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Developing an Evaluation Indicator System for the Competitiveness of Sports Tourism Destinations in Yunnan Province, China

Yi Dan[1], Chenfei Yang[2]
[1] *School of Physical Education,Yuxi Normal University, China*
[2] *School of Physical Education,Yuxi Normal University, China*
Corresponding Author: Chenfei Yang

ABSTRACT: *This study applied Porter's Diamond Model and successfully constructed and validated the evaluation indicator system for the competitiveness of Yunnan's sports tourism destinations through Exploratory Factor Analysis and Confirmatory Factor Analysis. This system encompasses three key dimensions: core experience and satisfaction, service quality and market dynamics, and infrastructure and policy environment, ensuring a comprehensive assessment of the destination's competitiveness. Subsequently, the Analytic Hierarchy Process was employed to scientifically allocate weights to each evaluation index, quantitatively revealing the impact of different factors on the competitiveness of Yunnan's sports tourism destinations. Empirical data analysis validated that the constructed index system possesses good reliability, validity, and model fit, effectively reflecting the competitiveness of Yunnan's sports tourism destinations. The study found that core experience and satisfaction are the most critical competitiveness factors, significantly influencing tourist attraction and satisfaction; service quality and market dynamics follow closely, playing an important role in enhancing tourist experience and destination brand image; although infrastructure and policy environment have lower weights, they provide the necessary support for the sustainable development of sports tourism.*

KEYWORDS: *Diamond Model, Sports Tourism, Competitiveness Evaluation, EFA, CFA, APH*

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I. INTRODUCTION

The sports tourism industry has experienced rapid growth as China’s economy enters a new normal, particularly driven by global health and tourism trends, which are leading the country into a new era characterized by large-scale tourism, health, and leisure industries. China has introduced several policies, such as the Guiding Opinions on Vigorously Developing Sports Tourism and the Opinions on Accelerating the Development of the Sports Industry and Promoting Sports Consumption, to provide policy support for sports tourism. In 2020, Yunnan issued the Opinions on Accelerating the Construction of a Strong Sports Province, emphasizing the significance of sports tourism in regional development and highlighting the deep integration of sports, tourism, culture, and wellness industries. Yunnan's unique natural environment and rich ethnic sports resources, combined with its openness to international cooperation, offer distinctive opportunities for the development of sports tourism.

The definition of sports tourism destinations lacks consensus, but it is generally regarded as a place that combines sports resources with tourism facilities, emphasizing the integration of sports activities with travel, including both participation and sightseeing (Higham, 2007). However, there is still debate over how to define the competitiveness of such destinations. This paper considers the competitiveness of sports tourism destinations as a comprehensive concept that encompasses the effective transformation of sports resources into marketable tourism products to achieve economic growth, environmental protection, and ecological balance (Weed & Bull, 2009). In analyzing industrial competitive advantage, Michael Porter’s (2011) diamond model provides a classic analytical framework, including key factors such as factor conditions, demand conditions, related and supporting industries, and firm strategy, structure, and rivalry. The model also considers government and chance as auxiliary factors, offering a comprehensive tool for analyzing the competitiveness of regional sports tourism destinations. By applying Porter’s diamond model and utilizing quantitative research tools, this study aims to provide measurable indicators to enhance the competitiveness of Yunnan’s sports tourism destinations, supporting their development towards internationalization and high-end growth.

II. LITERATURE REVIEW

The research on the competitiveness of sports tourism destinations originated from studies on tourism destination competitiveness (Higham, 2007), but its unique attributes have gradually made it an independent research field. International research on sports tourism destination competitiveness started relatively early and covers a wide range of topics, from the construction of theoretical models to practical applications (Hallmann et al., 2012; Serrano et al., 2021) . Porter's diamond model is one of the key theoretical frameworks used to study tourism destination competitiveness, emphasizing the competitive advantages of a nation or region in the global market, including factors such as factor conditions, demand conditions, related and supporting industries, firm strategy, structure and rivalry, government, and chance (Vlados, 2019). In recent years, research has gradually shifted from a supply-side perspective to a consumer-oriented approach. For instance, Hallmann et al. (2012) analyzed the factors related to sports tourism destinations from the consumer's perspective, identifying that infrastructure, accessibility, accommodation facilities, the combination of activities within the destination, and the image of the destination significantly influence sports tourists. Serrano et al. (2021) attempted to determine the most competitive beaches and zones in terms of sustainability and proposed criteria for surfing tourism indicators, offering an overview of these areas through geographical and political-economic perspectives. Additionally, research by Yu, Qiu, and Yang (2022) indicated that the development of sports tourism destinations not only depends on infrastructure but is also closely related to market demand, regional conditions, and resource development. The failure to consider regional comparative advantages in resource development often leads to scattered layouts of sports tourism projects, resulting in fierce competition and high redundancy.

