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Research on sustainable development of forest therapy tourism in Enshi based on SWOT-AHP model

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Abstract. Forest therapy is a new industry which is based on forest ecological environment. With the purpose of pursuing health, it integrates forestry, health services and tourism. As the tourism industry is increasingly developing into the pillar industry, forest therapy is also booming, and gradually becomes the core industry to promote the strategic goal of "rural revitalization" in Enshi Tujia and Miao Autonomous Prefecture. Research on its sustainable development is of great significance to the regional economic growth. This paper is based on the SWOT-AHP model and a combination of qualitative and quantitative methods. The strength, weakness, opportunities and threats of sustainable development of forest therapy tourism in Enshi Tujia and Miao Autonomous Prefecture are analyzed and corresponding countermeasures are put forward. Finally, they are ranked from high to low: strength, opportunities, weakness, and threats. Among them, the sound climate is the biggest advantage of sustainable development of forest therapy tourism in Enshi Tujia and Miao Autonomous Prefecture, while the poor infrastructure and the lack of service system are the main weakness. The increase of market demand is the biggest opportunity. The difficulty in attracting investment and fund is the biggest threat. Furthermore, through the analysis of four quadrant coordinate method, the strategic coordinate P (x, y) is determined to P (0.367, 0.301), with the strategic strength factor of ρ=0.949 5. It is concluded that as for forest therapy tourism in Enshi, the competitive development strategy should be adopted to guarantee the sustainable development of Enshi tourism and promote the implementation of rural revitalization.

Keywords. Forest therapy, sustainable development, SWOT-AHP model, four quadrant strategy.

Based on the statistics of the World Health Organization, nearly 75% of people are in sub-health condition, and only 5% of people conform to the true health standard [1]. China is undergoing rapid social and economic development at present, and the living style of residents is more compact, but due to the limited capacity of the ecological environment, the issue of health has become a social hotspot [2]. The forest therapy, integrating forest landscape, forest environment, forest products and forest culture, with leisure and health service facilities, can cultivate the mind, adjust the function, strengthen the body, prolong the life, and improve the sub-health condition of body [3-4]. “No. 1 Central Document” for 2021 emphasized the comprehensive promotion of the “rural revitalization” strategy. Forest therapy is a new industry [5], and also an important means to promote the deep integration and transformation of forestry and tourism [6-7].

The research on sustainable development of forest therapy tourism has been increasingly significant, which mainly focuses on development potential evaluation, forest therapy resources evaluation and base construction planning [8-10]. SONG, WAN and LI et al. analyzed forest therapy resources, forest therapy environment and development and construction conditions based on the development potential evaluation system of forest therapy tourism [11-13]. In view of forest therapy resources, DI and SONG et al. analyzed the forest resources, forest therapy environment, landscape conditions and facilities [14-15]. In order to better construct and develop the forest therapy tourism base, PAN et al. discussed site selection, development planning and facility construction [16], and LI et al. established an evaluation system for Beijing-Tianjin-Hebei Forest Therapy Base based on the eight-element model [17]. From a macro perspective, WEN et al. established a regional tourism evaluation model based on factor analysis [18], LI et al. analyzed the influencing factors of therapy tourism [19], ZHANG et al. established an industrial suitability evaluation system based on 6 primary indicators, namely therapy tourism service capability, therapy tourism service items, hardware facilities, public service system, personnel allotment and therapy tourism characteristic service experience, so as to promote the healthy and ordered development of therapy tourism [20]. In specific, SWOT method was generally used for analysis. LU et al. adopted SWOT and analyzed the potential of developing forest therapy in Dasiji, Zhejiang [21]. WU, based on SWOT method, analyzed the situation of forest therapy in Sichuan and proposed the corresponding development model [22]. CHEN et al. analyzed the promotion path of forest therapy in Beijing Jiufeng National Forest Park with this method [23]. SWOT is a qualitative analysis, which can better identify the trend, but cannot quantify the dominant situation among indicators. In recent years, the SWOT-AHP model based on the combination of qualitative and quantitative analysis [24-27] has become a normative approach for making therapy tourism development decisions. LI et al. studied the development decision of therapy tourism in Beijing Olympic Forest Park with SWOT-AHP model [28], and ZHAO studied the development strategy of ecotourism in Jiulonggu Forest Park in Fujian with SWOT-AHP model [29]. At present, this model is generally limited to the research on decisions regarding small regions such as forest parks and forest therapy bases, but rarely used in the research on sustainable development of therapy tourism in mountainous ethnic areas.

Enshi Tujia and Miao Autonomous Prefecture (Enshi), located in the southwest of Hubei Province, is surrounded by mountains and rivers, with multiple ethnic minority villages. By virtue of the significant natural strength, it is suitable for being taking as the destination of ecological therapy tourism. In recent years, Enshi, in response to the national call for regional tourism, has innovatively established the “tourism+” sustainable development pattern, integrating the concept, format and culture of forest therapy into rural construction. Forest therapy tourism has gradually become the

main factor of tourism and the main path for implementing the "rural revitalization" strategy in Enshi. Therefore, it is imperative to perform qualitative and quantitative evaluation on sustainable development of forest therapy.

In this paper, the sustainable development of forest therapy tourism in Enshi is systematically discussed, and the strength, weakness, opportunities and threats are qualitatively and quantitatively analyzed with the SWOT-AHP model. At the same time, the development strategy of forest therapy tourism in Enshi is determined by the four quadrant coordinate method, so as to promote the "rural revitalization" strategy in Enshi, and realize the regional sustainable development.

