consider J' as a set of negative sub-traits.

$$\text{Positive Ideal solution : } A^+ = \{v_1^+, \dots, v_n^+\} \quad (4)$$

$$\text{where: } v_j^+ = \{\max(v_{ij}) \text{ if } j \in J; \min(v_{ij}) \text{ if } j \in J'\}$$

$$\text{Negative Ideal solution : } A^- = \{v_1^-, \dots, v_n^-\} \quad (5)$$

$$\text{where: } v_j^- = \{\min(v_{ij}) \text{ if } j \in J; \max(v_{ij}) \text{ if } j \in J'\}$$

Step 4: Calculate the Euclidean distance of the tribe options between the positive and negative ideal solutions

$$\begin{aligned} S_i^+ &= \sqrt{\sum_{j=1}^n (v_{ij} - v_i^+)^2} \quad i = 1, \dots, m \\ S_i^- &= \sqrt{\sum_{j=1}^n (v_{ij} - v_i^-)^2} \quad i = 1, \dots, m \end{aligned} \quad (6)$$

Step 5: Compute the relative approximation of each tribe option to the ideal solution P_i^* , which is a value function [47]

$$P_i^* = \frac{S_i^-}{S_i^+ + S_i^-} \quad (7)$$

Step 6: Rank the tribe options according to in the descending order of P_i^* [48]

4. Results and Discussion

This study applied a mixed FAHP and FTOPSIS approach to evaluate the cultural vicissitude aspects of Indigenous tourism in Taiwan. FAHP uses the geometric mean to present a comprehensive aggregate score, in order to obtain the importance level of cultural aspects of Indigenous tourism. The weighting was carried out considering 16 expert judgments. The experts filled out a pairwise comparison questionnaire, the results of which were processed using the FAHP method. The calculated consistency ratio was less than 0.1 ($CR = 0.0312$), which means that the comparisons under the adopted criteria were consistent. Then, the weights of the criteria were multiplied by the dimension weight, in order to obtain the integrated weight and ranking of each criterion (see Table 2). The outcomes after handling the questionnaire with the FAHP were the weighted values for each sub-trait in the TOPSIS analysis. Finally, the TOPSIS method was used to calculate the score of each sub-trait, and then subsequently rank them.

Table 2. Weights of aspects and sub-traits.

Aspect	Weight	Sub-Trait	Weights of Sub-Trait	Integrated Weight	Ranking
Material culture	0.5478	Souvenirs and handicrafts	0.4115	0.2254	1
		Clothes and accessories	0.1829	0.1002	4
		Cuisine and farming	0.1396	0.0765	7
		Habitation	0.1446	0.0792	5
		Architectural heritage	0.1214	0.0665	9
Institutional culture	0.2791	Education	0.3692	0.1030	3
		Taboos	0.2387	0.0666	8
		Rituals and festivals	0.3921	0.1094	2
Spiritual culture	0.1731	Language	0.2370	0.0410	11
		Literature and art	0.3134	0.0543	10
		Beliefs	0.4496	0.0778	6

4.1. FAHP Results (Cultural Vicissitude Aspects)

The results for the cultural vicissitudes were obtained using the FAHP method. These results indicated that material culture had the highest weight (0.5478). The other cultural vicissitudes are ranked as follows: institutional culture (with a weight of 0.2791), followed by spiritual culture (with a weight of 0.1731). Table 2 presents the ranking of cultural vicissitude aspects. It should be noted that these findings were obtained initially for Taiwan; every country has a unique Indigenous culture, which may lead to variations in the results. According to the expert opinions, the most important cultural vicissitude aspect was material culture, followed by institutional and spiritual cultures. Indigenous tribes are usually located in mountainous areas, and their habitats are considered worse than in city and rural areas. However, more and more tourists want to explore these areas, due to well-developed transportation. The development of tourism may create more interaction opportunities between residents and tourists, which may increase their desire for material demands. Institutional culture involves shared values, such as education, taboos, life and death, etiquette, festivals, and marriage [19], which are inherited by the following generation. However, this is less critical for Indigenous tourism. Finally, spiritual culture was found to be unimportant for Indigenous tourism; however, it is critical for residents, as local culture formation is a process of accumulating the characteristics and spirit of local people within a specific geographical area in a historical period [49].

4.2. FAHP Results

The weight of each cultural vicissitude aspect was estimated using the FAHP method, computed through the pairwise comparisons matrix. The results indicated that souvenirs and handicrafts are an essential sub-trait in material culture, followed by clothes and accessories, habitation, cuisine and farming, and architectural heritage, respectively. This result reveals that souvenirs and handicrafts are critical for developing Indigenous tourism, as they can bring economic revenue to local tribes. For conserving Indigenous culture and promoting life quality, material culture is considered the main cultural vicissitude aspect. There are 16 Indigenous peoples in Taiwan, each having a unique culture and art features. Hence, developing the tourism industry requires combining typical totems with handicrafts. By arranging authentic journeys for tourists, they can experience archery, bamboo rafting, plant plaiting, trap setting, enjoying PawPaw drumming and local cuisine, and overnighting in a traditional tribe house. Integrating cultural traits into the tribal trip can lead tourists to perceive local culture deeply.