Research on the competitiveness of sports tourism destinations in China mainly focuses on regional or provincial levels, with methods and content gradually becoming more comprehensive and in-depth. For example, Zuo et al. (2021) conducted a spatial analysis of the spatial distribution pattern and influencing factors of sports tourism resources in China, highlighting that the variation in resource distribution across different regions plays a crucial role in influencing the competitiveness of sports tourism destinations. Xu, Yang, and Ren (2020), through an empirical study on sports tourism in Guizhou Province, explored the relationship between novelty-centered business model innovation and competitive advantages in sports tourism. Their findings indicate that innovative business model designs can significantly enhance the market appeal and competitiveness of sports tourism. Chen (2020) applied the SWOT-AHP model in their research on the ice-snow sports tourism industry in Zhangjiakou, proposing strategic recommendations for industry development. Their study suggests that strengthening policy support, optimizing resource allocation, and improving infrastructure and service levels are key to enhancing the competitiveness of ice-snow sports tourism. Li et al. (2023), through a study on risk perception and consumption behavior in sports tourism in China, found that risk perception significantly affects tourists' decision-making behaviors, and proposed that reducing risk perception and improving service quality are effective approaches to boosting the market competitiveness of sports tourism.

In summary, although the research on the competitiveness of sports tourism destinations both domestically and internationally began from different perspectives, they have gradually developed into systematic theoretical frameworks and methodological approaches. However, studies specifically focusing on the competitiveness of sports tourism destinations in Yunnan Province remain relatively scarce. A search in the China National Knowledge Infrastructure (CNKI) database yielded only 18 relevant publications, indicating that this topic has not yet received significant academic attention or thorough research exploration. This highlights a substantial research gap in the field of sports tourism in Yunnan Province, underscoring the urgent need for more systematic and empirical studies to address this deficiency. For a region endowed with abundant natural resources and unique ethnic cultures, establishing a comprehensive competitiveness evaluation system is crucial. Such a framework would not only enhance the overall image of Yunnan's sports tourism but also effectively guide local policy formulation and the rational allocation of resources.

III. RESEARCH METHODOLOGY

This study aims to construct a competitiveness evaluation index system for sports tourism destinations in Yunnan. The research is conducted in three phases. In the first phase, the literature review method is employed to collect and analyze existing domestic and international studies on the competitiveness of sports tourism destinations. By integrating these findings with Porter’s Diamond Model, an initial evaluation index system is constructed. In the second phase, based on the initial findings, data is collected using a questionnaire survey method. Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) are then applied to further refine and validate the structure, reliability, and validity of the index system. In the third phase, the Analytic Hierarchy Process (AHP) is introduced to assign weights to each evaluation indicator, ensuring that the evaluation system accurately and scientifically reflects the standing of Yunnan's sports tourism destinations within a global competitive environment. The overall objective of this research is to provide a practical and operational competitiveness assessment tool for sports tourism destinations in Yunnan.

IV. FINDINGS

Phase One: Theoretical Construction of Evaluation Indicators

In the process of constructing a competitiveness evaluation index system for sports tourism destinations in Yunnan, this study integrates Porter's Diamond Theory with the specific context of Yunnan's sports tourism destinations. By extensively reviewing key domestic and international literature and theoretical frameworks on sports tourism and destination competitiveness, carefully selected and adjusted evaluation indicators were developed to match the unique characteristics of the Yunnan region, including:

Factor Conditions: This includes the accessibility and conservation of natural scenic resources, the quality of sports tourism resources, the professionalism of tour guides, the attitude of service personnel, and the convenience and quality of transportation, accommodation, and sports facilities.

Demand Conditions: This dimension involves the intensity of tourists' demand for sports tourism activities and their overall satisfaction with the sports tourism experience.