1. Data and methods

1.1. Overview of the study area

Enshi Tujia and Miao Autonomous Prefecture is located in the southwest of Hubei Province between Wuling Mountains and Daba Mountains in the east of Yunnan-Guizhou Plateau, with the coordinates of 108°23'12"-110°38'08"E, 29°07'10"-31°24'13"N. The terrain is dominated by mountains, together with valleys and hills, with the mean altitude of 1,000 m. It is governed by subtropical monsoon mountain humid climate, with warm winter, cool summer, abundant rainfall, and distinct seasons. As recorded in the *Statistical Bulletin of National Economic and Social Development of Enshi Tujia and Miao Autonomous Prefecture in 2020*, the forest area reached 1.504×10^6 hm^2, with the forest greening rate of 74.79%, and forest coverage rate of 70.14%. There are five nature reserves [30], well preserving the biodiversity, and the abundance of plants and animals. Therefore, it is known as an important "animal and plant gene bank" in Central China.

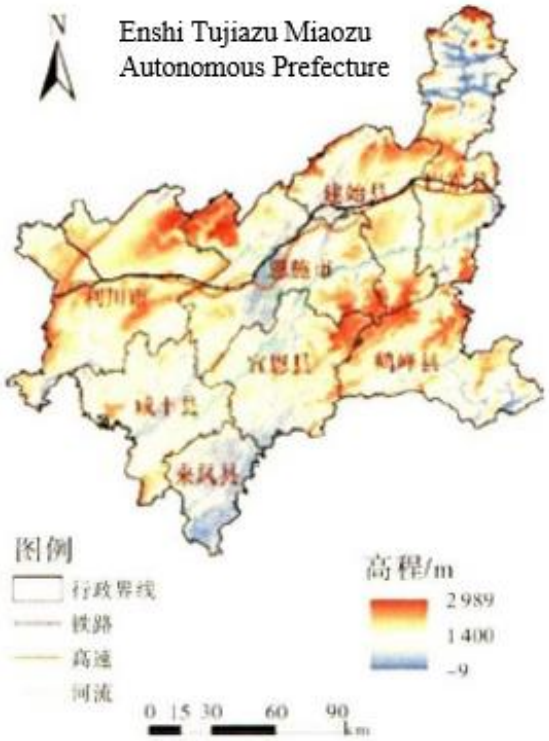

Figure 1. Enshi administrative figure

1.2. Data source

The data of this study are collected from field research and the relevant statistical data. From August to October 2020, Xuzhou Forest Therapy Base, Suobuya Stone Forest Scenic Spot, Bashan Forest Farm and Tongpen Water Forest Therapy Base were investigated, and questionnaires were issued to the park staffs for understanding the development status, development potential and future prospects of local tourist attractions. The statistical data are collected from 2010-2019 Enshi Statistical Yearbook, and 2015-2020 Statistical Bulletin of National Economic and Social Development of Enshi Tujia and Miao Autonomous Prefecture [31-32].

1.3. Study method

1.3.1. SWOT-AHP model analysis

SWOT-AHP model analysis is a quantitative analysis in accordance with the logical sequence of decomposition, comparison, judgment, and synthesis based on qualitative analysis, which is generally used to determine the weight of

each index, and simplify the complex decision problem [33-36]. It can establish a hierarchical structure model from top to bottom (target layer, criterion layer, and index layer) based on different properties of various indexes, construct a judgment matrix based on pairwise comparison of model indexes by the relevant experts, perform calculation based on the judgment matrix with the sum product method or root method, and determine the corresponding element weight with the characteristic root method; then perform the consistency check, and overall ranking, so as to obtain the weight of each index relative to the total target. The specific steps are shown below:

1) Establish a judgment matrix. Establish a hierarchical structure model based on the results of SWOT analysis, to provide an index hierarchy framework for AHP analysis. On this basis, the indexes of different criterion layer and those in a criterion layer can be assigned with values by pairwise comparison through expert consultation, to evaluate the relative importance of the indexes. The values assigned by experts to all indexes should be weighted to determine the average value.

The index of the matrix is set as a_{ij}, which can be calculated with the ratio of average value according to the following equation:

$$a_{ij} = a_i / a_j \tag{1}$$

Where, a_i is the average value of index i, a_j is the average value of index j.

The comparison results can be transformed into a pairwise comparison judgment matrix A with the following equation:

$$A = \begin{bmatrix} 1 & a_{12} & \cdots & a_{1n} \\ a_{21} & 1 & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & 1 \end{bmatrix} \tag{2}$$

2) Solve the judgment matrix. There are many methods to solve the judgment matrix. In this paper, the sum product method is used as follows:

Firstly, normalize each column of the judgment matrix, with the following equation:

$$\overline{a}_{ij} = a_{ij} / \sum_{k=1}^{n} a_{kj} \tag{3}$$

Secondly, add the judgment matrix after column normalization by rows:

$$\overline{W}_i = \sum_{j=1}^{n} \overline{a}_{ij} \tag{4}$$

Thirdly, normalize the vector $\overline{W} = [\overline{\omega_1}, \ \overline{\omega_2}, \ \overline{\omega_3}, \ \cdots \ \overline{\omega_n}]^T$ with the following equation:

$$W_i = \overline{W} / \sum_{j=1}^{n} \overline{W}_j \tag{5}$$

Finally, calculate the maximum characteristic root of the judgment matrix λ_{max}:

$$\lambda_{max} = \sum_{i=1}^{n} \frac{(AW)_i}{nW_i} \tag{6}$$

Where, $(AW)_i$ refers to element i of the vector AW.

3) Consistency check. The calculation error in the process of normalization will slightly affect the consistency, so it is necessary to perform the consistency check.

Calculate consistency index CI of the judgment matrix with the following equation:

$$CI = \frac{\lambda_{max} - n}{n-1} \tag{7}$$

Where, λ_{max} is the maximum characteristic root, n is the order of the judgment matrix.

