

Research on Development Strategy of China Ice-Snow Sports Tourism Industry Based on SWOT-AHP Model-Case Study on Zhangjiakou

Wenjie Chen ¹, Pan Zhou ² and Kihyung Bae ^{3,*}

¹ Sejong University; PH.D Candidate; cwj920624@naver.com

² Sejong University; PH.D Candidate; nikolay3511@163.com

³ Sejong University; Professor; baekh@sejong.ac.kr

* Correspondence

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Abstract: Industrial integration is the innovative embodiment of regional economic theory. The promotion of industrial integration is conducive to improving the scale effect and spillover effect of the industry. Also, it has the power to radiate, drive, and lead the innovation and development of the whole industrial cluster. The purpose of this paper was to identify the most suitable development pattern of the ice-snow sports tourism industry in Zhangjiakou, one of the host cities of the 2022 Winter Olympics. This study combs the characteristics of the development of the ice-snow sports industry, and analyzes the current situation of the industry in Zhangjiakou based on the SWOT-AHP method. This paper argues that the integrated industry is the most suitable development pattern for the promotion of the ice-snow culture industry in Zhangjiakou. The following content will present effective countermeasures to accelerate the development of the ice-snow culture industry integration in Zhangjiakou from three aspects: industrial resource integration, industrial chain layout, and scientific and technological innovation. The IT live simulation technique facilitates identifying some vital elements during the data collection.

Keywords: ice-snow sports industry; culture tourism; integrated industry; SWOT-AHP model

1. Introduction

Under the background of economic globalization and industrial competition, the traditional regional competition, enterprise competition and product competition have been extended to the competition of integrated industry. In other words, the core of competition is changing qualitatively. The concept of integrated industry has been more and more recognized and supported. Thus, in the future, the competition of mass culture industry will be the competition of industry integration. Ice-snow culture industry is a special sports culture industry formed through the excavation and integrated utilization of ice and snow resources. It involves art, tourism, sports, leisure and various fields, which can realize the combination of people's cultural life and economic behavior. At the same time, it plays an important role in improving people's living standards and accelerating regional economic growth. Due to the radiation effect of Beijing-Zhangjiakou 2022 Winter Olympic Games, the consumption of ice-snow sports tourism in China has gradually increased, and the development of the industry has attracted attention. According to the latest statistics from the China Institute of Tourism, during the winter of 2016 to 2017, the scale of China's ice-snow tourism market reached 170 million, and the income was about 270 billion yuan [1].

Developing ice-snow sports tourism industry in Zhangjiakou is claimed to have following points of significance. First, along with the construction of the sports venues and stadiums, the urban construction and ecological environment will be facilitated. Second, the promotion of ice-snow culture industry will popularize the public enthusiasm for winter sports thus expand the consumer market. Third, it will to some extent boost the regional economic development in North China. The current development of ice-snow sports tourism industry in China are mainly concentrated in Northeast areas, while in Zhangjiakou the industries are receiving

relatively less attention. According to the China Ice and Snow Tourism Development Report 2018, among the top ten rankings of ice-snow scenic spots in China, the northeast region accounted for nine [2]. As a matter of fact, Zhangjiakou owns unique geographical advantages and abundant ice-snow resources. Besides, the Winter Olympics is bound to provide a vital opportunity for the development of ice-snow sports tourism industry and for stimulating the potential growth of local consumer markets. However, some problems, such as the lack of systematic management and operation mechanism, and the lack of sustainable development planning, are still remaining to be resolved. Therefore, how to make use of the Olympic effect to develop local ice-snow culture tourism industry, and to realize the sustainable growth becomes the focuses of this study.

