

Article

Identification and Prioritization of Tourism Development Strategies Using SWOT, QSPM, and AHP: A Case Study of Changbai Mountain in China

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Abstract: This research was conducted with the objective of identifying and ranking the tourism sector development strategies for the Changbai Mountain. The SWOT approach was used to construct strategies and the QSPM matrix and AHP method were employed to rank selected strategies. A questionnaire and the Delphi technique were used to collect and analyze research data from forty specialists. The effectiveness of 16 internal factors and 12 external factors in the business region was assessed. According to the results obtained, “Existence of beautiful natural features with distinctive scenery” is the most significant strength of Changbai Mountain. Also, “Inadequate amenities and weakness of infrastructure construction” has been established as the most significant weakness. The term “Adapting the development of the region to the national strategy” is among the most significant external opportunities. Additionally, the “islanding phenomenon” is one of the most significant threats. Sixteen plans were recommended for the growth of the Changbai Mountain’s tourism business. On the basis of the matrix of internal–external components in the SWOT model, an offensive strategy was identified as the optimal approach. We used the combined SWOT-AHP model with 4 criteria and 28 sub-criteria to determine the optimum strategy in the second model, and offensive methods were given the highest priority. The results showed that the “Taking advantage of the natural, historical potentials, etc.” and “Establishing an appropriate mechanism for public and private sector investment” strategies are the most crucial for improving the condition in Changbai Mountain. Therefore, special consideration should be given to the tourism potential in this region, and it should be placed on the agenda of managers and planners in order to strengthen the tourism industry, the region’s economic status, and create employment opportunities.

Keywords: tourism industry; SWOT method; QSPM matrices; AHP method; Changbai Mountain



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1. Introduction

In light of the failure of development programs in less developed communities, the growth and expansion of tourism is seen as one of the fundamental methods for these areas [1]. As one of the most lucrative businesses, tourism now plays a significant part in the economies of nations. Along with agriculture and animal husbandry, the development of tourism is regarded as a fundamental and vital aspect for alleviating poverty and reducing immigration, fostering social welfare, preserving traditional cultural traits, and generating

employment possibilities. Therefore, the development of tourism must be planned for less developed areas [2].

The planning approach is one of the fundamental components of the planning system and the intellectual component of any planning activity. As vital as it is to plan for the unification of the tourism system, it is also essential to prepare for the inclusion of tourism in the macro-development strategies, plans, and patterns. Therefore, tourism planning should be acknowledged as an ongoing and adaptable process, and the framework of policies and plans should be adaptable to allow for the potential of compromise with the evolving conditions [3]. In general, planning is an ongoing activity that must be adaptable to changing situations while achieving development goals. Therefore, strategic planning aims to build a suitable equilibrium between the system and its surroundings, with a greater emphasis on detecting and resolving pressing issues. The strategic planning technique aims to rapidly alter the tourism destination's future conditions [4].

Identifying and integrating tourism development strategies is a crucial step in their implementation. There are various approaches and models available for this purpose, each having its own notion and insight and adhering to a unique method and instruction. The SWOT matrix, which examines the system's weaknesses, strengths, opportunities, and threats, is the most prevalent model [5]. Deriving a strategy based on the strengths and weaknesses from within and the external opportunities and threats provides the decision makers with realistic solutions and identifies how far the system is from the ideal vision of sustainable development, thereby guiding the efforts towards the ideal and desired structure [6].

A review of studies conducted in the field of management strategy assessment shows that SWOT analysis is one of the tactical methodologies for developing, designing, and extracting management strategies in many fields, including agriculture and tourism [7]. In addition, the studies conducted show that SWOT analysis is usually used along with other complimentary approaches, such as the analytical hierarchy process (AHP), analytic network process (ANP), and simple additive weighting (SAW), etc., to offer scientific plans and quantify their importance and prioritization [8,9]. However, there is consensus on the use of SWOT analysis for the initial stage of strategic management. This technique of analysis has been used in studies of the development of the tourism industry to specify effective factors and propose policy changes [10,11].

Along with technical progression, there are a growing number of theoretical and utilizable experiences throughout the world for analyzing, surveying, planning, and managing tourism [12,13]. Jayawardena et al. [14] examined Niagara's sustainable tourism development. According to Fazenda et al.'s [15] research titled Doro Valley Tourism Program, the Doro Valley region has distinctive characteristics which necessitate the promotion of sustainable tourism for its management and preservation. Navarro et al. [16] used a SWOT approach to support biodiversity and sustainable tourism in Caguanes National Park. Ünal et al. [17] evaluated the tourism potential of the Sinop region using the SWOT method. Dewi et al. [18] used the SWOT method to manage tourism and provide sustainable strategies.

Numerous scholars are interested in examining the capabilities of tourism by employing strategic planning and SWOT analysis [19–25]. Sariisik et al. [26] have examined the environmental and social impacts of ecotourism on the local population in northwest Turkey. Using a questionnaire and SWOT analysis, this study investigates the challenges, capabilities, and constraints of the tourism business. Mallick et al. [27] used the SWOT and QSPM approaches to investigate the sustainable development of ecotourism in the Rameswaram region. Sari et al. [28] used SWOT matrix and QSPM to provide sustainable tourism strategies. Shiri and Seymohammadi [29] studied the feasibility of developing tourism entrepreneurship in rural areas with the SWOT model.

Solving multi-criteria decision-making problems is difficult, especially when those criteria contrast with each other, and increments in the desirability of one can decrease the desirability of another. That is why methods called multi-criteria decision-making (MCDM) methods, and in particular the multi-attribute decision-making (MADM) method, have

been developed to help solve these issues [30]. Multi-attribute decision-making methods have a diversity of techniques at different stages of decision making. The decision-making technique, by exchanging diverse indicators, identifies the option that has the highest position [31].

In multi-attribute compensatory decision models, all indicators are considered to make the final decision and exchanges take place between indicators in them. This means that a change in an index is compensated by a reverse change in the index or other indices. The analytic hierarchy process (AHP) is one of the favorites and is the most widely used multi-criteria method. In this technique, the processes of rating alternatives and aggregating to find the most relevant alternatives are merged. The technique is used for ranking a set of alternatives or for the selection of the best in a set of alternatives. The application of multi-criteria decision-making methods in several fields has been considered by many researchers [32,33]. Meshram et al. [34] proposed the SAW and TOPSIS approaches for prioritizing watersheds. Yang et al. [35] used the improved TOPSIS method for environmental risk assessment. Huang and Zhang [36] used the AHP model to evaluate the economic performance of tourism in the Pearl River. Taş and Çakir [37] used a fuzzy MCDM approach to evaluate health tourism sites. Zhu et al. [38] used the TOPSIS decision-making method to investigate the ecotourism capabilities of West Lake.

Due to its abundance of natural attractions, the Changbai Mountain is one of the most important touristic destinations in China. However, it has not yet achieved its true position in the country's tourism economy. Dealing with the development of the tourism industry in this region within the framework of tourism sustainable development also necessitates the application of measures and techniques that transform development visions and strategies into (natural and social) environment-compatible actionable plans and measures. In spite of the existing flaws, it is necessary to examine and design plans for the expansion of tourism in the region. In this regard, expert judgement is crucial at each level of strategic planning in the Changbai Mountain. Using the provided ideas and with the participation of the tourism development trustees of the Changbai Mountain and tourism specialists, it is possible to transform this area into one of the most important tourist centers of China and contribute to the regional economy, employment, and development. To this end, the primary objective of the current research is to use the strategic planning process to provide solutions and establish realistic strategies for the development of tourism in this region, while searching for and expanding the tourism potential of the Changbai Mountain. With the goal of analyzing the structure of tourism and identifying the strengths, weaknesses, opportunities, and threats of the tourism industry, it would be feasible to address the region's vulnerabilities and threats and capitalize on its strengths and opportunities. In this context, the SWOT matrix will be utilized to identify strengths and weaknesses and to formulate strategies. The QSPM matrix and AHP technique will then be utilized to rank the selected strategies. Considering the region's potential, the establishment of such an executive strategy to promote the tourism development of the Changbai Mountain becomes vital.