According to the assignment of consistency index RI of the judgment matrix, calculate CR with the following equation:

$$CR = CI / RI \tag{8}$$

Where, CR is the random consistency ratio of the judgment matrix, CI is the consistency index of the judgment matrix. RI is the average random consistency index of the judgment matrix. If $CR<0.1$, it indicates that the consistency check is qualified, and if $CR>0.1$, it indicates that the matrix should be further modified, until satisfactory consistency is obtained.

4) Weight determination. Based on the judgment matrix passing the consistency check, determine the importance of indexes of a layer relative to those of the upper layer, and then combine the weights of each criterion layer with the weights within each criterion layer to calculate the priority scores of all indexes. Finally, it is necessary to perform the

consistency check for total ordering.

1.3.2. Four-quadrant coordinate method

The strategic goal of sustainable development of forest therapy tourism in Enshi can be determined by the four quadrant coordinate method [37]. The development strategy and its intensity can be determined through calculating the barycentric coordinates of the strategic map, as well as the azimuth angle and intensity coefficient of the center of gravity [38], thus exploring the path of sustainable development of forest therapy.

The weight results can be analyzed by SWOT-AHP model, to determine the overall intensity of strength, weaknesses, opportunities and threats.

Overall intensity of strength: $S = \sum S_i/n_s$ (9)

Overall intensity of weakness: $W = \sum W_i/n_w$ (10)

Overall opportunities and strength: $O = \sum O_i/n_o$ (11)

Overall intensity of threats: $T = \sum T_i/n_t$ (12)

Where, n_s, n_w, n_o, and n_t respectively refer to the number of indexes of strength, weakness, opportunities and threats. S_i, W_i, O_i and T_i respectively refer to the intensity of strength, intensity of weakness, intensity of opportunities and intensity of threats of the index i.

In addition, the four variables, namely strength, weakness, opportunities and threats are taken as the semi-axis to establish a four-quadrant coordinate system. The overall intensity of strength, overall intensity of weakness, overall intensity of opportunities and overall intensity of threats are taken as the point coordinates for positioning, which can be connected to form a strategic quadrilateral, whose strategic barycentric coordinates, strategic azimuthal angle and the strategic positive intensity, negative intensity and intensity coefficient are calculated, so as to finally determine the specific strategic plan and its intensity.

Strategic barycentric coordinates:

$$P(x,y) = (\sum x_i/4, \sum y_i/4) \quad (13)$$

Strategic azimuthal angle:

$$\theta = \arctan(y/x)(0 \le \theta \le 2\pi) \quad (14)$$

Strategic positive intensity:

$$U = S \times O \quad (15)$$

Strategic negative intensity:

$$V = W \times T \quad (16)$$

Strategic intensity coefficient:

$$\rho = U/(U+V) \quad (17)$$

2. Analysis of results

2.1. Establishment of the SWOT model

Index system of sustainable development factors of forest therapy tourism in Enshi (Table 1) has been determined in combination with the field research data, referring to the Standards of National Demonstration Base for Therapy Tourism (LB/T051-2016) and the experience of developing forest therapy tourism in other regions [11-20], and following the scientific, systematic, practical and dynamic principles.

The index system in Table 2 is used to design a questionnaire for surveying the scenic staffs, the related enterprises, park construction experts and scholars, so as to screen out the main strategic factors affecting the sustainable development of forest therapy tourism in Enshi. Each index in the questionnaire is assigned based on the degree of influence. Taking a certain advantage as an example, there are five degrees of influence, namely no advantage (1), slight advantage (3), general advantage (5), large advantage (7) and great advantage (9). A total of 54 questionnaires were distributed and 48 were effectively recovered, based on the survey results, the average value of each index was calculated, for determining the main indexes, as shown in Table 2.

2.2. SWOT factor analysis

SWOT analysis model is established based on the main indexes, as shown in Figure 2, and the indexes are qualitatively analyzed.

Table 1. Index system of sustainable development factors of the forest therapy tourism in Enshi

Target layer	Criterion layer	Index layer
The sustainable development of forest therapy tourism in Enshi	Strength (S)	Abundant biological resources S_1
		Sound climate S_2
		Diverse tourism resources S_3
		Unique traffic location S_4
		Colorful national culture S_5
		Favorable policy environment S_6
		Diverse local features S_7
		Stable customer market S_8
	Weakness (W)	Shortage of professionals W_1
		Limited degree of development W_2
		Poor infrastructure W_3
		Poor operational mechanism W_4
		Insufficient publicity W_5
		Insufficient industrial integration W_6
		Low concept awareness W_7
		Deficient technical support W_8
	Opportunities (O)	Strong policy support O_1
		Broad market prospect O_2
		Health industry development O_3
		Industry transformation and upgrading O_4
		Change in consumption concept O_5
	Threats (T)	Surrounding pressure of competition T_1
		Difficulty in attracting technologies T_2
		Difficulty in attracting investment and fund T_3
		Diverse tourism demand T_4
		Difficulty in ecological protection T_5

Table 2. Average value od index

Index No.	Average Score	Major Index or Not	Index No.	Average Score	Major Index or Not
Strength S			Weakness W		
S_1	6.211	Yes	W_1	6.368	Yes
S_2	7.325	Yes	W_2	4.556	No
S_3	6.187	Yes	W_3	6.909	Yes
S_4	4.795	No	W_4	4.282	No
S_5	5.762	Yes	W_5	5.360	Yes
S_6	4.383	No	W_6	5.122	Yes
S_7	4.909	No	W_7	3.981	No
S_8	3.981	No	W_8	4.326	No
Opportunities O			Threats T		
O_1	4.834	Yes	T_1	4.313	Yes
O_2	5.332	Yes	T_2	3.677	No
O_3	3.166	No	T_3	4.618	Yes
O_4	4.303	Yes	T_4	4.122	Yes
O_5	3.166	No	T_5	3.451	No