At present, the researches on ice-snow culture tourism mainly focus on marketing problems, tourist motivations, environmental impacts and regional economics. For instance, Sun, Li, & Miao and Liu & Sun focused on the characteristics of China's ice-snow market and put forward possible strategies for products exploring and marketing [3, 4]. After Richards claimed the concept of "habitual" consuming motivation of the ice-snow tourism industry [5], scholars such as Sun and Wang started to pay more attention to the consuming motivation and its social influence to other related industries [6, 7]. Furthermore, Song studied the structure of the industry and its modification in order to improve the tourism ecological footprint model [8]. Wang, Zhu, & Yi analyzed the regional environmental tolerance in Northeast China and established the early warning interval of carrying capacity of ski sightseeing environment [9]. Nevertheless, it should be pointed out that most of the current researches show a high degree of repeatability, and are lack of perspective on a specific industry in a particular environment or during developing period. Especially on the performance of a specific industry in large-scale sports events, the research seems to be insufficient.

Hypothesis 1: The development of ice-snow sports tourism industry in Zhangjiakou owns strong potential.

At present, the construction of soft and hard environment, the level of economic development and the level of urban development of Zhangjiakou are all not as well as those of Beijing and surrounding areas. Referring to its process of local industrial development, compared with Beijing, there is a big gap in the aspects of talent team, planning and construction, supporting ability, service efficiency and platform quality. Therefore, this paper will analyse the advantages, disadvantages, opportunities and challenges for developing ice-snow culture industry in Zhangjiakou by SWOT analysis to discuss whether the industry has strong development potential.

Hypothesis 2: Integrated industry is the most suitable pattern for the development of ice-snow culture industry.

With the increasing competition of the market and the improvement of the market mechanism, the core competitiveness of the industry is more reflected in such three aspects as the ability to control and dominate the industrial value chain, the ability to integrate and utilize the real and potential resources, and the ability to integrate the multiple systems. Recently, some new industrial organization forms, for instance, industrial convergence, industrial association and industrial cluster, have become important models for sustainable development of mass tourism and sports industry. The ice-snow sport tourism industry requires a flexible development pattern due to its boundary dynamic uncertainty. This pattern needs to be adjusted according to the changes of producers, collaborators, suppliers, sellers, customers and other industry entities at all times. Thus, as the main body of consumer behaviour, tourism culture enterprises have to change the rigid development mode and make it fully flexible. In other words, it has to focus on the changing needs of consumers. Through dynamic integration innovation, the needs of mass consumers would be fulfilled efficiently and effectively. The common industrial development patterns are industrial association, industrial convergence, industrial cluster and integrated industry. In this paper, the core factors of the four industrial development patterns and the SWOT analysis factors that influence the growth of ice-snow culture industry in Zhangjiakou will be effectively combined. On this basis, the weight of different patterns will be calculated by AHP analysis to demonstrate whether integrated industry is the most applicable way to promote ice-snow culture industry in Zhangjiakou.

2. Theoretical Definition of "Integrated Industry"

Integrated industry refers to a kind of economic complex structure. It shows that in the process of integrated industry, because of the continuous diffusion and innovation of science and technology, the dynamic development factors that the integration relies on will also continue to evolve. As a result, it will drive the

formation of competitive advantage. In the process of development, integrated industry presents two significant advantages. First, the high integration of industry could give full play to the function of the market to find the optimal resource allocation and to utilize the network effect. Second, the high integration of industry would promote the development of industry to form "path dependence" and "positive feedback" of network effect, and gradually strengthen its leading position in the market.

Integrated industry is a kind of economic compound structure under the background of industrial globalization and world economic integration. Integrated industry reveals the inherent law of industrial development and evolution. It is the adjustment, optimization and upgrading of industrial structure, and is the system integration of product, technology and market innovation. The continuous improvement of integrated industry will help to reduce the manufacturing cost and transaction cost of the main body of the market. Thus it will improve the industrial scale effect and spillover effect. The development of integrated industry will also improve the core competitiveness of the whole industrial cluster by radiating, driving and leading the development of the whole industrial cluster. It can be seen that the integrated industry has important theoretical and policy reference value for reforming and upgrading the industrial structure, especially for adjusting regional industry, strengthening the international competitive power of industry and creating world-class industrial cluster.