Considering the importance of the topic, the present research was conducted with the following goals:

- Determining the internal and external variables influencing the development of the Changbai Mountain and tourism.
- Ranking strategic initiatives according to the Changbai Mountain and tourism industry's key factors using the QSPM matrix and AHP method.

In light of these concerns and aims, the following research question is posed: what are the best strategies for the growth of the Changbai Mountain and tourism, and how should the strategies be prioritized?

2. Materials and Methods

2.1. The Study Area

Changbai Mountain, named for its main peak bald mountain and after white pumice and snow, is located in the east of northeast China's Jilin province in the south of Changbai Mountain nature reserves, contained in Antu county, Fusong county, Jilin province, and the interior of the Korean nationality autonomous county, and is the highest mountain in eastern Eurasia. Changbai Mountain has a total area of 190,781 hectares, and the forest area and grassland area account for 16,081 hectares and 5683 hectares, 87.9%, respectively. The forest coverage rate of the forest ecological system is the main protection of the natural complex nature reserve. Changbai Mountain was listed as a UN international biosphere reserve in 1980, as the northeast is the leading producer of triple gem ginseng, mink, chopped deer, and many rare biological resources, such as beauty, mountain grapes, wild mushrooms, jindal, boschniakia rossica and manchurian tiger, red-crowned cranes, etc. Changbai Mountain nature reserves not only have complicated plant types but the species are also very rich (Figure 1).



Figure 1. Geographical location of the study area—Changbai Mountain.

Analyzing the prominent problems existing in the process of carrying out ecotourism in Changbai Mountain is as follows:

First, infrastructure construction still needs to be strengthened and faces strong financial constraints. Changbai Mountain is a remote destination for most of the country. The current situation of few direct flight routes, few flights, and inconvenient railway traffic makes the accessibility of Changbai Mountain low, which further increases the difficulty of attracting medium and remote markets.

Second, tourism products need to be further developed. The extreme seasonal pattern of Changbai Mountain is one of the biggest challenges in tourism development. The peak season of tourism is clearly divided, and the peak season has a large number of tourists. In 2022, the maximum daily number of tourists reached 39,000, which is far more than the normal capacity of the scenic spot and was thus very crowded. At the same time, there are very few tourists in the off-season, and the number of daily tourists is less than 1000, which not only seriously affects the ecological protection work of the scenic spot but also is not conducive to the economic benefits of the scenic spot.

Third, management system obstacles are present. Since its establishment, the management scope of the Changbai Mountain Management Committee has undergone significant changes.

Fourth, there are Changbai Mountain ecological environment protection practical problems. At present, the pollution control work of catering and entertainment services in the zone, including the change of coal to gas, the promotion of biomass fuel, and other issues have not been solved.

2.2. Research Methodology

The current study is applied in terms of its objective and is descriptive in terms of its survey design. This research, conducted in the form of a field study, identifies and prioritizes tourist sector growth plans in the Changbai Mountain. This study utilized the SWOT analysis, the QSPM matrix, and the AHP approach to rank the selected strategies. Figure 2 depicts the research's flowchart. The details of the research methodology are provided below.

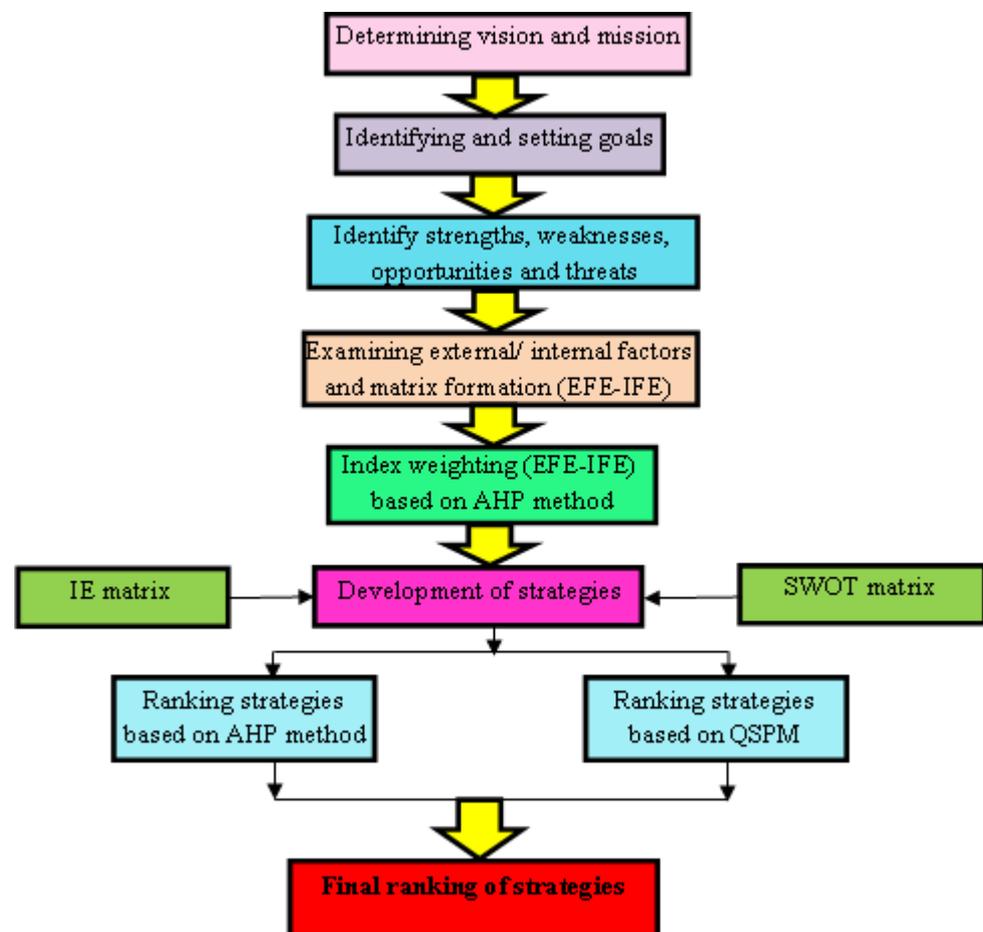


Figure 2. Flow chart of research steps.

2.2.1. Providing Strategies and Plans for the Development of the Tourism Industry Based on the SWOT Matrix

The development of initiatives for the Changbai Mountain requires a scientific foundation. Among these techniques is the use of the QSPM matrix. Using IFE (Internal Factors Evaluation Matrix) and EFE (External Factors Evaluation Matrix) matrices, one must initially analyze and rank internal and external strategic factors, i.e., strengths and weaknesses, opportunities and threats, in monitoring and research. In this study, the evaluation matrix

of internal factors (IFE) or the evaluation matrix of external factors (EFE) was constructed using the following steps:

The initial stage: based on the researcher's questionnaire, the internal/external elements of Changbai Mountain were discovered, the extracted factors were described with the assistance of specialists and the local people, and a final list of factors was compiled. It is important to note that the SWOT analysis of Changbai Mountain was conducted with the growth of the tourism industry in consideration.

In the second stage, weights and coefficients were assigned to the previously enumerated factors. These coefficients for internal factors (strengths and weaknesses) or external elements (opportunities and threats) range from 1 to 100, indicating a factor's relative significance. Changbai Mountain's mission, perspective, and values were used to determine the coefficients of importance.

Third stage: In this stage, each factor ((strength or weakness) or (opportunity and threats)) was ranked from 1 to 4 based on its effectiveness in achieving the ideal condition. At this level, respondents were tasked with identifying the factor type. The component that impedes Changbai Mountain's development and prevents it from reaching its vision is labeled "Weakness". The factor that aids Changbai Mountain's development is designated "Strength".

