

Activating Ice and Snow Sports Leisure Consumption Scenes in Northeast China: A Mixed-methods Study of Young Tourists and Local Residents

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Abstract

Background: Ice and snow sports has become an important field of sport tourism, leisure consumption and service-sector upgrading in Northeast China. Recent winter-tourism growth has produced large visitor flows, but arrival and online visibility do not automatically translate into embodied sport participation, repeated leisure consumption or locally embedded winter-sport routines. **Objective:** This study examines how Ice and snow sports leisure consumption scenes are activated, and why young tourists and local residents follow different conversion pathways. **Methods:** An explanatory mixed-methods design was adopted. The qualitative phase consisted of 66 semi-structured interviews with university experts, sport/tourism officials, ice and snow association leaders, resort and rink operators, coaches, equipment-rental and training providers, young tourists, local residents, community organizers and new-media operators. Grounded-theory coding was used to derive the main categories and mechanism chain. A supplementary survey of 133 respondents (70 young tourists and 63 local residents) was then used for descriptive comparison and exploratory regression. **Results:** The qualitative analysis identified a seven-stage activation mechanism: resource attraction, scene entry, service threshold reduction, experiential immersion, identity formation, consumption conversion and regional value spillover. Quantitative evidence showed that young tourists scored higher on resource perception, participation thresholds, service-support demand, scene experience, digital/social connection and consumption conversion, whereas local residents scored higher on place identity/value. Regression analysis indicated that service support, scene experience and place identity/value significantly predicted consumption conversion, while digital/social connection was not significant after service and experience variables were controlled. **Conclusion:** Ice and snow sports consumption should be understood as a scene-activation process rather than a simple tourism-demand outcome. Northeast China can improve conversion from tourism flow to sport leisure consumption by designing beginner-friendly products for tourists and accessible, affordable, community-based ice and snow programs for residents.

Keywords

Ice and snow sports, Sport leisure consumption, Scene activation, Young tourists, Local residents, Sport tourism, Place identity, Service support

Introduction

Ice and snow sports have moved beyond a seasonal leisure activity and have become a strategic interface among sport tourism, urban branding, service consumption and regional development. In China, the national ice and snow economy strategy emphasizes the integrated development of sport participation, culture, equipment, tourism and public services. The guideline issued by the General Office of the State Council in 2024

sets development targets of 1.2 trillion yuan by 2027 and 1.5 trillion yuan by 2030 for the ice and snow economy [1]. This policy background indicates that winter sport and winter leisure are no longer peripheral sectors; they are part of broader service-sector upgrading and domestic-demand expansion.

Northeast China, including Heilongjiang, Jilin, Liaoning and the eastern part of Inner Mongolia, is the most

recognizable ice and snow region in China [2]. Harbin, Changchun, Jilin City, Shenyang, Yabuli, Beidahu, Changbai Mountain and Hulunbuir have accumulated destination images based on snow quality, cold-climate landscapes, winter festivals, ski resorts and local winter culture. Recent official data show strong momentum. The total output of China's sport industry reached 3.8421 trillion yuan in 2024, and the value added of sport services accounted for 72.0% of the sport-industry total. During the 2024-2025 winter season, Harbin received more than 90 million tourist visits and generated approximately 137.22 billion yuan in tourism revenue [3]. Jilin also reported rapid winter-tourism growth, with diversified ice and snow products and large-scale snow-season demand.

However, a sport-studies perspective requires a more precise question. Large tourism flows do not necessarily become sustained sport participation. Many young tourists are attracted by short videos, iconic snow landscapes, winter festivals and destination branding. They enter the scene, take photographs, consume food and entertainment products, and share images online. Yet a smaller proportion convert into active skiing, skating, curling, structured training, equipment rental, repeat visits or community participation. This gap can be described as the conversion problem between tourism traffic and sport leisure consumption.

The present study argues that this problem should be examined through the novel concept of scene activation. A scene is not merely a physical site, such as a ski resort, an ice rink or a winter festival. It is a dynamic configuration of inherent resource endowment, spatial accessibility, service support, social interaction, digital exposure, embodied experience and meaning production. Ice and snow sports leisure consumption ultimately occurs when users can move from attraction and entry to safe participation, meaningful experience, identity formation and subsequent repeated behavioral or payment outcomes [4].