3. Methodology 1: SWOT Analysis

3.1 S-Internal strengths: rich culture tourism resources and powerful industrial competitiveness

Zhangjiakou is a historical city with profound cultural heritage, long-standing civilization and abundant geological resources. Plenty of topographical features such as basins, mountains and plateaus provide fundamental conditions for building natural ski resorts. Since 2000, Zhangjiakou has built large-scale ski resorts, such as Chongli Wanlong, Changchengling, and Dolemeidi. Referring to the total size of fields of ski resorts, Zhangjiakou ranks second in China. In recent years, Zhangjiakou has just begun to develop ice-snow industry. Combined with relevant government policies, Zhangjiakou promotes rapid innovation on local tourism and ice-snow economy. Besides, Zhangjiakou combines regional culture with ice-snow tourism as a way to display and carry forward traditional culture. Through increased diversity of ice-snow cultural experience for tourists, more consumers are attracted. At the preparing stage of the Beijing 2022 Winter Olympics, Zhangjiakou is focusing mainly on developing the "Olympic Economy" benefits and accelerating the promotion of ice-snow sports tourism industry. For this purpose, Zhangjiakou has gradually launched mass sports cultural projects such as the Olympic Forest Park, the Olympic Museum, and the Comprehensive Sports Park, which attracts more than 20 new enterprises to settle [10]. In order to realize the integrated development of sports events, tourism and leisure, national fitness and other industries, and to further enhance the competitiveness of hosting other sports and cultural events, Zhangjiakou has established quite a few high-end creative culture parks, for instance ice-sports culture industrial park and ice-snow culture creative industry park. It is predicted that the ice-snow sports tourism industry will gradually become the pillar industry in Zhangjiakou's future economy. In addition, other culture industries inside the capital circle will also have a linkage effect on ice-snow sports tourism industry. It will also contribute to the innovation and upgrading of Zhangjiakou's culture industrial chain.

3.2 W-Internal weaknesses: backward economy, incomplete infrastructure, and the lack of talents

First, in the China's economic landscape, Zhangjiakou still belongs to the relatively backward economic region with poor economic strength and limited local finance. Due to topographical factors, it absorbs less overseas capital, thus accepts limited foreign influence on regional economy. Besides, the basic highway construction in Zhangjiakou needs to be improved. The road conditions in rural areas are complex, which leads to potential security risks. Referring to scenic areas, due to the unreasonable design of the parking lot and limited parking spaces, congestion occurs frequently. The inconvenience of public transportation, to a certain extent, restricts the development of ice-snow sports tourism industry in Zhangjiakou. Secondly, in the process of creating a unique culture industry brand, the most critical resources are the talents and professionals of which Zhangjiakou is particularly lack. The Siphon effect of big cities nearby has dug up plenty of outstanding talents. It indubitably leads to the shortage of professionals and the limited technical level of personnel, especially in the area of ice-snow service and management. In addition, there are relatively few higher education institutions and scientific research institutes that engage in the training of talents in ski service or relevant fields in

Zhangjiakou. As a result, skiing enterprise operations, product innovation, and technology research capability of local industries are all not strong enough. All these factors restrict the cultivation of talents in cultural industry, and limit the development of ice-snow sports tourism industry in Zhangjiakou.

3.3 O-Improved consuming environment and national policy supports

With the rapid development of China's economy, the public demands for leisure and culture industry market has also greatly increased. Winter Olympic Games own an important influence on enhancing the public's understanding of ice-snow culture. It is estimated that, as Zhangjiakou becomes one of the joint hosts of the 2022 Winter Olympic Games, the total income of local culture industry, driven by Olympics, will reach more than 300 billion yuan [11]. Since Beijing and Zhangjiakou successfully bid for the 2022 Winter Olympic Games, the enthusiasm of Chinese residents to participate in ice-snow sports activities has been unprecedented, and the ice-snow sports tourism industry has entered the golden age of explosive growth. According to the data released on the "In-depth Analysis Report on Business Model Innovation and Investment Opportunities of China's Ice-snow Industry" published by the China Industry Research Institute, in 2018, the number of ice-snow tourists in China reached 197 million, which equated to a revenue of about 330 billion yuan with an increase of 22% over 2017 [12]. The per capita consumption of ice-snow tourism was 1,675 yuan. The average stay for ice-snow sightseeing is 2.8 days, which witnessed an increase of 0.65 days over the same period the year before the last [13]. Therefore, it is stated that ice-snow tourism is gradually becoming a creative way of tourism experience for Chinese residents.