Related and Supporting Industries: This includes the service quality of travel agencies, the service quality of sports activity organizers, the level of cooperation between enterprises, and the support enterprises provide for sports tourism.

Firm Strategy, Structure, and Rivalry: This covers the market positioning of enterprises, service innovation, the degree of market competition, and the number of new entrants into the market.

Role of Government: This dimension evaluates government investment and promotion of sports tourism, as well as the comprehensiveness and enforcement of sports tourism-related laws and regulations.

Opportunities: This includes opportunities to experience unique cultures and ethnic traditions, as well as the attractiveness of emerging sports tourism activities.

Phase Two: Establishment and Empirical Testing of the Evaluation Index System

In this phase, Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were employed to validate the structural soundness of the theoretical index system constructed in the previous phase. To ensure the representativeness and accuracy of the survey results, a pre-survey was conducted by randomly selecting 40 tourists at a popular sports tourism destination in Yunnan Province. Subsequently, a formal survey was conducted by randomly selecting 200 tourists from the same area. A five-point Likert scale was used, where respondents rated each indicator from 1 (strongly disagree) to 5 (strongly agree) to accurately quantify the performance of various competitiveness dimensions of Yunnan's sports tourism destinations. After screening the responses, 8 incomplete or evidently unreasonable questionnaires were excluded, resulting in 192 valid responses, with an effective response rate of 96%. Among the participants, 120 were male and 72 were female, reflecting the gender distribution of tourists participating in sports tourism activities.

Exploratory Factor Analysis: Principal component analysis was conducted using IBM SPSS Statistics software to extract factors with eigenvalues greater than 1, setting 0.5 as the critical value for factor loadings. The Kaiser-standardized orthogonal rotation method was used to optimize the factor structure, and the process successfully converged after 7 iterations, with a KMO value of 0.854 and a significance level of P=0.000. As shown in Table 1, the 20 evaluation indicators were ultimately grouped into three main factors, with a cumulative contribution rate of 84.07%, and each indicator's loading exceeded the threshold of 0.5. This indicates that the extracted factors are well-represented and distinctive, effectively reflecting the multidimensional characteristics of the competitiveness of Yunnan's sports tourism destinations. The three factors represent the core dimensions of competitiveness and are therefore named "Core Experience and Satisfaction," "Service Quality and Market Dynamics," and "Infrastructure and Policy Environment," each focusing on assessing the competitiveness and strengths of Yunnan's sports tourism destinations in specific areas.

Subsequently, Cronbach's α was used to test the reliability of the index system. The overall Cronbach's α was calculated to be 0.984, with 0.937 for Core Experience and Satisfaction, 0.972 for Service Quality and Market Dynamics, and 0.953 for Infrastructure and Policy Environment. All dimensions achieved a Cronbach's α above 0.9, indicating that the internal consistency of the evaluation system is reliable.

Indicator	Principal Component		
	1	2	3
Attractiveness of Emerging Sports Tourism Activities	0.850		
Opportunities to Experience Unique Culture and Traditions	0.848		
Overall Satisfaction with Sports Tourism Experience	0.706		
Quality of Sports Tourism Resources	0.700		
Market Positioning of Enterprises		0.844	
Service Quality of Travel Agencies		0.830	
Attitude of Service Personnel		0.772	
Service Quality of Sports Activity Organizers		0.767	
Number of New Market Entrants		0.756	
Degree of Market Competition		0.724	

Professionalism of Tour Guides		0.721	
Enterprise Support for Sports Tourism		0.706	
Intensity of Tourists' Demand for Sports Tourism Activities		0.637	
Enterprise Service Innovation		0.631	
Accessibility and Conservation of Natural Scenic Resources			0.834
Level of Cooperation Among Enterprises			0.779
Government Investment and Promotion in Sports Tourism			0.754
Comprehensiveness and Enforcement of Sports Tourism Regulations			0.670
Convenience of Transportation, Accommodation, and Sports Facilities			0.669
Quality of Transportation, Accommodation, and Sports Facilities			0.622
Cumulative Contribution Rate	37.318%	64.159%	84.070%
Dimension Naming	Core Experience and Satisfaction	Service Quality and Market Dynamics	Infrastructure and Policy Environment

Table 1: Component Matrix and Cumulative Contribution Rate of the Index System (n=200)

Confirmatory Factor Analysis: Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) were conducted using IBM SPSS Amos to further assess the validity of the model structure, focusing on the theoretical relationships between dimensions and the overall model fit. Additionally, the convergent and discriminant validity of the index system were evaluated to ensure that it accurately reflects the competitiveness of sports tourism destinations in Yunnan.