This study focuses on two distinct user groups: young tourists and local residents. Young tourists are highly visible in the current ice and snow boom because they bring traffic, social-media exposure and willingness to pay for novelty and emotional value. Local residents, however, form the stable everyday base of Ice and snow sports development. They determine whether winter

sport becomes a local lifestyle rather than a short-lived destination spectacle. Treating these two groups as one homogeneous market would obscure the different thresholds, motivations and underlying conversion logics they face. Accordingly, this study asks three core research questions: (1) What categories and mechanism chain explain the activation of Ice and snow sports leisure consumption scenes in Northeast China? (2) How do young tourists and local residents differ in motivations, thresholds, service needs and conversion outcomes? (3) Which service and experience factors predict consumption conversion in an exploratory survey?

Literature review and analytical framework

Ice and snow tourism, sport tourism and regional development

Research on ice and snow tourism has emphasized that winter destinations depend on a combination of climate resources, snow landscapes, sport infrastructure, cultural interpretation and service governance [5]. Studies on the spatial distribution and management of ski resorts in China also show that resource endowment alone cannot guarantee sustainable development; accessibility, market organization, services and local development capacity are all necessary conditions.

Sport tourism differs from general sightseeing because it involves bodily participation, skill learning, event experience or travel motivated by diverse sport-related activities. Recent scholarly work on ski tourism service quality and servicescape shows that perceived service quality, social atmosphere and symbolic meanings can influence long-term leisure satisfaction and loyalty. Similarly, research on participation constraints and perceived risks among China's ski tourists suggests that the transition from peripheral interest to deeper commitment depends on psychological connection, effective risk reduction and supportive services [6]. These empirical findings justify the present focus on service threshold reduction as a key mechanism.

Regional sustainable development is also relevant. Ice and snow sports can stimulate employment, equipment services, training, hospitality, transport and media communication [7]. Yet regional value cannot be inferred only from arrivals or revenue. For sport-oriented development, the critical issue is whether winter tourism becomes a participatory, repeatable and locally

embedded consumption system.

Consumption scenes, digital-social connection and place-based identity

The concept of consumption scene links physical space with symbolic meaning, service interaction and behavioral outcomes. In tourism and hospitality research, consumer experience is increasingly understood as a journey rather than a single transaction. For Ice and snow sports, this journey begins before arrival through short videos, peer recommendations and platform information, continues through equipment rental, coaching and on-site safety perception, and extends after the activity through photos, comments, recommendations and repeat-purchase decisions.

Digital communication is especially important for young tourists [8]. Digital exposure accelerates scene entry, but it can also create an expectation gap when on-site services do not match online imagery. Studies of sport-tourist destination image and behavioral intentions indicate that affective and cognitive images shape revisit intention [9]. Therefore, digital traffic should be connected with service quality and experience design, rather than treated as an independent driver of conversion. Place identity and place attachment also matter. Memorable tourism experiences can strengthen attachment and revisit intention, while emotional experiences in cultural tourism can influence satisfaction and behavioral intention [10,11]. In the present study, identity formation includes tourist image of Northeast China, resident winter lifestyle, community belonging and perceived regional value.

Analytical framework

Based on prior research and field materials, this study conceptualizes scene activation as a process in which ice and snow resources attract users into a scene; service systems reduce technical, psychological, spatial and economic thresholds; positive embodied and social experiences generate identity; identity and experience jointly facilitate consumption conversion and regional value spillover. This framework integrates sport tourism, consumer experience, servicescape, constraints negotiation and place-based identity [12].

Methods

Research design

An explanatory mixed-methods design was adopted. The qualitative phase was given priority because the purpose

of the study was to identify the mechanism through which Ice and snow sports leisure consumption scenes are activated in real-world settings. Semi-structured interviews were used to collect narratives from policy, industry, service-provider and user perspectives. Grounded-theory coding was then used to construct the mechanism chain.

The quantitative phase was designed as supplementary triangulation rather than a fully confirmatory survey. A questionnaire was used to describe user differences and test whether the core variables derived from the qualitative phase were associated with consumption conversion. Because the survey sample was exploratory and smaller than the ideal scale for structural equation modeling, the quantitative results are interpreted cautiously as diagnostic evidence (as shown in Figure 1).