The statistical sample of this research for the second and third stages and pairwise comparisons consisted of a group of tourism specialists, including tourism-experienced professionals, university faculty members, senior managers of the public sector, and agency managers. Our cohort was comprised of forty individuals with over ten years of service experience. In this study, experts were chosen using the subjective sampling method (judgment type). In this strategy, individuals who can give the researcher the needed information are selected [39]. For this reason, forty tourism specialists with executive and scientific experience were chosen as the sample.

In the fourth step, the weight of each element was multiplied by its rank to determine the final score.

In the fifth stage, the total score for internal or external factors was calculated by adding the final scores for each factor. In the evaluation matrix of internal or external elements, regardless of the number of factors responsible for Changbai Mountain's strengths or weaknesses, the final score never exceeded 4 or fell below 1, with an average of 2.5. If the overall score hits 4, it indicates that the region has an exceptional position (strength) in its internal environment, in achieving the ideal vision, and in executing the mission. The region should examine tactics that maximize the utilization of these strengths. The number 1 also indicates that the Changbai Mountain contains numerous internal environmental weaknesses, which should be avoided and transformed into opportunities. Regarding external variables, the number 4 represents an excellent chance that should be utilized to realize the objective. The number 1 also indicates that the Changbai Mountain is threatened by the external environment, which can be mitigated by internal forces.

In the sixth stage, micro- and macro-strategies were offered utilizing the SWOT analysis, and a variety of SO, WO, ST, and WT strategies were presented. Using the SWOT matrix, a list of distinct strategies was compiled into four distinct groupings.

In the seventh stage, decisions were made using the quantitative strategic planning matrix. Due to several constraints, it is not possible to apply every strategy. Therefore, the optimal strategy should be selected by ranking the strategies stated. The quantitative strategic planning matrix is a tool for identifying the most effective and alluring tactics [40]. Using the QSPM model, strategies can be evaluated through valuation (scoring), and the optimal candidate can be chosen among all available alternatives.

2.2.2. SWOT-AHP Model

To formulate Changbai Mountain's strategies, the SWOT-AHP model was applied to acquire the internal and external effective variables, similar to the first model, and then to assess the hierarchical structure of the alternatives.

In the hierarchical structure, the four criteria of strength, weakness, opportunity, and threat were employed as the first-level criteria, and 28 internal and external effective elements were used as the second-level sub-criteria. In addition, four offensive (SO), competitive (ST), conservative (WO), and defensive (WT) tactics were employed in the final level of the hierarchical structure, and Expert Choice software was used to conduct pairwise comparisons, normalization, and ranking computations.

3. Results

3.1. Strategies and Plans for the Development of the Tourism Industry

The Changbai Mountain is rich in natural, cultural, historical, and archaeological attractions for both local and international visitors. The objective of the development of the Changbai Mountain tourism sector is to raise the satisfaction of tourists and stakeholders with a focus on growth, profitability, and environmental protection in the region. Also, with the aid of numerous natural attractions, hospitable and friendly people, and contemporary technology, the objective is to give quick, accurate, and high-quality services to Changbai Mountain's tourists. Using expert perspectives, this study found six opportunities, six threats, seven strengths, and nine weaknesses. The significance level of the t-test was less than 0.05; therefore, their importance was established and all cases were regarded as effective internal and external variables in the growth of the Changbai Mountain tourism business. These can play a significant part in the design of the Changbai Mountain tourism sector development strategies.

3.2. Analysis of Internal and External Variables

After identifying the external (opportunities and threats) and internal (strengths and weaknesses) components of tourist growth in the Changbai Mountain area, the evaluation matrices of the external factors (EFE) and internal factors (IFE) were explored. According to the evaluation matrix of external elements (Table 1), the total score is 2.628. Because the score is more than 2.5, it suggests that the tourism industry in the Changbai Mountain has responded effectively to external opportunities and threats.

Table 1. Evaluation matrix of external factors of tourism development of Changbai Mountain.

Row	Key External Factors	Importance Factor (from 0 to 1)	Score (from 1 to 4)	Final Score
Opportunities				
1	Increasing travel and recreation motivation among individuals	0.087	2.8	0.244
2	Increasing the private sector's willingness to participate in tourism-related initiatives and programs (construction of hotels and residences)	0.091	2.9	0.264
3	Possibility of establishing and expanding local marketplaces and providing local goods and souvenirs	0.079	2.3	0.182
4	Genuine opportunities to earn money from handicrafts	0.078	2.3	0.179
5	The development direction of Changbai Mountain conforms to the national strategy	0.095	3.2	0.304
6	Cultural heritage protection and utilization contribute to the construction of a "beautiful country".	0.085	2.6	0.221

Table 1. Cont.

Row	Key External Factors	Importance Factor (from 0 to 1)	Score (from 1 to 4)	Final Score
Threats				
1	Escalating environmental issues attributable to tourism activity	0.084	2.7	0.227
2	Inadequate management of tourists and attractions	0.074	2.2	0.163
3	Absence of an appropriate strategic and operational plan to attract international tourists to the region	0.077	2.3	0.177
4	Existence of competitive recreational and tourist areas in the vicinity and tourist appeal by other regions	0.08	2.5	0.2
5	The phenomenon of islanding is one of the important issues in Changbai Mountain protection	0.087	2.8	0.244
6	Natural and economic geographic location “marginalization” is one of the most difficult problems in Ming Changbai Mountain	0.083	2.7	0.224
Total		1		2.628

Notably, among the researched opportunities in Changbai Mountain, “The development direction of Changbai Mountain conforms to the national strategy” has been introduced with a score of 0.304 as one of the most significant opportunities. Also, of the investigated threats, “The phenomenon of islanding is one of the important issues in Changbai Mountain protection” has been identified as the most significant with a score of 0.244.

According to the evaluation matrix of internal criteria (Table 2), the final score for this area is computed to be 2.933. The fact that this value is more than 2.5 suggests that the tourism industry of Changbai Mountain has effectively capitalized on its strengths and mitigated the negative effects of its limitations on the region’s tourism development.

Table 2. Evaluation matrix of internal factors of tourism development of Changbai Mountain.

Row	Key Internal Factors	Importance Factor (from 0 to 1)	Score (from 1 to 4)	Final Score
Strengths				
1	Existence of beautiful natural features with distinctive scenery, including waterfalls, forests, rivers, and mountains, among others	0.08	3.6	0.288
2	The presence of numerous cultural and historical attractions	0.076	3.2	0.243
3	The opportunity to capitalize on a variety of natural resources for the development of the tourism business, such as the availability of mineral resources, geothermal resources, and springs	0.066	2.9	0.191
4	Biodiversity of the region	0.071	3	0.213
5	The presence of a tranquil setting away from the bustle of major cities	0.054	2.6	0.14
6	The uniqueness of tourism resources	0.062	2.8	0.174
7	Varieties rich in tourism resources	0.058	2.7	0.157

Table 2. Cont.

Row	Key Internal Factors	Importance Factor (from 0 to 1)	Score (from 1 to 4)	Final Score
Weaknesses				
1	Weak advertising in the tourism industry and failure to introduce tourist attractions	0.045	2.5	0.113
2	Inadequate visitor service amenities and weakness of infrastructure construction	0.075	3.2	0.24
3	Poverty, unemployment, and local resident migration	0.069	3.1	0.214
4	Weak planning and investments in the public and private sectors	0.071	3.1	0.22
5	Lack of qualified personnel in tourism section	0.042	2.4	0.101
6	Absence of adequate frameworks for travelers' optimal use of tourism resources, particularly in natural and protected regions	0.049	2.5	0.123
7	Inadequate access to certain tourism destinations in the region (low road quality)	0.055	2.7	0.149
8	Natural ecological system is fragile	0.066	2.9	0.191
9	Extreme seasonal pattern is one of the biggest challenges for the development of tourism	0.061	2.9	0.177
Total		1		2.933

Notably, “Existence of beautiful natural features with distinctive scenery, including waterfalls, forests, rivers, and mountains, among others” with a score of 0.288 has been identified as one of the region’s most significant strengths. Also, among the analyzed weaknesses, “Inadequate visitor service amenities and weakness of infrastructure construction” with a score of 0.24 was one of the most significant.