2.2.1. Strength

1) Abundant biological resources. The “golden cut of animals and plants” traverses Enshi, which, at the same time, was protected by the Qinling Mountains and Daba Mountains from the destruction of the Quaternary glacier, making it a “refuge” of animals and plants. It is known as an important “gene pool of animals and plants” in Central China, involving more than 3,000 species of plants and 500 species of terrestrial vertebrates in over 900 genera, 215 families [39]. By virtue of the vast forest area, there are 45 natural reserves, including 5 national and 1 provincial natural reserve. For example, in Xingdoushan Natural Reserve dominated by subtropical evergreen deciduous broad-leaved mixed forest, there are 2,033 species of vascular plants in 843 genera, 200 families [40], and 225 species of ligneous plants in 105 genera, 53 families, including 101 species of deciduous trees, 79 species of evergreen trees, 25 species of deciduous shrubs, and 20 species of evergreen shrubs [41].

Strength	Weakness
Abundant biological resources S_1	Shortage of professionals W_1
Sound climate S_2	Poor infrastructure W_3
Diverse tourism resources S_3	Insufficient publicity W_5
Colorful national culture S_5	Insufficient industrial integration W_6
Opportunities	**Threats**
Strong policy support Q_1	Surrounding pressure of competition T_1
Broad market prospect Q_2	Difficulty in attracting investment and fund T_3
Industry transformation and upgrading Q_4	Diverse tourism demand T_4

Figure 2. SWOT analysis model of sustainable development of forest therapy tourism in Enshi

2) Sound climate. Enshi belongs to subtropical monsoon humid climate, with rainfall and high temperature in the same season, in addition to the complex mountain topography, and diverse micro-climatic conditions, Enshi has the average annual temperature of 16°C, mean annual sunshine duration of 1,046h, mean annual precipitation of over 1,500mm, and relative humidity of about 83%. At the same time, there is a vast area of forest, with diverse tree species, mainly the broadleaved deciduous trees, which are high in carbon fixation and oxygen release, with relatively high negative oxygen ion concentration in air. PM10 and PM2.5 reach 34μg.m-3 and 23μg.m-3 respectively, and the average annual rate of excellent and good air quality reaches 97.6% [30].

3) Diverse tourism resources. There are superior natural attractions, making it the "World Selenium Capital", "Forest Sea in West Hubei" and "Natural Oxygen Bar". It has been attaching importance to the development of tourism, for example, it has developed the Enshi Grand Canyon, the largest karst cave and Enshi Pingbaiying in the primitive forest, as well as Karst stone forest [42]. There are 32 A-level scenic spots, including seventeen 4A-level, and three 5A-level scenic spots (Enshi Grand Canyon, Badong Shenlong Creek, Lichuan Tenglong Cave), forming a high-density and high-quality cluster of A-level scenic spots [30].

4) Colorful ethnic culture. The production and consumption of tourism are characterized by strong spirituality, making it important for tourism planning to explore and organize regional culture [43]. Enshi is a settlement of ethnic minorities, including 29 ethnic minorities, such as Tujia, Dong and Miao. There are well-preserved ecological Dong villages, the ethnic minority style villages and stockade villages and chieftain culture based on the ruins of Tusi City, reflecting the unique and distinct local conditions and customs. The innovation and development of the "tourism+culture" forest therapy mode can effectively promote the development of creative cultural products of forest therapy.

2.2.2. Weakness

1) Shortage of professionals. Forest therapy is a diversified industry integrating rehabilitation, ecology, medicine and health preservation, which requires inter-disciplinary talents with management experience and skills, such as forest therapists, forest therapy technicians and forest commentators. However, due to the underdeveloped economy, it is hard to introduce talents from other regions, and due to the lack of standard technical training, there is a shortage of professionals.

2) Poor infrastructure. Compared with similar tourist attractions in other regions, the infrastructure construction is still insufficient in Enshi, making it unable to meet the increasing market demand. This problem is mainly reflected in health care facilities, transport infrastructure and accommodation facilities. At present, Enshi can provide regular health care facilities, which, however, are limited in quantity and insufficient in technology. Although there is a preliminary 3D traffic network consisting of expressways, railways, air and water transport, the highway density is only 82.39 km/10,000 people, and the mileage is less than 30,000 km, making it hard to meet the tourists' demand of "fast arriving and slow visiting". Due to the limited accommodation facilities and insufficient quantity, it would be hard for tourists to book rooms during the holidays.

3) Insufficient publicity. As analyzed based on the literature articles about the development status of forest therapy tourism [44-46], Enshi has publicized by the Internet and new media, but the publicity forms are inferior to those adopted by Chengdu, Chongqing, and Zhangjiajie. There are no multi-channel and multi-perspective publicity methods, and the publicity fails to make full use of Internet technology. It generally attracts the tourists from surrounding areas.

4) Insufficient industrial integration. Forest therapy tourism is the effective integration of tourism industry and health industry based on forest. In order to highlight its own strength, it is necessary to identify the common ground in between, and establish a characteristic tourism therapy project combined with the actual demand of tourists. However, in view of the development status of forest therapy tourism in Enshi, the connection between tourism industry and health industry is still not close enough. They are relatively independent, limited in integration, and insufficient in

industrial characteristics [47].