Explanatory mixed-methods research design

1. Policy and industry context

Macro context: ice and snow economy, sport tourism and service upgrading.

2. Qualitative exploration

66 interviews across policy, industry, services, community and user groups.

3. Grounded-theory coding

Open, axial and selective coding derive categories and the mechanism chain.

4. Survey triangulation

133 responses support group comparison and exploratory regression.

5. Integrated model

Qualitative categories and survey evidence form the scene-activation model.

Qualitative priority Quantitative triangulation
Mechanism integration

Figure 1. Explanatory mixed-methods research design.

Qualitative sampling and interviews

The interview sample included 66 participants from eight categories. Participants were selected through

purposive and snowball sampling to cover policy, industry, coaching, equipment services, consumer experience, community participation and digital communication. Interview materials covered typical ice and snow contexts in Heilongjiang, Jilin, Liaoning and Inner Mongolia.

Interview questions focused on recent ice and snow experiences, perceived conversion from tourism traffic

to sport consumption, differences between young tourists and local residents, service bottlenecks, community participation, digital media, identity formation and regional development value (see Table 1). Subsequent thematic coding of transcribed narratives further sorted original textual data to extract core dimensions for the follow-up questionnaire design and quantitative verification.

Table 1. Interview sample structure.

Category	Number	Analytical function
University experts/professors	4	Theoretical interpretation of sport economy, sport tourism and community participation
Sport/tourism officials or ice and snow association leaders	6	Policy support, public services, event organization and cross-sector coordination
Operators of ski resorts, scenic areas and ice rinks	8	Service bottlenecks, customer structure, pricing and repeat-consumption issues
Coaches (skiing, skating, curling and snow activities)	8	Beginner barriers, safety concerns, course design and service standardization
Equipment-rental, training and outdoor-club providers	8	Equipment thresholds, operational efficiency and bundled service opportunities
Young tourists	14	Novelty seeking, digital exposure, social sharing and willingness to pay
Local residents/community organizers	14	Everyday accessibility, affordability, family/community support and lifestyle identity
New-media/self-media/platform operators	4	Digital scene entry, content dissemination and user-community operations
Total	66	Multi-stakeholder evidence for grounded-theory model

Grounded-theory coding and trustworthiness

Interview transcripts were analyzed through open, axial and selective coding. Open coding identified meaning units such as short-video attraction, fear of falling, equipment inconvenience, coach reassurance, queue frustration, community accessibility, family participation, local winter lifestyle and Northeast destination image. Axial coding clustered these units into seven categories: resource attraction, scene entry, service threshold reduction, experiential immersion, identity formation, consumption conversion and regional value spillover.

Selective coding connected these categories into the central mechanism of Ice and snow sports leisure consumption scene activation (as shown in Table 2).

To improve trustworthiness, the analysis used multi-source triangulation across experts, officials, operators, coaches, tourists and residents. Negative cases, such as tourists who stopped after one attempt or residents who remained inactive nearby resources, were retained to avoid over-optimistic interpretation. Coding decisions were discussed the author team until category definitions and the mechanism chain were stable.

Table 2. Grounded-theory coding framework and empirical evidence.

Selective category	Axial meaning	Representative open codes	Illustrative empirical evidence
Resource attraction	Ice and snow endowment and destination image attract users	Snow quality; winter atmosphere; festivals; short-video imagery	A university expert described the current situation as high visibility but difficult retention.

Selective category	Axial meaning	Representative open codes	Illustrative empirical evidence
Scene entry	Users enter through mediated, social or local channels	Short-video seeding; peer recommendation; family trip; community notice	Young tourists often arrived after seeing travel notes or videos, while residents were more often mobilized by family, schools or community activities.
Service threshold reduction	Technical, psychological, spatial and economic barriers are lowered	Coach reassurance; equipment fitting; transport connection; insurance; beginner package	Coaches repeatedly emphasized that fear of falling, embarrassment and unclear equipment use were decisive beginner barriers.
Experiential immersion	Users experience embodied challenge, emotion and social atmosphere	Novelty; emotional release; accomplishment; photo sharing; group interaction	Positive first runs, safe guidance and social interaction changed fear into excitement for many beginners.
Identity formation	Experience generates destination image or local lifestyle identity	Northeast warmth; winter lifestyle; community belonging; local pride	Residents associated nearby ice activities with family routines and community belonging; tourists linked meaningful experiences with destination affection.
Consumption conversion	Experience is translated into payment or continued behavior	Course purchase; equipment rental; repeat visit; recommendation; community participation	Operators noted that good service increased willingness to buy lessons, rent equipment, revisit or recommend.
Regional value spillover	Activated scenes create wider social and economic value	Employment; hospitality; equipment services; community vitality; place branding	Officials and operators connected ice and snow participation with jobs, hospitality consumption and regional image.