3.3. Developing Strategies with SWOT Model

In this study, the SWOT framework was utilized to construct Changbai Mountain tourism strategies. Figure 3 depicts the strategy diagram that was developed based on the factor scores. The final score for the matrix of internal elements was 2.933, while the final score for the matrix of external variables was 2.628, based on the information gathered from the SWOT forms. The internal–external matrix diagram consists of four main parts, including SO strategies or offensive strategies, which mean utilizing capabilities to take advantage of opportunities, WO strategies or conservative or adaptive strategies, which mean improving environmental conditions by utilizing capabilities, ST strategies or competitive strategies, which mean improving internal systems by utilizing opportunities, and WT strategies or defensive strategies, which mean reducing weaknesses and a competitive advantage. The analytical framework for determining strategies using the SWOT approach is depicted in Figure 3. According to the findings, the best strategic position for the Changbai Mountain is in the offensive range, which is centered on internal strengths and external opportunities, and should be based on utilizing the capabilities and potentials of the study area.

In this study, the SWOT matrix was utilized to examine threats, opportunities, weaknesses, and strengths in order to promote the Changbai Mountain tourism industry (Table 3). This matrix compares external opportunities and threats with internal strengths and weaknesses based on the information gathered in the first stage.

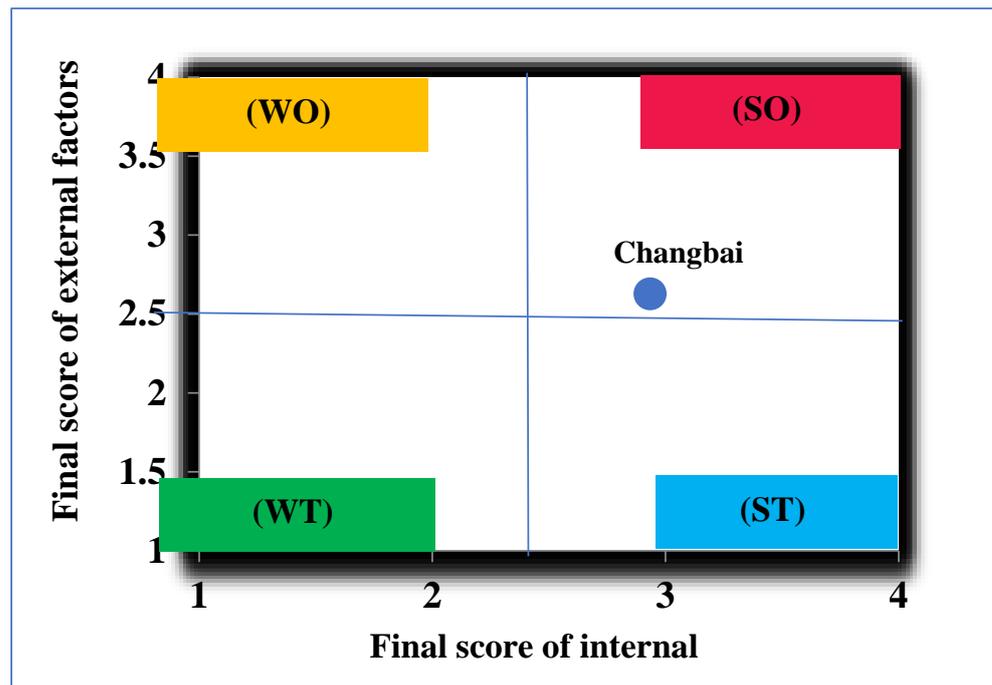


Figure 3. Diagram of determining strategies based on the final value of internal and external factors in Changbai Mountain.

Table 3. SWOT matrix for the development of tourism industry of Changbai Mountain.

Quality objectives	<p>Opportunities</p> <p>O₁. Increasing travel and recreation motivation among individuals</p> <p>O₂. Increasing the private sector’s willingness to participate in tourism-related initiatives and programs (construction of hotels and residences)</p> <p>O₃. Possibility of establishing and expanding local marketplaces and providing local goods and souvenirs</p> <p>O₄. Genuine opportunities to earn money from handicrafts</p> <p>O₅. The development direction of Changbai Mountain conforms to the national strategy</p> <p>O₆. Cultural heritage protection and utilization contribute to the construction of a “beautiful country”</p>	<p>Threats</p> <p>T₁. Escalating environmental issues attributable to tourism activity</p> <p>T₂. Inadequate management of tourists and attractions</p> <p>T₃. Absence of an appropriate strategic and operational plan to attract international tourists to the region</p> <p>T₄. Existence of competitive recreational and tourist areas in the vicinity and tourist appeal by other regions</p> <p>T₅. The phenomenon of islanding is one of the important issues in Changbai Mountain protection</p> <p>T₆. Natural and economic geographic location “marginalization” is one of the most difficult problems in Ming Changbai Mountain</p>
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Table 3. Cont.

Strengths	SO strategies	ST strategies
S ₁ . Existence of beautiful natural features with distinctive scenery, including waterfalls, forests, rivers, and mountains, among others	SO ₁ . Taking advantage of the potentials and natural, historical, etc., attractions of the region as a result of the region's beautiful tracks	ST ₁ . Determining the ecological tolerance capacity and preventing the overexploitation of natural resources by tourists
S ₂ . The presence of numerous cultural and historical attractions	SO ₂ . Convince the investors of the capital return to utilize the region's potential capacities	ST ₂ . Establishing winter and summer tourism hubs to attract tourists throughout the year
S ₃ . The opportunity to capitalize on a variety of natural resources for the development of the tourism business, such as the availability of mineral resources, geothermal resources, and springs	SO ₃ . Establishing an appropriate mechanism for public and private sector investment in infrastructure, tourism services, and entrepreneurship	ST ₃ . Formulation of strategic plans to maximize potentials and opportunities in order to attract international tourists
S ₄ . Biodiversity of the region	SO ₄ . Using the capabilities of tourism to revive the villages of the region and economic prosperity of the residents	ST ₄ . Development of ecotourism in rural areas
S ₅ . The presence of a tranquil setting away from the bustle of major cities	SO ₅ . Training of local forces and women in alternative jobs with respect to the regional condition and endowments	ST ₅ . The construction of ecological tourism in line with the green water and green mountain
S ₆ . The uniqueness of tourism resources		
S ₇ . Varieties rich in tourism resources		
Weaknesses	WO strategies	WT strategies
W ₁ . Weak advertising in the tourism industry and failure to introduce tourist attractions	WO ₁ . Quantitative and qualitative enhancement of service and welfare facilities in accordance with the natural environment of the region	WT ₁ . Developing a strategic environmental plan to manage all sorts of pollution and land use modifications
W ₂ . Inadequate visitor service amenities and weakness of infrastructure construction	WO ₂ . Offering a variety of incentives to private investors who establish tourism enterprises in the region	WT ₂ . Expansion of formal and informal skill training institutes to teach specialized and qualified human resources in tourism-related industries.
W ₃ . Poverty, unemployment, and local resident migration	WO ₃ . Implementation of programs to eliminate poverty and unemployment through local community empowerment and self-assurance	WT ₃ . Lessening the dependence of regional household income on natural resources
W ₄ . Weak planning and investments in the public and private sectors		
W ₅ . Lack of qualified personnel in tourism section		
W ₆ . Absence of adequate frameworks for travelers' optimal use of tourism resources, particularly in natural and protected regions		
W ₇ . Inadequate access to certain tourism destinations in the region (low road quality)		
W ₈ . Natural ecological system is fragile		
W ₉ . Extreme seasonal pattern is one of the biggest challenges for the development of tourism		

3.4. SWOT-AHP Model Findings

As shown in the diagram, the objective (choosing the best strategy to develop the tourism industry in the Changbai Mountain area) is in the first level of the AHP model. The SWOT groups (strengths, weaknesses, opportunities, and threats) are in the second level, factors are in the third level, and strategic options (SO, WO, ST, and WT) are in the fourth level of the model (Figure 4).