2.2.3. Opportunities

1) Strong policy support. The National Forestry and Grassland Administration has issued the *Opinions on Promoting the Development of Forest Therapy Industry*, pointing out that the development of the forest therapy industry should adhere to five basic principles, namely ecological optimization, acting according to circumstances, scientific development, innovation and market leadership, and also clarifying the main task of vigorously developing the forest therapy industry. At the local level, the government of Enshi has issued the *Implementation Plan for Enshi to Construct a Demonstration Zone of Green Development in Western Hubei*, clearly stating the task of developing eco-cultural tourism following the concept of "beautiful Enshi and green development". The forest therapy industry is the core of constructing an eco-cultural tourism cluster, and it is necessary to construct a high-quality and high-grade forest therapy industry standardization demonstration model.

2) Broad market prospect. The serious population aging and environmental pollution have increased the demand for medical treatment and health care, and improved the people's health consciousness, leading to vigorous development of therapy tourism industry [48]. In Enshi, the first national tourism demonstration zone in Hubei Province, the number of tourists and the income of tourism have continued to rise in the past ten years. As shown in the *Enshi Statistical Yearbook* for these 10 years, from 2010 to 2019, the number of tourists in Enshi increased by 60,552,100, reaching 71,177,100, and the total tourist income reached 53.045 billion yuan, increasing by tenfold, which was quite impressive for Enshi, a fourth-tier city.

3) Industrial transformation and upgrading. The traditional mode of simply enjoying scenery cannot meet the demand of tourists, who are partial to experiential and leisure&well-being tourism. Therapy tourism integrating sports, leisure, well-being and pension is the key to tourism transformation and development under the new normal. Enshi can make use of its environmental strength, selenium-rich environment and traditional Chinese medicine health preservation strength to create more distinctive therapy tourism products and promote the transformation and upgrading of the regional therapy tourism [47].

2.2.4 Development threats

1) Surrounding pressure of competition. The special geographical structure provides Chongqing with abundant forest therapy resources. There are 22 national forest parks, showing a great potential for the development of the forest therapy industry. In addition, Sichuan, Guizhou and Yunnan are significantly superior to Enshi in humanistic and natural resources. Guizhou has prepared the forest therapy planning, and established more than 100 forest therapy bases, many of which have created a certain forest brand effect. Sichuan Province has issued the *Construction Standards for Forest Therapy Bases in Sichuan Province*, and constructed the first forest therapy e-commerce platform. In addition, Zhangjiajie in Hunan is a famous tourist city in China, attracted 80,493,000 tourists in 2019, and it is superior to Enshi in terms of infrastructure, talent training, and market demand.

2) Difficulty in attracting investment and fund. The poor infrastructure, the shortage of professionals, and the backward publicity mechanism have led to the low popularity, weak attraction, and limited sources of tourists. At the same time, forest therapy tourism is a long-term industry with weak effect and slow revenue, and in addition to multiple uncertain factors, compared with other regions enjoying strong economic strength, it is much harder for Enshi to attract investment and fund.

3) Diverse tourism demand. The diverse demand for therapy tourism has brought market opportunities to the forest therapy tourism, but with the increasing of the well-being demand, the traditional simple sightseeing tourism cannot meet the demand of the tourists, and forest therapy tourism with the physiological and medical functions can better cater to the demand of the mass, and make them better enjoy the joy of life, thus achieving the purpose of education and cultivation of mind and body. The tourism market should be segmented according to the demand for forest therapy, so as to improve the existing therapy tourism projects and meeting the demands of different consumer groups.

Through SWOT analysis on sustainable development of forest therapy tourism in Enshi, the strength and weakness, as well as opportunities and threats with respect to forest therapy tourism are clarified, and it is determined that Enshi is in a complex situation with "strength, weakness, opportunities and threats".

2.3. Hierarchical model analysis

2.3.1. Establishment of the evaluation index system

Based on the analysis on internal and external factors affecting the sustainable development of forest therapy tourism in Enshi, an evaluation system can be established, and the pairwise combination of the factors for SWOT analysis can determine the corresponding sustainable development strategy, as shown in Figure 3.