Survey design and quantitative analysis

The questionnaire contained screening questions, demographic data, ice and snow participation behavior and Likert-type items scored from 1 to 5. Composite domains were designed according to qualitative categories: resource perception, participation motivation, participation threshold, service support, scene experience, digital/social connection, place identity and value and consumption conversion (as shown in Table 3). A total of 133 valid responses were retained, including 70 young tourists and 63 local residents.

Data were analyzed using descriptive statistics, independent-samples t-tests and exploratory ordinary least squares (OLS) regression. The dependent variable was consumption conversion. Predictors included service support, scene experience, place identity and value and digital and social connection. Because several domains were intentionally formative or heterogeneous rather than reflective scales, reliability coefficients are interpreted conservatively. The survey is used to triangulate the qualitative mechanism rather than to claim population-level generalization.

Table 3. Survey domains and measurement interpretation.

Domain	Items	Interpretive focus
Resource perception	C1-C5	Perceived attractiveness and uniqueness of Northeast ice and snow resources
Participation motivation	D1-D8	Novelty, health, social interaction, emotion release, family and cultural motives

Domain	Items	Interpretive focus
Participation threshold	E1-E8	Price, time, equipment, safety, skill and weather-related barriers
Service support	F1-F7	Coaching, rental convenience, transport, insurance, digital booking and beginner support
Scene experience	G1-G8	Atmosphere, queue/order, shareability, graded products, safety and immersion
Digital and social connection	H1-H6	Short-video influence, peer recommendation, sharing and sport partners
Place identity and value	I1-I7	Regional affection, lifestyle identity, community vitality and recommendation value
Consumption conversion	J1-J8	Repeat participation, course purchase, payment for services, recommendation and follow-up attention

Ethical considerations

All participants were informed of the academic purpose of the study. Participation was voluntary, and interview data were anonymized before analysis. The study did not involve medical diagnosis, clinical intervention or personal-sensitive disclosure. The survey was anonymous and used only for academic research and project design.

Results

The conversion gap between winter tourism traffic and sport leisure consumption

The interviews consistently indicated that Northeast China's abundant ice and snow resources have generated strong inbound traffic, but the conversion from tourism flow to sport leisure consumption remains notably uneven. Experts and officials described the present situation as one in which destination visibility and arrival have improved substantially, while sport participation depth and repeat consumption require further targeted activation. A recurring core judgment was that many visitors complete a tourism or symbolic-consumption journey but do not necessarily complete a sport-participation journey.

Four distinct types of thresholds explain this notable gap. First, technical thresholds are high because skiing, skating and other winter sports require basic skills that beginners cannot acquire through casual observation alone. Second, psychological thresholds include fear of falling, fear of injury, embarrassment and inherent uncertainty about how to start. Third, operational thresholds include equipment rental, queuing, transport,

weather, booking, price transparency and insurance. Fourth, social thresholds include lack of companions, weak community organization and limited post-activity engagement.

The gap differs markedly between user groups. Young tourists are attracted by novelty, social sharing and destination imagery, but their short stay and limited skill base make conversion into deeper sport consumption uncertain. Local residents may live close to ice and snow resources, but high resort prices, distance, lack of organization and winter inactivity can suppress everyday participation.

Mechanism chain of scene activation

Grounded-theory analysis produced a complete seven-stage mechanism chain. Resource attraction provides the initial pull, but it is insufficient by itself. Scene entry occurs when users formally enter the ice and snow context through travel, family activities, community events or digital media. Service threshold reduction is the pivotal stage: coaching, rental efficiency, transport, insurance, booking transparency and beginner-friendly products determine whether users feel safe and capable enough to genuinely participate. Experiential immersion then converts observation into embodied enjoyment. Identity formation links the positive experience to destination image, local lifestyle or community belonging. Consumption conversion appears in course purchase, equipment rental, repeat visits, recommendations and community participation. Finally, regional value spillover occurs when activated scenes support employment, service upgrading, community vitality and place branding (as shown in Figure 2).