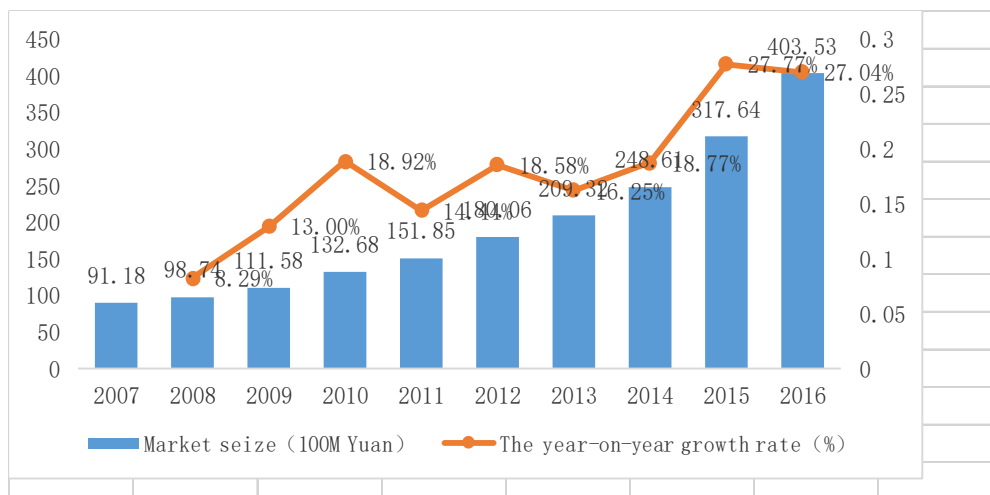


Figure 1. The scale and growth rate of China's ice-snow tourism market (2007-2016)

The "Winter Sports Development Plan (2016-2025)" issued by the General Administration of Sport of China pointed out that by 2025, a more systematic development pattern of winter sports will be established. In that way, the foundation of winter sports will be more solid; the popularity of winter sports will be greatly improved; and the competitive strength will be highly accelerated [14]. At the same time, President Xi Jinping put forward a significant instruction of promoting winter sports and ice-snow culture industry to take root in Zhangjiakou [15]. That is, to strengthen the construction of Zhangjiakou ice-snow infrastructure, and to accelerate the popularization of winter sports. Moreover, it is planned to transfer Zhangjiakou into a national ice-snow sports tourism industry demonstration base and an international winter sports tourism and experience attraction, saying "turning snow and ice hills into gold and silver mountains". National policy is regarded as the most important development factor and motivation in China. The government policy calls for the promotion of China's winter sports industry, and the participation of social capital. It will definitely lay a solid foundation for the development of the Zhangjiakou ice-snow sports tourism industry.

3.4 T-Market modification and external challenges in post-Olympic era

In recent years, people have been more eager to improve their physical health or to challenge themselves in some minority sports and culture events. Taking equestrian as an example, relying on the advantages of project popularization and key city support, the Chinese equestrian industry has gradually become a scale. To

some extent, it has already occupied a certain share in minority sports culture industries, and has produced a larger market threat to Zhangjiakou’s ice-snow sports tourism industry. Hosting Olympic Games is regarded as a symbol of strong national power. It is because that holding a major international event often requires huge investment. However, the rate of return remains doubtful. Since Los Angeles successfully turned the loss into profit in 1984, the Olympic surplus has become a focus. When the 2000 Sydney Olympics created a surplus of \$45 million, four years later [16], the 2004 Athens Olympics was overburdened by the construction industry with a deficit of 0.7% and a budget of \$2.44 billion, which referred to almost no surplus [17]. Furthermore, in 2008, the Beijing Organizing Committee for Olympic Games estimated before the Games that the gross income would reach 20.5 billion yuan and the balance of revenue and expenditure will reach 1.157 billion yuan, which witnessed an increase of 800 million yuan over the budget [18]. Nevertheless, considering the large investment in earlier stage, there would be basically no surplus.