From the institutional culture perspective, the residents recognize the development of tourism industry can benefit local areas and promote their economic situation. From a cultural vicissitude perspective, rituals and festivals involved offering sacrifices or welcoming gods in the early stages; the performance of these rituals has now become a tourism activity [50]. Education is the best way to pass on Indigenous culture to the following generations, in order to understand the associated customs, language, and habits better. Facial tattooing was a valuable cultural tradition for some tribes in the past; however, it is a cultural symbol that no longer seems to be common practice. Instead, a facial tattoo invokes the spirit of ancestors preaching in the present day.

Within the spiritual culture, it was revealed that beliefs emerged as the most important sub-trait, followed by literature, art, and language. Indigenous beliefs involve animism, including nature worship and worship of the souls of the dead; meanwhile, their literature and art include the unique styles of songs, dances, paintings, and music. At present, this spiritual culture still exists among tribal residents but is not significant for the development of Indigenous tourism. While language was ranked the most insignificant sub-trait, Indigenous people used Mandarin to communicate with others; as such, Indigenous language has become unnecessary for their life. Thus, overall, spiritual culture was found to be insignificant for Indigenous tourism.

4.3. The Overall Ranking of the Sub-Traits

The final ranking of the sub-traits is presented in Table 2, showing the ranks of the most to least critical cultural vicissitude sub-traits. The overall results reveal that souvenirs and handicrafts were the most crucial sub-traits, with a weight of 0.2254. Meanwhile, rituals and festivals were recognized as the second vital sub-trait, with a weight of 0.1094, and education was indicated as the third important sub-trait, with a weight of 0.1030. Affecting by multi-ethnic cultural assimilation, Indigenous peoples may lose their unique cultural features. For considering both tourism development and cultural conservation, this study suggests that an individual tribe designs its unique handicrafts and plans a tribal trip for a small group. In addition, popularizing Indigenous education can facilitate cultural conservation. Hence, elementary schools can arrange more Indigenous culture programs to educate the next future generation.

In contrast, language was ranked as the least important sub-trait, with a weight of 0.0410. Literature and art were recognized as the second least vital sub-trait, with a weight of 0.0543; architectural heritage was indicated as the third unimportant sub-trait, with a weight of 0.0665. The results indicate that Indigenous tourism development is more related to promoting residents' quality of life. As to literature, arts, language learning, and architectural heritage, residents are viewed as unimportant things.

4.4. Fuzzy TOPSIS Results

When using FTOPSIS, the decision-makers score each of the aspects and sub-traits from one to nine points, and the geometric mean is used to integrate the evaluation matrix derived from the opinions of the 16 experts, in order to establish normalized evaluation values. By applying the Euclidean distance equation, the values for each evaluation matrix, the positive ideal solution, and the negative ideal solution were calculated. A priority order was then set, based on each aspect's relative approximation. In the results, the material culture had the highest priority, while the spiritual culture was the least important, and the institutional culture was in the middle, as shown in Table 3. Then, the decision matrix, fuzzy normalized decision matrix, and weighted normalized fuzzy decision matrix were obtained. From this, the final priority order of the cultural vicissitude sub-traits in the Indigenous tourism evaluation results of three tribes was obtained, as shown in Table 4. In general, in order to develop Indigenous tourism, the three considered tribes should focus more on designing souvenirs and handicrafts that show tribal spirit. The cultural vicissitude results serve to improve the quality of life of residents. Hence, the development of economic demand is critical for Indigenous residents.

Table 3. The priority order of each Indigenous cultural aspect.

Cultural Aspect	S_i^+	S_i^-	P_i^*	Ranking
Material culture	0.0058	0.1136	0.9515	1
Institutional culture	0.0767	0.0312	0.2894	2
Spiritual culture	0.1162	0.0032	0.0270	3

Table 4. The final priority order of sub-traits of the three tribes (weights).