Scene activation mechanism of ice and snow sports leisure consumption



Figure 2. Scene activation mechanism of Ice and snow sports leisure consumption.

Dual pathways: Young tourists and local residents

The young-tourist pathway is characterized by mediated attraction, novelty seeking and social sharing. Many young tourists are drawn into the scene by short videos, travel notes and visually impressive snow imagery. Their initial motivation is often emotional release, social display or the desire to experience a distinctive northern winter. For this group, scene activation requires low-friction first experiences. Products that combine equipment, coaching, insurance, photography and a short social activity may be more effective than fragmented services sold separately.

The local-resident pathway is characterized by everyday accessibility, affordability and community organization. Interviews with community organizers and local residents indicated that large ski resorts are often too expensive or time-consuming for ordinary families. By contrast, city parks, community ice rinks, school-community programs and family activities can normalize winter sport. Local residents are less dependent on novelty and more sensitive to price, distance, family support and routine formation. For this group, community-based scenes, parent-child activities and local clubs are central (see Figure 3). Consistent with the preceding mixed-method evidence, such divergent developmental logics further verify the necessity of differentiated service design targeting the two segmented consumer cohorts.

Young tourists: traffic-to-participation pathway



Local residents: public-space-to-lifestyle pathway



Figure 3. Dual-pathway activation of Ice and snow sports leisure consumption.

Survey diagnostics: Reliability, validity and group differences

The survey provided valuable preliminary exploratory empirical support for the grounded qualitative model. The overall KMO value was 0.642, and Bartlett’s test of sphericity was statistically significant ($\chi^2=2066.19$, $df=1596$, $p<0.001$), indicating that the item matrix contained sufficient statistical association for subsequent

diagnostic exploration. Resource perception, service support, scene experience and digital and social connection showed acceptable internal consistency. Participation motivation, participation threshold, place identity and value and consumption conversion were treated as composite diagnostic domains because they were deliberately inherently multidimensional and formative in design (see Table 4).

Table 4. Descriptive properties and measurement diagnostics.

Domain	Items	Mean	SD	Reliability and measurement note	Interpretation
Resource perception	5	4.26	0.40	$\alpha=0.708$	acceptable reflective consistency
Participation motivation	8	3.97	0.18	formative composite; α not applicable	diagnostic index interpreted by content logic
Participation threshold	8	3.90	0.35	formative composite; α not applicable	diagnostic index interpreted by content logic
Service support	7	4.30	0.28	$\alpha=0.724$	acceptable reflective consistency
Scene experience	8	4.21	0.32	$\alpha=0.788$	acceptable reflective consistency
Digital and social connection	6	4.06	0.40	$\alpha=0.766$	acceptable reflective consistency
Place identity and value	7	4.48	0.20	formative composite; α not applicable	diagnostic index interpreted by content logic
Consumption conversion	8	4.26	0.19	formative composite; α not applicable	diagnostic index interpreted by content logic

Table 5 and Figure 4 report group comparisons. Young tourists scored higher than local residents on resource perception, participation motivation, participation threshold, service support, scene experience, digital/social connection and consumption conversion.

Local residents scored higher on place identity. These results align with qualitative finding that young tourists are more responsive to attraction, service packages and social-media-mediated scenes, whereas local residents connect to winter lifestyle and local identity.

Table 5. Descriptive statistics and group comparisons.