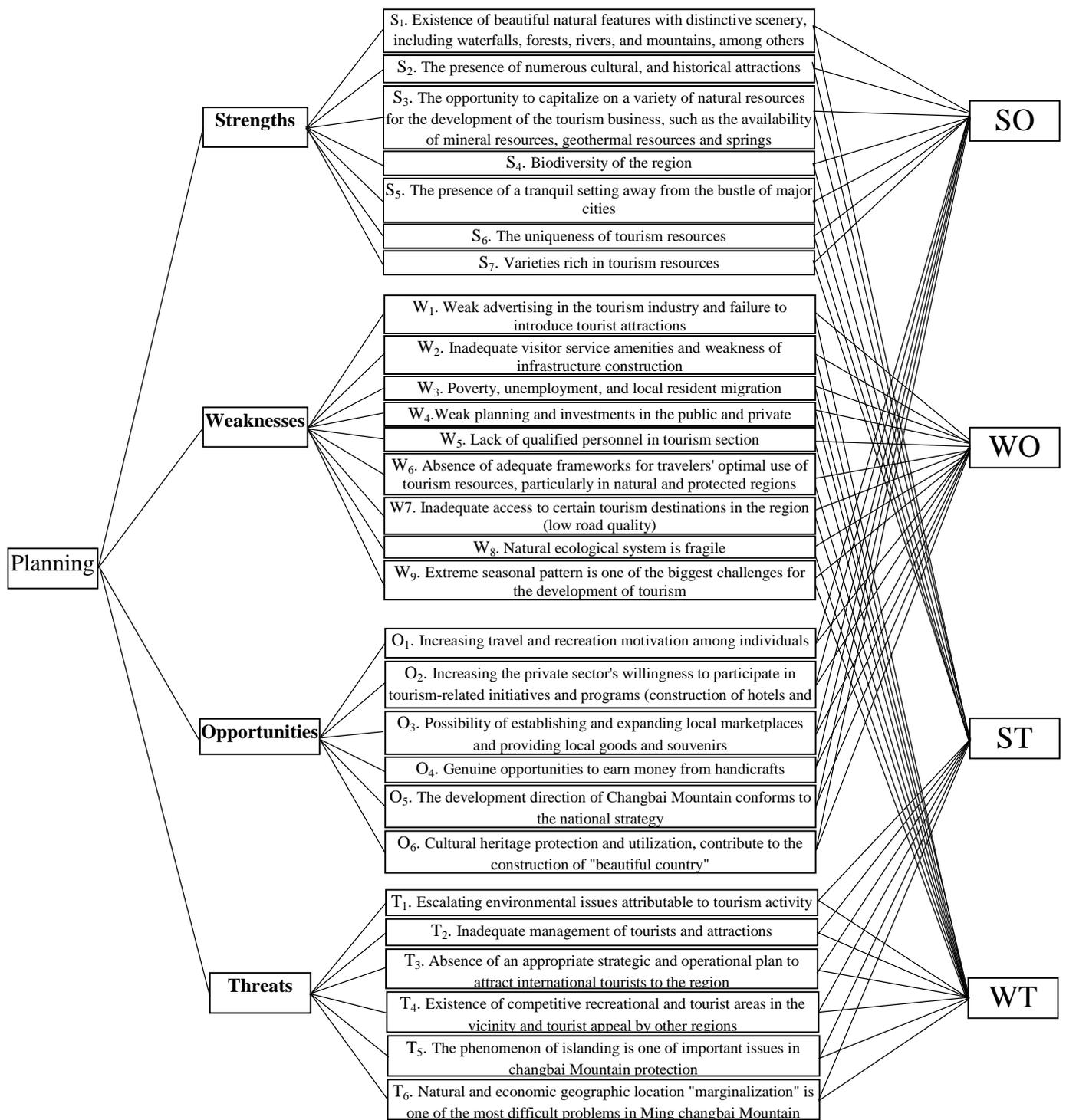


Figure 4. AHP model for SWOT analysis in evaluating the development of tourism industry of Changbai Mountain.

At this stage, the elements of each level are compared with respect to the dependent element at a higher level, and their weights are calculated using the analytical hierarchy process. In addition, if the consistency ratio is less than 0.1, the comparisons are regarded as valid. In this study, the weights of each group of strengths, weaknesses, opportunities, and threats, as well as the weights of the SWOT subfactors, were determined using the Expert Choice software, as shown in Table 4. As indicated in the table, the relative value of

weakness (0.324) is the highest among the SWOT components, followed by strength with 0.242, threat with 0.230, and opportunity with 0.204.

Table 4. The results of pairwise comparisons of SWOT factors.

SWOT	SWOT Weight	SWOT Matrix Factors	Consistency Ratio	Weight Factors	Final Weight of Factors
Strength	0.242	S ₁ . Existence of beautiful natural features with distinctive scenery, including waterfalls, forests, rivers, and mountains, among others	0.06	0.235	0.057
		S ₂ . The presence of numerous cultural and historical attractions		0.183	0.044
		S ₃ . The opportunity to capitalize on a variety of natural resources for the development of the tourism business, such as the availability of mineral resources, geothermal resources, and springs		0.131	0.032
		S ₄ . Biodiversity of the region		0.153	0.037
		S ₅ . The presence of a tranquil setting away from the bustle of major cities		0.091	0.022
		S ₆ . The uniqueness of tourism resources		0.114	0.028
		S ₇ . Varieties rich in tourism resources		0.093	0.023
Weakness	0.324	W ₁ . Weak advertising in the tourism industry and failure to introduce tourist attractions	0.07	0.053	0.017
		W ₂ . Inadequate visitor service amenities and weakness of infrastructure construction		0.191	0.062
		W ₃ . Poverty, unemployment, and local resident migration		0.146	0.047
		W ₄ . Weak planning and investments in the public and private sectors		0.162	0.053
		W ₅ . Lack of qualified personnel in tourism section		0.042	0.014
		W ₆ . Absence of adequate frameworks for travelers' optimal use of tourism resources, particularly in natural and protected regions		0.064	0.021
		W ₇ . Inadequate access to certain tourism destinations in the region (low road quality)		0.090	0.029
		W ₈ . Natural ecological system is fragile		0.123	0.040
		W ₉ . Extreme seasonal pattern is one of the biggest challenges for the development of tourism		0.129	0.042
Opportunity	0.204	O ₁ . Increasing travel and recreation motivation among individuals	0.06	0.171	0.035
		O ₂ . Increasing the private sector's willingness to participate in tourism-related initiatives and programs (construction of hotels and residences)		0.191	0.039
		O ₃ . Possibility of establishing and expanding local marketplaces and providing local goods and souvenirs		0.109	0.022
		O ₄ . Genuine opportunities to earn money from handicrafts		0.111	0.023
		O ₅ . The development direction of Changbai Mountain conforms to the national strategy		0.251	0.051
		O ₆ . Cultural heritage protection and utilization contribute to the construction of a "beautiful country"		0.166	0.034

Table 4. Cont.