During the CFA of the competitiveness evaluation index system for Yunnan sports tourism destinations, it was found that the minimum factor loading across the three dimensions (Core Experience and Satisfaction, Service Quality and Market Dynamics, Infrastructure and Policy Environment) was 0.76, with the rest exceeding 0.8. This indicates that the indicators effectively map onto their respective first-level dimensions. Moreover, based on the model fit parameters, the chi-square to degrees of freedom ratio (χ^2/df) was 2.85, CMIN/DF was 1.963, GFI was 0.961, RMSEA was 0.059, CFI was 0.915, and NFI was 0.936. All these fit indices met acceptable standards, confirming that the model demonstrates a good fit with the sample data collected.

The Average Variance Extracted (AVE) and Composite Reliability (CR) were used to assess the convergent validity of the index system. AVE measures the explanatory power of a latent variable over its indicators, while CR reflects the internal consistency of the model. When AVE is above 0.5 and CR exceeds 0.6, the model is considered to have good convergent validity. The minimum AVE value among the dimensions in this study is 0.526, and the minimum CR value is 0.86, both exceeding the standard thresholds. Next, discriminant validity was evaluated by examining the square root of the AVE and the Pearson correlation matrix. The square root of the AVE indicates factor cohesion, while the Pearson correlation reveals inter-factor relationships. When a factor's cohesion is significantly higher than its correlation with other factors, discriminant validity is confirmed. According to Table 3, each dimension's AVE square root surpasses its correlations with other dimensions, while significant correlations are observed among the dimensions ($p<0.01$), indicating strong discriminant validity for the system.

Phase Three: Determining the Weights of Indicators

Building on the exploratory factor analysis and confirmatory factor analysis, this phase utilizes the Analytic Hierarchy Process (AHP) to determine the weights of each competitiveness indicator, providing a more scientific and quantitative evaluation result. AHP, developed by Thomas L. Saaty in the early 1970s, is a complex decision-support tool that breaks down complicated decision problems into smaller, more manageable parts. It then mathematically quantifies the relative importance of each part, ultimately offering quantitative support for decision-making (Ho, 2008). In this study, AHP is applied to systematically quantify the relative importance of each evaluation indicator, offering comprehensive decision support for the precise evaluation of the competitiveness of Yunnan's sports tourism destinations.

Weight Calculation Method: The research objective is divided into three levels. The first is the goal level, which is competitiveness evaluation. The second is the criteria level, including Core Experience and Satisfaction (A), Service Quality and Market Dynamics (B), and Infrastructure and Policy Environment (C). The third is the alternatives level, which consists of specific indicators under each criterion: Attractiveness of Emerging Sports Tourism Activities (A1), Opportunities to Experience Unique Culture and Traditions (A2), Quality of Sports Tourism Resources (A3), Overall Satisfaction with Sports Tourism Experience (A4); Market Positioning of Enterprises (B1), Service Quality of Travel Agencies (B2), Attitude of Service Personnel (B3), Service Quality of Sports Activity Organizers (B4), Degree of Market Competition (B5), Professionalism of Tour Guides (B6), Number of New Market Entrants (B7), Enterprise Service Innovation (B8), Enterprise Support for Sports Tourism (B9), Intensity of Tourists' Demand for Sports Tourism Activities (B10); Government Investment and Promotion in Sports Tourism (C1), Quality of Transportation, Accommodation, and Sports Facilities (C2), Convenience of Transportation, Accommodation, and Sports Facilities (C3),

Comprehensiveness and Enforcement of Sports Tourism Regulations (C4), Level of Cooperation Among Enterprises (C5), Accessibility and Conservation of Natural Scenic Resources (C6).