Sub-Trait	Tribe A	Tribe B	Tribe C
Souvenirs and handicrafts	0.2097	0.2476	0.1850
Clothes and accessories	0.0611	0.1063	0.1694
Cuisine and farming	0.0451	0.0963	0.0934
Habitation	0.0434	0.0815	0.0921
Architectural heritage	0.0274	0.0780	0.1069
Education	0.1532	0.1082	0.0516
Taboos	0.0934	0.0613	0.0419
Rituals and festivals	0.1752	0.0722	0.0804
Language	0.0312	0.0535	0.0338
Literature and art	0.0681	0.0427	0.0533
Beliefs	0.0922	0.0524	0.0922

4.5. Final Ranking

This study first used the FAHP method to obtain criteria weights, applying triangular fuzzy number (TFN) to assess the linguistic ratings given by the experts. Then, this study evaluated the three tribes using FTOPSIS to calculate the weights of the evaluation criteria and the performance matrix. The overall Indigenous cultural tourism evaluation results are shown in Table 5.

Table 5. Final ranking of tribes.

	S_i^+	S_i^-	P_i^*	Ranking
Tribe A	0.2527	0.2019	0.4441	3
Tribe B	0.2761	0.2882	0.5108	2
Tribe C	0.5116	1.5336	0.7498	1

The FTOPSIS method indicated that tribe C possessed the most optimal cultural tourism model, followed by tribes B and A, respectively. Tribe C owns traditional cultural features and a unique natural environment rich in forest resources. It is the optimal model for developing Indigenous tourism. Tribe B lists the second because of its ecological environment and fishing and hunting culture. Tribe A places third due to its rich history with cultural insides. The results showed that the best type to develop Indigenous tourism needs to have an innate natural environmental advantage and then combine with tribal cultural features to design special tribal trips. As such, resource integration can successfully create an advantage for Indigenous tourism.

4.6. Sensitivity Analysis

Finally, this study implements sensitivity analysis to check the robustness according to substituting the cultural vicissitude aspect's weight for another, as in [51]. Since there are three cultural vicissitude aspects, it comes to be with three combinations. This study calculates the relative approximation values and indicates it as AA_{ij} when the aspect i and aspect j are switched. For instance, AA_{mi} presents the weights of material culture(m) and institutional culture(i) that have been switched. Then, the weighted decision matrix and the fuzzy positive and negative ideal solutions were established. Next, the Euclidean distance was evaluated to compute the relative approximation coefficients of each tribe option to the ideal solution P_i^* . Sensitivity analysis results are presented in Table 6. The results showed that the weight substitute of AA_{is} has a different ranking in tribes. As the results show in Table 7, only tribe A becomes the second option in the combination AA_{is} . Tribe C is still the best option in the new algorithm. Consequently, the sensitivity analysis results present the robustness of this new calculation.

Table 6. The relative approximation values.

	Tribe A	Tribe B	Tribe C
AA_{mi}	0.4039	0.5205	0.6025
AA_{ms}	0.3901	0.5602	0.6922
AA_{is}	0.4270	0.4054	0.5874

Table 7. Sensitivity measurement effect to the final ranking.

	Ranking
AA_{mi}	$C \succ B \succ A$
AA_{ms}	$C \succ B \succ A$
AA_{is}	$C \succ A \succ B$

5. Conclusions

Indigenous unique cultures are viewed as a critical tourism attraction. Developing Indigenous tourism can promote residents' socio-economic status. Based on the previous literature and expert opinion, this study identifies cultural vicissitude aspects of Indigenous tourism using a mixed MCDM method. The contributions of this study are summarized as follows:

According to the results, a mixed MCDM is a helpful model for evaluating cultural vicissitude aspects and demonstrating the criteria interrelations. It provides the idea for prioritizing the critical aspects and sub-traits, which may help local communities and residents to plan practical actions to conquer this cultural vicissitude problem. Consequently, this study finds out the problems and focus points of cultural vicissitude on Indigenous tourism based on FAHP weights, which reminds residents of the attention between cultural conservation and tourism development. This is a critical contribution to the tourism field using a mixed MCDM model.

This study also reviews the related literature on Indigenous culture and introduces the concept of cultural vicissitude in selecting criteria for Indigenous tourism. In addition, weights of selecting criteria are acquired from FAHP and imported into FTOPSIS. Fuzzy set theory is considered a helpful approach for solving complex systems due to changeable outcomes being highly unpredictable. The vagueness and complexity of the uncertainty and subjectivity in the evaluation process by human thoughts can be entirely quantified [52]. Since cultural features are symbols, complexity, and diversity, the mixed MCDM method with fuzzy sets can help select the most critical aspects, the optimal Indigenous cultural tourism model and enrich decision-making efficiency.

The insights from the results provide implications for other countries that may also face cultural vicissitude problems related to tribe development. However, the Indigenous cultural nature may be affected by tourism development. It is recommended that Indigenous tribes be concerned about the importance of cultural conservation while developing the tourism industry in order to promote cultural sustainability. The proposed models are suitable for tribal development, whether in high mountain or rural areas. The implications are expected to be very fruitful for local community planners and the government. Future research may consider other MCDM methods, which can be employed for comparison with the results of this study.

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