Following comes the venue recycle. The construction of venues is not only the basis for a successful game, but also a major expense for Olympic capital investment. However, after it ends, the low re-utilization rate usually reflects massive wastes. Although there are some reasonable cases of sustainable venue reuse, for example, the 20th Winter Olympics in Turin and the 21st Winter Olympics in Vancouver, in most of cases the venues were not be reused after Games. For instance, after the 22nd Winter Olympics in Sochi, even though the venues were reconstructed as national training centers, due to less than 500,000 local population, the venues were visited occasionally. Moreover, the venues used in 23rd Winter Olympics in PyeongChang were suspended due to high maintenance costs and absence of long-term effective operation mechanism. Although the ice-snow sports tourism industry is identified as a sunrise industry with prosperous development prospects, there are still many problems and challenges remaining to be settled. How it could be developed in a healthy, stable and rapid condition in the post-Olympic era becomes a vital problem. According to present information released by Chinese government, in 2022 Beijing Winter Olympics, 8 venues will be located in Zhangjiakou, including 1 temporary construction, 2 existing, and 5 new. Facing high maintenance costs and unsatisfactory consuming income, the post-Olympic economic situation, if still remains similar as present, might not be able to realize sustainable utilization of venues [19]. Therefore, after the end of the Winter Olympics, whether and how the stadiums and supporting facilities could be reasonably recycled becomes a problem that must be properly handled.

4. Methodology 2: AHP-SWOT analysis

4.1 Determining the AHP-SWOT strategic model

The methodology of the research shows a combination of literature review, questionnaire interview and new technology. First, by summarizing the relevant literature, and referring to the opinions of experts in relevant fields, the questionnaire topics are determined. Secondly, according to Likert Scale and Delphi Method, the factors that selected from questionnaires and other possible elements selected by IT live simulation are divided into SWOT groups. Finally, the SWOT-AHP model is built. By putting the key factors selected from SWOT groups into the AHP model, the numerical value of importance of each factor could be calculated.

The detailed calculation processes are as following. Firstly, through SWOT rectangle analysis, the influencing factors, the strengths, the weaknesses, the opportunities and the challenges that Zhangjiakou ice-snow sports tourism industry faces are determined. The extraction and specific measurement of all influencing factors are obtained through field researches, IT support, and expert interviews.

Table 1. SWOT analysis matrix of ice-snow sports tourism industry strategic development choices

S	S1 Abundant culture resources S2 Improved consumption environment S3 Competitive Sports culture industries
W	W1 Incomplete industrial chain W2 Low economic level and imperfect infrastructure W3 Lack of industry professionals
O	O1 Promising Olympic economy O2 National Policy Support O3 Transformation, upgrading and integration of Cultural industry

T	T1 Fierce internal industrial competition
	T2 Diversified needs of sport items
	T3 Insufficient development in the post-Olympic era

4.2 Establishing AHP hierarchical model

Then, based on the SWOT analysis results, an AHP analysis chart in line with the development of Zhangjiakou ice-snow sports tourism industry can be established. Likert Scale and Delphi Method are used to construct the SWOT groups to judge the rectangle. Experts are invited to calculate the weighted average of each sub-factor of impact. Thus, the final scores of the factor, which representatives the degree of its influence, can be obtained. Assuming that Z experts rate the N sub-factors under factor X, then the average is (1). Taking the impact of strengths as an example, letting the strength have N sub-factors, and the weighted average of the expert scores, that is, the degree of influence of each sub-factor, can be represented by (2).

$$X_{nki} = (i = 1, 2, 3, 4, \dots, Z) \tag{1}$$

$$R = \frac{1}{m} \sum_{i=1}^m X_{nki} (k = 1, 2, 3, \dots, n) \tag{2}$$

$$A = \begin{vmatrix} 1 & 4 & 2 & 5 \\ 1/4 & 1 & 1/4 & 1/3 \\ 1/2 & 4 & 1 & 3 \\ 1/5 & 3 & 1/3 & 1 \end{vmatrix} \quad S = \begin{vmatrix} 1 & 1/2 & 1/5 \\ 2 & 1 & 1/5 \\ 5 & 5 & 1 \end{vmatrix} \quad W = \begin{vmatrix} 1 & 1/5 & 4 \\ 5 & 1 & 3 \\ 4 & 1/3 & 1 \end{vmatrix} \quad O = \begin{vmatrix} 1 & 1/5 & 1/3 \\ 5 & 1 & 3 \\ 3 & 1/3 & 1 \end{vmatrix} \quad T = \begin{vmatrix} 1 & 2 & 4 \\ 1/2 & 1 & 3 \\ 1/4 & 1/3 & 1 \end{vmatrix}$$