SWOT	SWOT Weight	SWOT Matrix Factors	Consistency Ratio	Weight Factors	Final Weight of Factors
Threat	0.23	T ₁ . Escalating environmental issues attributable to tourism activity	0.08	0.198	0.046
		T ₂ . Inadequate management of tourists and attractions		0.099	0.023
		T ₃ . Absence of an appropriate strategic and operational plan to attract international tourists to the region		0.121	0.028
		T ₄ . Existence of competitive recreational and tourist areas in the vicinity and tourist appeal by other regions		0.160	0.037
		T ₅ . The phenomenon of islanding is one of the important issues in Changbai Mountain protection		0.243	0.056
		T ₆ . Natural and economic geographic location “marginalization” is one of the most difficult problems in Ming Changbai Mountain		0.180	0.041

According to our findings, the final value of Changbai Mountain tourism sector development methods is as follows (Table 5).

Table 5. Final value of the four strategies.

Strategy Type	Final Results
SO	0.312
ST	0.258
WO	0.233
WT	0.197
Total value	1

As can be observed from the results of the combined AHP and SWOT analysis, the highest value is associated with the SO offensive approach (with a final value of 0.312). This approach comprises the following solutions:

1. Taking advantage of the potentials and natural, historical, etc., attractions of the region as a result of the region’s beautiful tracks.

Unearthed cultural relics and historical records since the Ming and Qing Dynasties show that Changbai Mountain also has a long cultural history. However, due to various reasons, there are very few cultural relics left to date. The scarcity of ornamental cultural and historical relics is the weakness of the development of tourism resources in Changbai Mountain. Therefore, the appropriate reproduction and restoration of some important historical relics should be conducted, and the exhibition contents of various natural, historical, folk, and revolutionary history museums in the area should be enriched. It is necessary to make more large-scale humanistic and historical documentaries such as those of Changbai Mountain and Yalu River to enhance and display the overall humanistic and historical charm of the Changbai Mountain scenic spot.

2. Convince the investors of the capital return to utilize the region’s potential capacities.

Ice and snow sports in China are still in their infancy and will have a large market in the future. Changbai Mountain is covered with snow all year round, making it a natural ski resort, which can actively build the Changbai Mountain winter tourism brand. The Changbai Mountain International Snow Festival has been held for 12 consecutive years, during which influential activities such as international and domestic snow sculpture competitions, the ice and snow car carnival, the ice and snow photography exhibition, and

the ice and snow culture Youth Forum have been held. Direct winter charter flights and through train services have been launched from Shanghai, Guangzhou, Xiamen, Hangzhou, and other key tourist source markets.

3. Establishing an appropriate mechanism for public and private sector investment in infrastructure, tourism services, and entrepreneurship.

With the advent of the era of high-speed rail, the “12 + 2” high-speed rail network in the eastern part of northeast China will soon be fully covered. The construction of the tourism highway around Changbai Mountain, the highway from Changchun to Songjiang River, Changbai Mountain Airport, and other infrastructure provides easy and convenient travel routes for people but also creates considerable employment opportunities for the local people, and effectively drives the development of the surrounding economy, such as catering, transportation, hotels, and other services. The urban public green space coverage rate has reached 21 percent, and urban per capita green space has reached 4 square meters. The government has a strong idea of tourism construction. Under the background of snow and ice, the construction of traffic in scenic spots, information networks, and tourism projects are also relatively comprehensive.

4. Using the capabilities of tourism to revive the villages of the region and economic prosperity of the residents.

The rich snow and ice resources of Changbai Mountain, as well as the snow and ice tourism to be developed, can promote the development and revitalization of the surrounding villages. Ice and snow tourism includes ice and snow experience, catering, accommodation, shopping, fitness, entertainment, equipment, clothing, and training industries. At present, the main industry development of ice and snow tourism in Changbai Mountain is still limited to ice and snow experience and entertainment, and the development of other aspects is not perfect, especially the industry development of clothing and ice and snow equipment.

5. Training of local forces and women in alternative jobs with respect to the regional condition and endowments.

3.5. Prioritization of Changbai Mountain Tourism Sector Development Initiatives Using QSPM

After defining the tourism sector development plans for Changbai Mountain, the quantitative strategic planning matrix (QSPM) was utilized to rank these strategies (Appendix A). The columns of the QSPM matrix, from left to right, contain the list of internal and external components and their respective weights, which are deduced accurately from the matrix of internal factors. Next, the SWOT matrix strategies (including SO, WO, ST, and WT) are placed in four columns, with each column providing an attractiveness score (AS) and a total attractiveness score (TAS). Multiplying the weight by the attractiveness score yields the total attractiveness score. The attractiveness score can range from 1 to 4 (maximum = 4; minimum = 1). Some strategic factors may not be desirable for a given plan. A score of attractiveness for this factor should not be considered in this instance. Notably, AS should not be based on assumption and should be accurate, rational, and reasonable. The TASs associated with each method are pooled at the conclusion. Whichever method has the highest score has primacy within the system.

After computing the overall score for each strategy in the quantitative strategic planning matrix, the strategies were ranked according to the scores received. Based on the matrix of internal–external components in the SWOT model, an offensive strategy was determined to be the most suitable for Changbai Mountain. As is evident from the table, SO1 strategy, or “Taking advantage of the potentials and natural, historical, etc., attractions of the region as a result of the region’s beautiful tracks” had the highest priority, whereas the WT2 strategy, or “Expansion of formal and informal skill training institutes to teach specialized and qualified human resources in tourism-related industries”, had the lowest.

4. Discussion

As a new strategy for the development of human and community coexistence and with the goal of economic productivity, the tourist industry has found a distinctive and fitting role in the development of regions today. In accordance with their temperature, geography, and hydrology, some regions such as Changbai Mountain provide unique attractions. Numerous studies have been conducted in the field of prioritizing various aspects of tourism and developing strategies [41]. For instance, Refs. [42–47] have offered several tourism development strategies.

The Changbai Mountain contains numerous natural, historical, and cultural tourism attractions. Identifying and prioritizing strategic tourism programs will play a crucial role in the creation of jobs and economic growth. In this study, in order to establish a strategy, plan for the Changbai Mountain, the region's plans were presented from two perspectives following expert interviews and document reviews. The initial perspective or model utilized a combined approach of IFE, EFE, and SWOT analytical techniques, the output of which was a table with 12 opportunities and threats for external factors and 16 strengths and weaknesses for internal factors. In addition, the following strategic studies in the sphere of tourist industry development can be mentioned: Chaghajerdi et al. [48] and Pranatayana et al. [49], among similar studies mentioned in the literature review.

One of the weaknesses of the SWOT model has been its inability to prioritize plans; therefore, planners attempt to compensate for this shortcoming by employing hybrid models [50,51]. In this study, a hybrid method was utilized to improve the SWOT analytical model's effectiveness. The execution method and integration of three applied techniques, AHP, QSPM and SWOT, distinguish this research from others of a similar nature. First, the internal and external elements influencing the development of Changbai Mountain tourism were identified using the SWOT approach, and then the strategies were prioritized using the AHP method and QSPM technique.

According to the findings of this study, "Existence of beautiful natural features with distinctive scenery, including waterfalls, forests, rivers, and mountains, among others" is the most significant strength and "Inadequate visitor service amenities and weakness of infrastructure construction" is the most significant weakness of tourism in the region. Regarding the external opportunities affecting tourism in the region, it was concluded that "The development direction of Changbai Mountain conforms to the national strategy" was the most significant opportunity and "The phenomenon of islanding is one of the important issues in Changbai Mountain protection" was the most significant threat. Then, based on these elements and by combining them in the SWOT matrix, appropriate strategies for each combination of internal and external factors were developed. The matrix of internal/external factors was utilized to choose the optimal strategy set for the region, and the right offensive approach for the area was described.

In the second perspective, both SWOT and AHP were utilized. In this model, internal and external factors and plans were analyzed using the SWOT method. In order to select the optimal set of strategies from the SO, ST, WO, and WT options, a hierarchical AHP structure was developed using the criteria of strength, weakness, opportunity, and threat for the first level of criteria and 28 internal and external sub-criteria. After conducting pairwise comparisons, it was concluded that the "weakness criterion" with a weight of 0.324 was ranked first, followed by the "strength criterion" with a weight of 0.242, the "threat criterion" with a weight of 0.230, and the "opportunity criterion" with a weight of 0.204. This demonstrates the predominance of weaknesses over other factors. Tourism industry managers and decision makers should pay special attention to planning weaknesses. This study's findings are compatible with Shang et al. [52], Navarro et al. [16], and Sari et al. [28] regarding the sustainability of ecotourism and the prominent advantages of the researched areas.