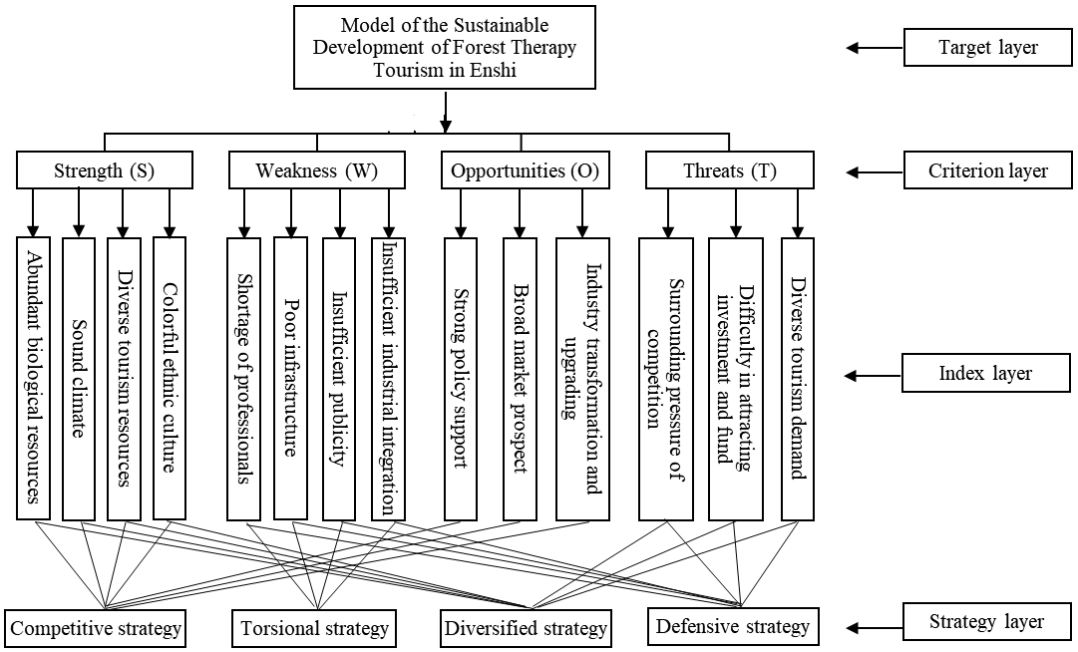

Figure 3. Sustainable development of forest therapy tourism in Enshi

2.3.2. Establishment of the judgment matrix to determine system weight

As shown in Figure 3, the importance of the criterion layer and each index layer was judged, and questionnaires were sent to experts and scholars in the fields of ecology, tourism, and forestry by email and field consultation. 25 questionnaires were distributed and 23 were recovered, with the recovery efficiency of 92%. Based on "pairwise comparison", a judgment matrix was established by equation (2), to calculate the corresponding weight of each index. The maximum eigenvalue and consistency ratio were calculated with equations (6) and (8), and CR<0.1 was taken as the standard to determine whether the index passes the consistency check, as shown in Table 3.

Table 3. The project layer judgement matrix and consistency check

Project layer	Judgment matrix	W_i	λ_{max}	CR	Consistency
General target	$A=\begin{bmatrix}1 & 3 & 2 & 5\\ 1/3 & 1 & 1/3 & 2\\ 1/2 & 3 & 1 & 5\\ 1/5 & 1/2 & 1/5 & 1\end{bmatrix}$	0.4606 0.1364 0.3284 0.0746	4.0647	0.0242	Passed
Strength	$S=\begin{bmatrix}1 & 1/4 & 2 & 5\\ 4 & 1 & 3 & 7\\ 1/2 & 1/3 & 1 & 4\\ 1/5 & 1/7 & 1/4 & 1\end{bmatrix}$	0.2336 0.5432 0.1690 0.0542	4.1647	0.0617	Passed
Weakness	$W=\begin{bmatrix}1 & 1/3 & 3 & 4\\ 3 & 1 & 7 & 6\\ 1/3 & 1/7 & 1 & 3\\ 1/4 & 1/6 & 1/3 & 1\end{bmatrix}$	0.2429 0.5774 0.1156 0.0642	4.1833	0.0686	Passed
Opportunities	$O=\begin{bmatrix}1 & 1/3 & 3\\ 3 & 1 & 4\\ 1/3 & 1/4 & 1\end{bmatrix}$	0.2721 0.6080 0.1199	3.0741	0.0713	Passed
Threats	$T=\begin{bmatrix}1 & 1/3 & 2\\ 3 & 1 & 4\\ 1/2 & 1/4 & 1\end{bmatrix}$	0.2395 0.6232 0.1373	3.0183	0.0176	Passed

2.3.3. Determination of the combination weight and weighted score

The intra-group weight represents the importance of each index in its index layer; therefore, it is of great significance to calculate the relative importance of each index to the overall target. As for forest therapy tourism in Enshi, the effective response degree of each index is scored (±5 - ±1) from high to low, based on which, the sensitivity is divided into five grades: Very sensitive, relatively sensitive, sensitive, slightly sensitive and insensitive. Strength and opportunities are given positive scores, and weakness and threats are given negative scores. Finally, the product of the

combination weight of each index and the corresponding score is used to determine the weighted score of each index. The greater absolute value indicates the greater intensity, as shown in Table 4.

Table 4. Combination weight and weighted scores of evaluation index system

Target layer	Criterion layer	Intra-group weight	Index layer	Intra-group weight	Combination weight	Index score	Weighted score
The evaluation index system for sustainable development of forest therapy tourism in Enshi	Strength	0.4606	Abundant biological resources	0.2336	0.1076	4	0.4304
			Sound climate	0.5432	0.2502	5	1.2510
			Diverse tourism resources	0.1690	0.0778	4	0.3114
			Colorful ethnic culture	0.0542	0.0250	3	0.0750
	Weakness	0.1364	Shortage of professionals	0.2429	0.0331	-4	-0.1324
			Poor infrastructure	0.5774	0.0788	-5	-0.3940
			Insufficient publicity	0.1156	0.0158	-3	-0.0474
			Insufficient industrial integration	0.0642	0.0088	-3	-0.0264
	Opportunities	0.3284	Strong policy support	0.2721	0.0894	4	0.3576
			Broad market prospect	0.6080	0.1997	5	0.9985
			Industry transformation and upgrading	0.1199	0.0394	3	0.1182
	Threats	0.0746	Surrounding pressure of competition	0.2395	0.0179	-3	-0.0537
			Difficulty in attracting investment and fund	0.6232	0.0465	-4	-0.1860
			Diverse tourism demand	0.1373	0.0102	-3	-0.0306

Based on the analysis on the weight results of SWOT-AHP model, the indexes of the sustainable development of forest therapy tourism in Enshi can be ranked as follows from high to low: strength, opportunities, weakness, and threats. In general, strength is superior to weakness; especially, the excellent climate environment and rich biological resources provide innate conditions for the development of forest therapy tourism. The weakness is mainly manifested in the aspects of infrastructure and professionals. In view of the imperfect supporting facilities for medical care, leisure and entertainment, sports and fitness, catering and accommodation, the serious loss of professionals, and the lack of training efforts, it is necessary to strengthen the construction of the supporting facilities, and build a professional team. As for external factors, the expanding demand of the forest therapy market is a strong driving force for the sustainable development of forest therapy tourism in Enshi, and policies are the basic guarantee. Therefore, it is necessary to further implement the relevant policies, perform top-level design based on preferential policies, and rationally implement the planning combined with market expansion opportunities. The difficulty in attracting investment and fund is the greatest threat to the development of forest therapy tourism in Enshi, in view of which, the policies should be loosened, the financing channels should be expanded, and characteristic industries should be established based on its own strength, so as to improve the competitiveness, and meet the diversity of requirements, thus realizing sustainable development.