Figure 2. The AHP structure judgment matrix of ice-snow sports tourism industry

4.3 Identifying the influential extent of impact factors

In order to ensure the accuracy of the research results, the five-level scale method and Delphi method are used to construct the SWOT group and the judgment matrix of S, W, O and T groups. Using B to indicate the weight, and using Sa to express the influence of the dominant sub-factors, then it can be presented as (3).

$$S_a = R_a \times B_a (a = 1, 2, 3, \dots, n_s) \tag{3}$$

$$S = \sum_{a=1}^{n_s} S_a (a = 1, 2, 3, \dots, n_s) \tag{4}$$

After determining the impact of each sub-factor, the total dimension of strengths, weaknesses, opportunities, and threats can also be confirmed respectively. Taking the total dimension of strengths as an example, since it is the sum of the strengths of the superior factors, it can be identified as (4). In the same way, the total strength of industrial association, integrated industry and industrial cluster is obtained. The research calculates the weight and consistency ratio (CR) by using Yaahp7.0 software. If CR<0.1, it proves to pass the consistency test, and vice versa.

Table 2. SWOT group judgment matrix and consistency test

Group	Priority	CR	Sub-factor	CR	Sub-priority	Total priority	
S	0.4904	$\lambda_{max} : 4.1857$ $CR = 0.0696$	S1	$\lambda_{max} : 3.0536$ $CR = 0.516$	0.1125	0.0552	
			S2		0.1786	0.0876	
			S3		0.7089	0.3476	
W	0.0741		$\lambda_{max} : 4.1857$ $CR = 0.0696$	W1	$\lambda_{max} : 3.0858$ $CR = 0.0825$	0.0936	0.0069
				W2		0.6267	0.0464
				W3		0.2797	0.0207
O	0.3052			O1		0.1047	0.0320

			O2	$\lambda_{max} : 3.0385$	0.6370	0.1944
			O3	$CR = 0.0370$	0.2583	0.0788
T	0.1304		T1	$\lambda_{max} : 3.0183$	0.5584	0.0728
			T2	$CR = 0.0176$	0.3196	0.0417
			T3		0.1220	0.0159

4.4 Calculating the strategic type azimuth and building a strategic triangle

According to the weight of the total order of the hierarchy, the vector of the total intensity of S.W.O.T can be calculated as (5).

$$S_{sum} = \sum_{a=1}^{n_s} S_a (a=1,2,3,\dots,n_s) = 2.0168; W_{sum} = \sum_{b=1}^{n_w} W_b (b=1,2,3,\dots,n_w) = 0.2960$$

$$O_{sum} = \sum_{c=1}^{n_o} O_c (c=1,2,3,\dots,n_o) = 2.4884; T_{sum} = \sum_{d=1}^{n_t} T_d (d=1,2,3,\dots,n_t) = 0.5792 \tag{5}$$

The coordinate system is formed by the dimension of total strengths, weaknesses, opportunity and treats. The corresponding points on the coordinate axis are S', W', O', T', which are connected in turn to obtain the development strategy quadrilateral. Finally, through identifying the azimuth, that is, calculating the coordinates of the center of gravity of the strategic quadrilateral, the type of future development strategy of Zhangjiakou ice-snow sports tourism industry can be determined. The barycentric coordinate presents as (6).

$$P(X, Y) = \left(\frac{\sum_{i=1}^4 X_i}{4}, \frac{\sum_{i=1}^4 Y_i}{4} \right) = P \left(\frac{S'}{4} + \frac{W'}{4}, \frac{O'}{4} + \frac{T'}{4} \right) = (0.43, 0.48) \tag{6}$$