Each element in the criteria and alternatives levels is compared pairwise based on their relative importance, using a scale from 1 to 9. A score of 1 indicates equal importance between two factors, while scores of 3, 5, 7, and 9 represent increasing levels of importance. Intermediate values (2, 4, 6, 8) are used to express moderate levels of importance. To ensure the accuracy and authority of the evaluation process, 10 experts from the sports tourism industry in Yunnan were invited to score the indicators. Taking the judgment matrix for the criteria level as an example, expert evaluations revealed that Core Experience and Satisfaction was considered the most important factor due to its direct relevance to the visitor experience. Service Quality and Market Dynamics were also significant but ranked slightly lower than Core Experience and Satisfaction. Infrastructure and Policy Environment, while important, was deemed to have a relatively smaller direct impact on competitiveness.

Weight Calculation Results: Based on the calculation formulas in each step of the AHP process, the competitiveness evaluation weights for Yunnan sports tourism destinations were obtained. These data reflect the relative contribution and importance of various evaluation indicators in assessing the competitiveness of Yunnan's sports tourism destinations.

At the goal level, Core Experience and Satisfaction (A) holds a weight of 0.637, making it the most important criterion, indicating that visitors' direct experiences play a decisive role in evaluating the competitiveness of sports tourism destinations. Next is Service Quality and Market Dynamics (B) with a weight of 0.258, reflecting the significant impact of service quality and market activities on enhancing the attractiveness of the destination. Infrastructure and Policy Environment (C), with a weight of 0.105, although relatively lower, still serves as an essential foundation supporting the competitiveness of sports tourism destinations.

At the alternatives level, the weights of specific indicators further reveal the contribution of each factor to the overall goal. Among them, the Attractiveness of Emerging Sports Tourism Activities (A1) holds the highest weight (0.467) in the Core Experience and Satisfaction category, with a combined total weight of 0.297, emphasizing the importance of new activities in attracting tourists. Opportunities to Experience Unique Culture and Traditions (A2), Quality of Sports Tourism Resources (A3), and Overall Satisfaction with Sports Tourism Experience (A4) have secondary weights, with combined total weights ranging from 0.018 to 0.102, highlighting their roles in influencing visitor satisfaction.

In the Service Quality and Market Dynamics category, Market Positioning of Enterprises (B1) carries a weight of 0.225, making it the most important factor in this category, with a combined total weight of 0.058. Service Quality of Travel Agencies (B2) and Attitude of Service Personnel (B3) follow closely, with weights of 0.148 and 0.130, and combined total weights of 0.038 and 0.034, respectively. Other indicators, such as Service Quality of Sports Activity Organizers (B4) and Degree of Market Competition (B5), have gradually decreasing weights, reflecting their relatively minor influence on market dynamics.

In the Infrastructure and Policy Environment category, Government Investment and Promotion in Sports Tourism (C1) is considered the most critical factor, with a weight of 0.294 and a combined total weight of 0.031. The Quality of Transportation, Accommodation, and Sports Facilities (C2) and Convenience of Transportation, Accommodation, and Sports Facilities (C3) each hold weights of 0.198, underscoring the importance of infrastructure in supporting destination competitiveness. Other factors, such as the Comprehensiveness and Enforcement of Sports Tourism Regulations (C4) and the Level of Cooperation Among Enterprises (C5), have lower weights, with combined total weights ranging from 0.011 to 0.014.

V. CONCLUSION

This study, based on Porter's Diamond Model, successfully constructed an evaluation index system for the competitiveness of sports tourism destinations in Yunnan. The empirical results indicate that Core Experience and Satisfaction is the key factor driving the competitiveness of Yunnan's sports tourism destinations, followed by Service Quality and Market Dynamics, while Infrastructure and Policy Environment, though having a lower weight, provides essential support for sustainable development. Through comprehensive quantitative methods, the construction and validation of this index system offer a detailed framework for assessing and enhancing the competitiveness of Yunnan's sports tourism destinations.

The findings provide significant implications for policymakers and industry practitioners. Firstly, Yunnan sports tourism destinations should prioritize improving visitors' core experiences and satisfaction, such as by enhancing the attractiveness of sports tourism activities and improving the quality of tourism services. Secondly, it is crucial to strengthen the monitoring and analysis of market dynamics and adjust market strategies in a timely manner to meet the evolving demands of tourists. Finally, policymakers should continue to invest in infrastructure and policy support, particularly in improving the quality and accessibility of tourism facilities, to comprehensively promote the sustainable development and competitiveness of Yunnan's sports tourism industry.

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