2.4. Development strategy analysis

According to the weight results of the hierarchical model, the overall intensity of strength, weakness, opportunities, and threats is determined: overall intensity of strength S=2.0678, overall intensity of weakness W=-0.6002, overall intensity of opportunities O=1.4743, and overall intensity of threats T=-0.2703.

In the four-quadrant coordinate system established based on the variables of strength, weakness, opportunities, and threats, the overall intensity of strength, weakness, opportunities, and threats is respectively positioned in the system and connected, forming a strategic evaluation matrix, as shown in Fig. 4. The barycentric coordinate P (x, y)=P (0.367, 0.301) is determined by equation (13), and then the azimuth angle is determined as θ=39°.

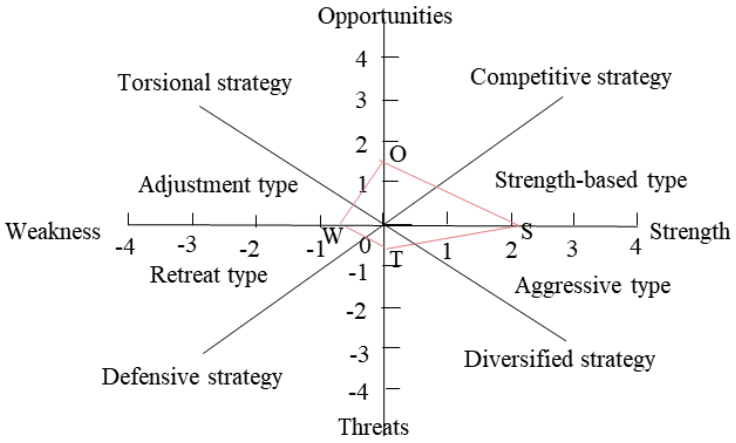

Figure 4. Sustainable development strategic matrix of forest therapy tourism in Enshi

On the basis of determining the position of the barycentric coordinate p, the analysis on the strategic intensity coefficient can help to further determine the development strategy. Firstly, the strategic intensity is divided into positive intensity and negative intensity, the former of which is affected by the internal strength and external opportunities, while the latter of which is affected by the internal weakness and external threats. As calculated based on the weighted scores of each index of the sustainable development of forest therapy tourism in Enshi, the strategic positive intensity U=3.0486, and the strategic negative intensity V=0.1622. The strategic intensity coefficient ρ=0.9495 is determined by equation (17). The value of ρ ranges from 0 to 1, and the greater value indicates the greater implementation intensity of the strategy.

According to the barycentric coordinates and the interval of azimuth angle θ, the forest therapy tourism in Enshi is determined to be a strength-based industry, and the competitive sustainable development strategy should be adopted. Based on the strategic intensity coefficient ρ=0.9495~1, the forest therapy tourism in Enshi should actively take competitive development strategy, to improve the industrial strength, realize the sustainable development of tourism, and drive regional economic development, thus promoting rural revitalization.

3. Discussion

PAN, CHEN and WANG respectively studied the forest therapy in Lushan National Nature Reserve Forest Therapy Base, Dunhua Laowangbai Mountain Forest Therapy Base and Yichun Forest Therapy Base with the AHP method [49-51], and put forward the corresponding suggestions, as shown in Table 5.

Table 5. Research results and suggestions on forest therapy in different areas

Research program	SWOT	Index (max)	Suggestions
Research on Lushan National Nature Reserve Forest Therapy Base (PAN)	S	Abundant forest therapy resources	1)Change the traditional business model and expand the forest therapy market
	W	Backward management mechanism	
	O	Increase of market demand	2) Improve forest therapy facilities and enrich forest therapy products
		Excessive development	
	T	Destruction of environmental resources	3) Stick to the red line and make rational use of environmental resources
Research on Dunhua Laowangbai Mountain Forest Therapy Industrial Development (CHEN)	S	Diverse local specialties	1) Develop characteristic products, enhance industry competition and relieve financial pressure
	W	Lack of forest therapy facilities	
	O	National policy support	2) Consolidate national policy support, improve infrastructure, and strengthen the introduction and training of talents
		Pressure of industrial competition	
	T		
Research on the Development of Yichun Forest Therapy Base (WANG)	S	Superior natural conditions	1) Improve forest therapy facilities and enrich forest therapy products 2) Strengthen the building of talent teams 3) Integrate and develop with relevant departments 4) Increase policy support and improve the traffic 5) Expand publicity efforts, and enhance the awareness of forest therapy
	W	Lack of forest therapy facilities and products	
	O	Increase of market demand	
		Inconvenient traffic	
	T		
Research on Development Strategy of Forest Therapy Tourism in Enshi	S	Sound climate	1) Implement government-led integration of resources 2) Cooperate in various ways to expand the strength 3) Improve service system, and enrich tourism products
	W	Poor infrastructure	
	O	Broad market prospect	
		Difficulty in attracting investment and fund	
	T		

Due to the uneven development of economy in different regions, and the differences in resource storage, climate and environment and local policies, the indexes such as strength, weakness, opportunities, and threats are different in the process of promoting forest therapy. As shown in the comparison analysis, the maximum strength and opportunities for the sustainable development of forest therapy tourism in Enshi are the same as those for the development of Lushan National Nature Reserve Forest Therapy Base and Yichun Forest Therapy Base. The superior natural conditions provide innate conditions for the development of forest therapy, and the growth of market demand strongly promotes the development of forest therapy. The maximum weakness regarding the development of forest therapy tourism in Enshi is the same as that of Yichun Forest Therapy Base. The lack of forest therapy infrastructure seriously affects the development of therapy tourism. At the same time, there are also some differences in the development of forest therapy tourism between the two places. In Yichun, there are numerous forest parks, without forest trails conforming to the standard of forest therapy and confined areas for quiet leisure wellness. Forest therapy products fail to be organically integrated with vacation, leisure, research, medicine and other related fields. However, the tourism in Enshi has been strongly supported by the government, which has been focusing on tourism development, and has also developed health care, rehabilitation, sports, culture-based forest therapy products that can ensure comprehensive tourism development.