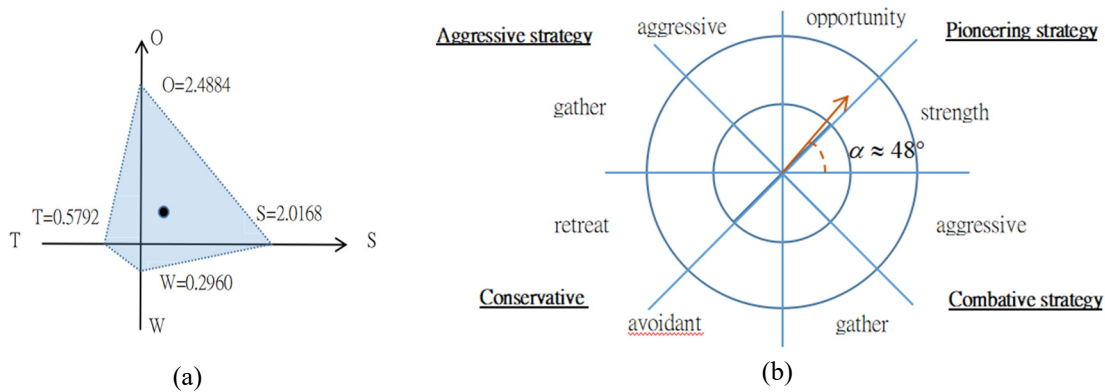


Figure 3. (a) AHP-SWOT strategic quadrilateral and (b) strategic azimuth of ice and snow cultural industry development

Verification for Hypothesis 1: Finally, the strategic azimuth can be introduced and calculated as (7). The center of gravity P is located in the first quadrant, so the development of Zhangjiakou ice-snow sports tourism industry should focus on SO strategic type which equates to opportunity exploitation strategy. That is, to seize the opportunity, to give full play to its own advantages, and to minimize the impact of adverse factors. Therefore, the development of Zhangjiakou ice-snow sports tourism industry should adopt a positive and pioneering strategic attitude.

$$\alpha \approx 48^\circ \tag{7}$$

4.5 Calculating the priority of different industrial development patterns

Using B for weights, and Ica for the impact of the sub-factors of industrial convergence, it comes out as (8). Taking industrial convergence as an example: the overall strength of integrated industry is the sum of the priority factors affecting the development model, that is (9).

$$IC_a = R_a \times B_a (a = 1,2,3, \dots, n_s) \tag{8}$$

$$IC_{sum} = \sum_{a=1}^{n_s} IC_a (a = 1,2,3, \dots, n_s) \tag{9}$$

According to the weight of the hierarchical total ranking, this study selects the priority factors that accord with the industrial development model, and finds out the vector of the total intensity of the different industrial development patterns. It could be calculated as (10).

$$\begin{aligned}
 II_{sum} &= \sum_{a=1}^{n_s} II_a (a = 1,2,3, \dots, n_s) = 3.1566 \\
 ICon_{sum} &= \sum_{b=1}^{n_w} ICon_b (b = 1,2,3, \dots, n_w) = 1.4193 \\
 IL_{sum} &= \sum_{c=1}^{n_o} IL_c (c = 1,2,3, \dots, n_o) = 2.5894 \\
 IClu_{sum} &= \sum_{c=1}^{n_o} IClu_c (c = 1,2,3, \dots, n_o) = 2.8340
 \end{aligned} \tag{10}$$

Verification for Hypothesis 2: Sorting from the results of the calculations, the following are obtained:

Table 3. SWOT group judgment matrix and consistency test results

Developmental pattern	Omnidirectional intensity	Priority
integrated industry	3.1566	1
industry cluster	2.8340	2
industry linkage	2.5894	3
Industry convergence	1.4193	4

5. Results and Discussion

5.1 Conclusion

After interpreting the advantages, disadvantages, opportunities and challenges of the development process of ice-snow culture industry in Zhangjiakou by AHP-SWOT model, this paper draws the following conclusions. Both the national policy of developing the ice-snow culture industry and the 2022 Winter Olympics reflect huge economic potential on Zhangjiakou’s ice-snow culture industry. Through the analysis of the total intensity of different industrial development patterns, this study figures out that compared with industrial cluster, industrial convergence, and industrial association, integrated industry pattern is the most suitable model for the development of ice-snow sport tourism industry in Zhangjiakou. The integrated industry is helpful to construct the local ice-snow culture industry chain and to make it a new growth point for Zhangjiakou, base on which the level of real economy could also be consolidated and upgraded.