All pairwise comparisons had an inconsistency rate of less than 0.1, indicating acceptable compatibility and no need to revise the comparisons. Following the pairwise comparisons of the sub-criteria, the priority of the alternatives was determined; SO had the highest priority, with a weight of 0.312, followed by ST, with 0.258, then WO and WT. In other words, offensive strategies were selected as the top priorities for the regional tourism industry's development.

Therefore, according to the findings of the study, the most effective strategy for the Changbai Mountain lies in the offensive range, with an emphasis on internal strengths and external opportunities, and it should be based on the capabilities and potentials of the Changbai Mountain. It is preferable for the region to maximize the utilization of upcoming chances. This study's findings are also compatible with Sariisik et al. [26], Okan et al. [53], Anggoro et al. [54], and Mallick et al. [27] regarding the strategies for conserving the valuable natural resources and emphasizing the natural structure of the ecosystems.

After determining the solutions for developing the tourism industry of Changbai Mountain, the following priority ranking was determined:

- (1) SO_1 . Taking advantage of the potentials and natural, historical, etc., attractions of the region as a result of the region's beautiful tracks;
- (2) SO_3 . Establishing an appropriate mechanism for public and private sector investment in infrastructure, tourism services, and entrepreneurship;
- (3) ST_1 . Determining the ecological tolerance capacity and preventing the overexploitation of natural resources by tourists.

Ecotourism environmental carrying capacity involves tourism, ecology, environmental science, landscape ecology, management, economics, sociology, planning, landscape architecture, geography, and other disciplines. We believe that the size of environmental carrying capacity of ecotourism follows the "law of the lowest factor". Under the premise of sustainable development, in a certain time, the natural environment, economic environment, and social environment can bear tourism and related activities, and the minimum value of the limit value in scale, intensity, and speed is the environmental carrying capacity of the scenic spot in that time. That is, what determines the carrying capacity of tourism environment is not the maximum bearing capacity factor but the "bottleneck" factor, and the environmental carrying capacity is determined by this factor.

- (4) WO_1 . Quantitative and qualitative enhancement of service and welfare facilities in accordance with the natural environment of the region.

Perfect and advanced tourism facilities and equipment, a high quality level, cheap accommodation conditions, and safe and convenient traffic conditions are necessary conditions for the construction of any tourist area. For the Changbai Mountain scenic spot, this is no exception, such as the construction and improvement of the connection of Tianchi south, west, and north gates of the tourism highway to build comfortable swimming pools and water recreation facilities in hot springs with large flow on the north slope. On the premise of ensuring fire safety, setting up self-service barbecue and dining spots for tourists along highways and hiking trails is required. Creating the necessary infrastructure to achieve the full coverage of network information and mobile phone signals in the scenic spot is essential.

- (5) ST_5 . The construction of ecological tourism in line with the green water and green mountain.

In order to build Changbai Mountain into a well-known tourism brand at home and abroad, it is necessary to improve the overall ornamental quality of the scenic spot and maintain the beautiful original ecological environment of Changbai Mountain as the primary task. For example, along the main tourist routes, a variety of physical geographical zoning signs (such as geology, landform, climate, vegetation, ecological regional zoning location, and zoning indicators) should be set up. The real-time display of air quality electronic tags and oxygen in the air, negative oxygen ions, and substances beneficial to human body health should be established and marked in scenic places. In order to restore

the beautiful environment of the original ecology, ginseng, frogs, fish in cold water, various wild fruits, mushrooms, wild vegetables, and wild animals in the forest area should be vigorously propagated for greater satisfaction of visitors. In order to create a beautiful and comfortable tourism environment, it is necessary to do a good job in the scenic area in terms of the county and the township (town), village construction, environmental beautification, and protection of the original ecological environment to build Changbai Mountain into a tourist scenic spot with the quality of water, air, and land being second to none at home and abroad.

- (6) WT₁. Developing a strategic environmental plan to manage all sorts of pollution and land use modifications.

The management of the ecological and environmental quality of administrative areas by administrative committees must be strengthened. Through the implementation of the environmental target responsibility system at various levels, the strength of all districts, departments, and units to jointly protect and improve the environment can be mobilized. An accountability system for environmental protection should be established. The following should be included: establishing fiscal expenditure subjects for environmental protection, gradually increasing the proportion of environmental protection inputs in public expenditure, and focusing on ensuring funds for supervision, monitoring, information, education, and scientific research of environmental law enforcement. Improving the system of environmental law enforcement, intensifying environmental law enforcement, and transforming environmental protection from mainly administrative measures to a comprehensive application of law, economy, technology, and necessary administrative measures are required to solve environmental problems. Application of the strict regulation of environmental violations should be ensured. Efforts to clean up and rectify enterprises that illegally discharge pollutants are necessary, and polluting projects that violate national industrial policies and fail to carry out environmental impact assessments should be punished. Illegal activities such as illegal development, construction, and tourism in nature reserve areas that cause ecological damage should be investigated and dealt with.

5. Conclusions

As a tourism hub in China, Changbai Mountain is interesting to travelers due to its unique natural, cultural, and ancient qualities; nevertheless, these features remain underdeveloped. Combining the SWOT and AHP models, an attempt was made in this descriptive analytical study to generate tourism plans for Changbai Mountain. Earlier, the identification and priority of the Changbai Mountain's tourism industry growth were examined. The quantitative examination of internal and external factors using the analytical hierarchy process (AHP) approach and the resulting graph demonstrated that the final score of the external factors' matrix is 2.63 and the final score of the internal factors' matrix is 2.93. These results demonstrated that the tourism development of Changbai Mountain possesses significant strengths and opportunities, as well as weaknesses and threats. However, neither the index of strengths (1.40) nor the index of opportunities (1.39) should be disregarded as prospective elements. Consequently, the results indicate that adopting an aggressive strategy in the tourism development of Changbai Mountain based on solidifying and maintaining the strengths and utilizing the opportunities available in the region, such as "Increasing the private sector's willingness to participate in tourism-related initiatives and programs", "Possibility of establishing and expanding local marketplaces and providing local goods and souvenirs", "Genuine opportunities to earn money from handicrafts", and "The development direction of Changbai Mountain conforms to the national strategy", is an important guarantee for achieving this sustainable tourism, as their implementation provides the necessary conditions and infrastructures for the presence of tourists.

The results indicated that the “Taking advantage of the potentials and natural, historical, etc., attractions of the region as a result of the region’s beautiful tracks” strategy was ranked highest, while the “Expansion of formal and informal skill training institutes to teach specialized and qualified human resources in tourism-related industries” strategy was ranked last. Consequently, it is hoped that the authorities will contribute to the development and enhancement of this region by focusing on the vision and objectives of tourism development in the Changbai Mountain and implementing these strategies with careful planning and expert input.

Due to funding and time limitations, the study was conducted over several months, and its findings cannot be applied generally. In addition, the processes of strategic planning in this study are based on David’s model, and the results may be different from those of other models. Notably, the identified strategic elements were selected based on the opinions of a subset of experts, and created findings may be different based on the opinions of another subset of experts. Noting that each of the themes stated in this study have numerous dimensions and aspects, it is essential to conduct extensive research on each of them in order to better comprehend and prepare for the development of tourism. In this regard, the following recommendations are made:

1. Officials and related organizations should pay more attention to the appointment of tour guides who are fluent in various languages and able to use new technology;
2. Developing adequate solutions to utilize the potential of foreign investors;
3. Focus on infrastructure and quality roads and vehicles in tourist areas, as well as the provision of a variety of lodging and amusement services in tourist locations;
4. Expert training to enlighten and educate tourists and foster a culture of wildlife protection;
5. Utilizing modern advertising and marketing technology to boost tourism by highlighting the region’s assets.