As for the sustainable development of forest therapy tourism in Enshi, the maximum weakness is the same as that for the development of therapy industry in Dunhua Laowangbai Mountain, but they are different in the maximum strength, the maximum opportunity and the maximum threat. In Laowangbai Mountain, there is the well-known black fungus, Acanthopanax tea, and Ganoderma robe powder with independent brands. Therefore, its maximum strength is the variety of local specialties. There are also abundant local specialties in Enshi, but the superior climate environment is the maximum strength for the sustainable development of therapy tourism due to the monsoon climate with rainfall and high temperature in the same season, such as the mountainous terrain, diverse micro-climatic conditions, the vast forest and rich negative oxygen ions. In terms of opportunities, the policy support brings great opportunities for the development of forest therapy in Laowangbai Mountain, while Enshi pays attention to the development of tourism all year round. With the improvement of the 3D traffic network, and the expanding of the sources of tourists, market demand has become the most important opportunity. In terms of threats, due to the vigorous development of domestic tourism, the competition has been increasingly fierce. As for Laowangbai Mountain, the industry competition pressure is its maximum threat. Although the forest therapy tourism in Enshi also faces the industry competition pressure, due to the limited level of economic development and weak infrastructure, the maximum threat is the difficulty in attracting investment and fund.

The indexes affecting the development of forest therapy tourism in different regions are roughly the same, involving forest therapy resources, forest therapy environment and external construction conditions, but the maximum indexes in different regions are different. Therefore, we should give full play to the strength of the development of forest therapy tourism in Enshi, overcome the weakness, seize the opportunities, bravely face the threats, and implement the planning of sustainable development of forest therapy tourism according to local conditions.

1) Implement government-led integration of resources. The government should exercise macro-regulation and integrate the biological resources with tourism resources and ethnic culture, and combine forest therapy with the existing scenic spots and folk culture based on the climate and environment strength, so as to practice the concept that “lucid waters and lush mountains are invaluable assets” while adhering to the priority to ecological protection, and construct high-quality and high-grade Tangya Tusi City - Pingbaying Ecological Cultural Tourism Zone, Gongshui Water Village, Youshui Tujia Cultural Experience Tourism Area, Selenium-Rich Forest Therapy Tourist Area, Liangjiangyuan Ecological Health Resort Tourism Area, Alpine Forest Experience Tourism Area, and Mountain Outdoor Sports Adventure Zone. In addition, Enshi should vigorously implement poverty alleviation through tourism, build a development model of seven counties centered at Enshi, and construct 102 pilot villages for poverty alleviation through tourism.

2) Cooperate in various ways to expand the strength. The government, schools and enterprises should cooperate with each other for mutual development. The government should provide policy support for the development of forest therapy tourism, relax the policies in terms of attracting investment and fund, provide preferential conditions, adhere to the principle of “government guidance, market subject, social participation, joint construction”, cooperate with enterprises to construct the forest therapy tourism industry, and attract a large number of high-quality partners for financing. Furthermore, the government should cooperate with relevant enterprises to hold large-scale publicity activities, give play to the important roles of Internet, new media and financial media in marketing, popularize the knowledge and publicize the forest therapy tourism in Enshi by various means and layers. Forest therapy is an emerging tourism industry integrating multiple industries. At present, the forest therapy tourism requires a large number of excellent and innovative talents. Enshi is next to Wuhan with many universities, and there are also two universities in Enshi; therefore, the government should fully cooperate with the universities, to cultivate the relevant professionals.

3) Improve service system, and enrich tourism products. Enshi has been an economically underdeveloped area, and its infrastructure for forest therapy development should be further constructed. Firstly, it should focus on improving the comprehensive infrastructure and supporting service facilities for forest therapy tourism, so as to improve the quality of basic services and meet the basic needs of tourists. Later, it should make use of its own resources to develop local tourism products such as featured villages, forest homes, forest inns, forest experience and forest ancient roads. In the later period, it should improve the basic medical facilities, create a green ecological environment, and develop a pattern combining medicine with health care that is more conducive to forest therapy for the elderly. Finally, it should deeply integrate forest therapy tourism with culture and finance, to increase the cultural creative products, develop

characteristic products in combination with local folk culture, tea culture and selenium culture, and create a development mode of “culture + sports + health”, so as to constantly improve the competitiveness and achieve sustainable development.

4. Conclusion

In this paper, the domination of different indexes in different dimensions is fully considered, and SWOT-AHP model is established. In addition, qualitative analysis and quantitative analysis are performed from the whole and part, and the four quadrant coordinate method is used to determine the sustainable development strategy of forest therapy tourism in Enshi. The following conclusions are made:

1) The indexes regarding the sustainable development of forest therapy tourism in Enshi are ranked from high to low: strength, opportunities, weakness, and threats. The sound climate (0.2502) is the maximum index of strength, the poor infrastructure (0.0788) is the maximum index of weakness, market demand (0.1997) is the maximum opportunity, and the difficulty in attracting investment and fund (0.0465) is the maximum threat.

2) For achieving sustainable development of forest therapy tourism in Enshi, the government should actively take the competitive development strategy, and make full use of its strength, to make up the shortage and enhance the competitiveness, thus achieving sustainable development of forest therapy tourism and promoting the progress of rural revitalization in Enshi.

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