5.2 Advice for local industrial development

The Zhangjiakou government and enterprises should take positive and effective measures to promote the integrated development of local ice-snow industry in aspects such as industrial resource integration, scientific and technological innovation, and industrial chain layout.

5.2.1 To improve the ability of integration and agglomeration of industrial resources, and to form the trend of integration and linkage development

In the process of industrial integration, due to the lack of international competitive agglomeration ability, the industry lacks support from related industries or upper and lower industries. It leads to the lack of interaction and spillover effect between industries and will slow down the innovation and development of the whole industry association group. Therefore, Zhangjiakou should establish and extend the "whole ice-snow culture industry chain". The local government could select and introduce leading enterprises in competitive sports events, cultural creativity, artificial intelligence and other industries in capital region, and organize activities for cooperation and docking of innovative resources, so as to promote the research and development of creative

products and to upgrade the level of local ice-snow culture. At same time, the government should introduce corresponding support funds. Only by establishing the Winter Olympics culture industry chain investment funds to attract social capital, the investment and financing platform under the leasing business will be made bigger and stronger. With sufficient financial support, the local government could focus more on supporting the research and innovation, developing key projects, constructing core parks, and training professional talents.

5.2.2 To take scientific and IT innovation as the carrier so as to break through the traditional core competition

In the long-term process of industrial integration, imperfect supporting system and insufficient core innovation ability are obvious problems. Besides, Big Data and various IT techniques become more and more important in new market. Therefore, Zhangjiakou should take scientific and technological innovation as the carrier, breaking through the core competitive power, integrating the resources of enterprises, higher educational institutes, and related research institutes of ice-snow culture industry in the surrounding areas to strengthen scientific ability, to establish cooperative innovation platform, and to carry out international cooperation. In addition, the local government should provide industrial technical support in the development of core technology, core self-research products, and creative IT products to fulfill a younger and smarter market. New forms of tourism, such as On-line trip, AR trip and VR trip could help to expand the market and update the quality of service. Divers mobile applications and software could be developed to improve the richness of the tourist experience.

5.2.3 To strengthen the core layout and to enhance the industry supporting capacity

Zhangjiakou should run through the concept of sustainable development and the consciousness of environmental protection when designing the layout of the ice-snow culture industry. In key areas, to enhance the regional industry supporting capacity should be taken as the major goal. Meanwhile, the matching in the industrial manufacturing links should also be paid more attention to. In other word, one main production link in the chain should be taken as the core, and other production links need to follow up to form a technology connection. The government should also pay attention to upstream and downstream superior industries to strengthen the industrial chain and to attract investment. Through comprehensive analysis of the opportunities, challenges, advantages and disadvantages of the existing industrial chain, the strategy for promoting and expanding the ice-snow industry chain in Zhangjiakou could be formulated. The local government and related enterprises could speed up the integration and extension process by launching attracting investment and making up the short board. It will gradually enhance the production capacity and the degree of industrial agglomeration of the whole ice-snow culture industry.

5.3 Limitation and recommendation for future research

Although the research has already got some achievement, there are still some insufficiency. Because of the limitation of data access, the statistical analysis is not comprehensive enough. Besides, since winter Olympics and ice-snow tourism are relatively new topics in China, insufficient domestic academic research and literature can be reviewed. Some of materials come from news and journalist reports which might contain personal standings. It is recommend that following topics could be focused on in future research: the integration ability of ice-snow culture tourism industry; the soft elements of the industry; the development strategy of ice-snow culture tourism industry in subtropical region in China; and the construction pattern of the industry integration interface.

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