Sustainable tourism is dependent on a healthy environment and keeping the region’s ecological strength intact, thus it is important to take precautions to protect the biodiversity of the ecosystem, such as marking important landmarks, plant and animal species, and natural areas with suitable signs.

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Appendix A. QSPM Matrix of Tourism Industry of Changbai Mountain for SO, WO, ST, and WT Strategies

Strategic Factors	Weight	SO ₁		SO ₂		SO ₃		SO ₄		SO ₅		WO ₁		WO ₂		WO ₃		ST ₁		ST ₂		ST ₃		ST ₄		ST ₅		WT ₁		WT ₂		WT ₃		
		AS	TAS																															
Opportunity																																		
O ₁	0.087	3	0.261	2	0.174	3	0.261	2	0.174	2	0.174	2	0.174	2	0.174	2	0.174	2	0.174	-	-	2	0.174	1	0.087	2	0.174	2	0.174	1	0.087	2	0.174	
O ₂	0.091	3	0.273	2	0.182	3	0.273	1	0.091	2	0.182	3	0.273	2	0.182	2	0.182	2	0.182	-	-	2	0.182	2	0.182	2	0.182	2	0.182	2	0.182	2	0.182	
O ₃	0.079	1	0.079	1	0.079	1	0.079	1	0.079	1	0.079	1	0.079	1	0.079	1	0.079	1	0.079	1	0.079	1	0.079	1	0.079	1	0.079	1	0.079	1	0.079	1	0.079	
O ₄	0.078	1	0.078	1	0.078	1	0.078	1	0.078	1	0.078	1	0.078	1	0.078	1	0.078	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
O ₅	0.095	2	0.19	2	0.19	2	0.19	2	0.19	1	0.095	2	0.19	2	0.19	2	0.19	2	0.19	2	0.19	2	0.19	-	-	2	0.19	2	0.19	2	0.19	2	0.19	
O ₆	0.085	1	0.085	1	0.085	1	0.085	1	0.085	1	0.085	1	0.085	1	0.085	1	0.085	1	0.085	1	0.085	1	0.085	1	0.085	1	0.085	1	0.085	1	0.085	1	0.085	
Threat																																		
T ₁	0.084	3	0.252	1	0.084	2	0.168	2	0.168	2	0.168	3	0.252	2	0.168	2	0.168	2	0.168	2	0.168	2	0.168	2	0.168	2	0.168	2	0.168	2	0.168	2	0.168	
T ₂	0.074	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.074	1	0.074	1	0.074	1	0.074	3	0.222	1	0.074	1	0.074	1	0.074		
T ₃	0.077	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.077	1	0.077	1	0.077	1	0.077	1	0.077	1	0.077	1	0.077	1	0.077		
T ₄	0.08	2	0.16	1	0.08	2	0.16	1	0.08	1	0.08	1	0.08	1	0.08	1	0.08	1	0.08	1	0.08	1	0.08	1	0.08	1	0.08	1	0.08	1	0.08	-	-	
T ₅	0.087	3	0.261	2	0.174	2	0.174	2	0.174	2	0.174	2	0.174	-	-	2	0.174	2	0.174	2	0.174	2	0.174	2	0.174	3	0.261	3	0.261	2	0.174	2	0.174	
T ₆	0.083	3	0.249	-	-	3	0.249	1	0.083	1	0.083	2	0.166	-	-	2	0.166	2	0.166	1	0.083	2	0.166	2	0.166	2	0.166	2	0.166	2	0.166	2	0.166	
Strength																																		
S ₁	0.08	3	0.24	2	0.16	2	0.16	2	0.16	1	0.08	3	0.24	2	0.16	2	0.16	2	0.16	1	0.08	2	0.16	2	0.16	3	0.24	2	0.16	-	-	2	0.16	
S ₂	0.076	4	0.304	1	0.076	3	0.228	2	0.152	2	0.152	2	0.152	1	0.076	2	0.152	2	0.152	2	0.152	2	0.152	2	0.152	2	0.152	2	0.152	2	0.152	-	-	2
S ₃	0.066	3	0.198	2	0.132	3	0.198	2	0.132	2	0.132	2	0.132	2	0.132	2	0.132	2	0.132	2	0.132	2	0.132	2	0.132	2	0.132	2	0.132	-	-	2	0.132	
S ₄	0.071	1	0.071	1	0.071	1	0.071	1	0.071	1	0.071	1	0.071	1	0.071	1	0.071	1	0.071	1	0.071	1	0.071	1	0.071	1	0.071	1	0.071	1	0.071	1	0.071	
S ₅	0.054	2	0.108	1	0.054	2	0.108	1	0.054	1	0.054	-	-	-	-	-	1	0.054	1	0.054	1	0.054	1	0.054	1	0.054	1	0.054	1	0.054	-	-	-	
S ₆	0.062	1	0.062	1	0.062	1	0.062	1	0.062	1	0.062	3	0.186	-	-	1	0.062	1	0.062	1	0.062	1	0.062	1	0.062	1	0.062	1	0.062	-	-	-	-	
S ₇	0.058	1	0.058	1	0.058	1	0.058	1	0.058	1	0.058	-	-	-	-	-	1	0.058	1	0.058	1	0.058	1	0.058	1	0.058	1	0.058	-	-	-	-		
Weakness																																		
W ₁	0.045	-	-	-	-	-	-	-	-	-	-	1	0.045	1	0.045	1	0.045	-	-	-	-	-	-	-	-	-	-	-	-	1	0.045	1	0.045	
W ₂	0.075	3	0.225	2	0.15	3	0.225	2	0.15	2	0.15	2	0.15	2	0.15	2	0.15	2	0.15	2	0.15	2	0.15	1	0.075	2	0.15	2	0.15	2	0.15	2	0.15	
W ₃	0.069	2	0.138	2	0.138	2	0.138	2	0.138	-	-	3	0.207	1	0.069	2	0.138	2	0.138	2	0.138	2	0.138	2	0.138	2	0.138	2	0.138	-	-	2	0.138	
W ₄	0.071	3	0.213	2	0.142	3	0.213	2	0.142	-	-	2	0.142	2	0.142	2	0.142	2	0.142	2	0.142	2	0.142	2	0.142	2	0.142	2	0.142	2	0.142	2	0.142	
W ₅	0.042	-	-	-	-	-	-	-	-	-	-	1	0.042	1	0.042	1	0.042	-	-	-	-	-	-	-	-	-	-	-	-	1	0.042	-	-	
W ₆	0.049	-	-	-	-	-	-	-	-	-	-	1	0.049	1	0.049	1	0.049	-	-	-	-	-	-	-	-	-	-	-	-	1	0.049	1	0.049	
W ₇	0.055	2	0.11	1	0.055	1	0.055	1	0.055	1	0.055	1	0.055	1	0.055	1	0.055	1	0.055	1	0.055	1	0.055	1	0.055	1	0.055	1	0.055	1	0.055	1	0.055	
W ₈	0.066	3	0.198	2	0.132	3	0.198	2	0.132	1	0.066	2	0.132	2	0.132	2	0.132	2	0.132	2	0.132	2	0.132	2	0.132	2	0.132	2	0.132	2	0.132	2	0.132	
W ₉	0.061	1	0.061	1	0.061	1	0.061	-	-	1	0.061	1	0.061	1	0.061	1	0.061	1	0.061	1	0.061	1	0.061	1	0.061	1	0.061	1	0.061	1	0.061	1	0.061	
Total			3.874		2.417		3.492		2.508		2.139		3.215		2.22		2.767		2.816		2.297		2.816		2.464		3.131		2.927		2.067		2.698	

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