Dimension	Mean	SD	Young tourists	Local residents	t	p	Cohen d
Resource perception	4.26	0.40	4.60	3.89	23.23	<0.001	4.08
Participation motivation	3.97	0.18	3.99	3.94	1.39	0.167	0.24
Participation threshold	3.90	0.35	4.20	3.57	25.26	<0.001	4.40
Service support	4.30	0.28	4.51	4.06	16.08	<0.001	2.75
Scene experience	4.21	0.32	4.46	3.93	17.44	<0.001	3.05
Digital and social connection	4.06	0.40	4.38	3.70	18.02	<0.001	3.14
Place identity and value	4.48	0.20	4.34	4.63	-11.45	<0.001	-2.05
Consumption conversion	4.26	0.19	4.34	4.17	5.52	<0.001	0.98

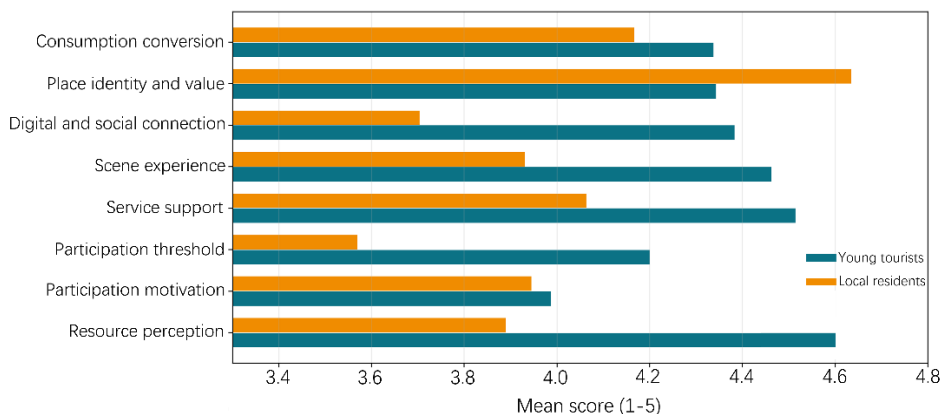


Figure 4. Construct means by respondent group.

Predictors of consumption conversion

Exploratory regression was conducted with consumption conversion as the dependent variable. The model explained 51.6% of the variance in consumption conversion ($R^2=0.516$, adjusted $R^2=0.500$, $F=34.050$, $p<0.001$). Service support, scene experience and place identity/value were significant positive predictors (as

shown in Table 6 and Figure 5). Digital/social connection was not significant after these variables were controlled, suggesting that online exposure and sharing may function mainly as entry channels and amplifiers, whereas sustained conversion depends more strongly on service quality, embodied experience and identity meaning.

Table 6. Exploratory regression predicting consumption conversion.

Predictor	B	SE	Standardized beta	t	p
Constant	0.251	0.493	/	0.510	0.611
Service support	0.258	0.083	0.373	3.098	0.002
Scene experience	0.368	0.080	0.606	4.588	<0.001
Place identity/value	0.347	0.077	0.367	4.510	<0.001
Digital/social connection	-0.051	0.046	-0.107	-1.111	0.269
Model fit	$R^2=0.516$	Adj. $R^2=0.500$	$F=34.050$	$p<0.001$	$n=133$

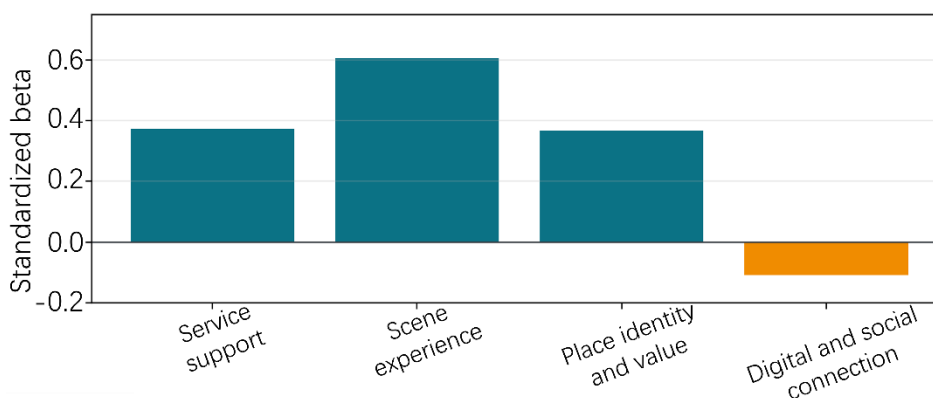


Figure 5. Standardized predictors of consumption conversion.

Discussion

From scenic traffic to participatory sport consumption

The findings show that the current ice and snow boom in Northeast China should not be evaluated only by tourist arrivals, revenue or online visibility. These indicators demonstrate resource attraction and scene entry, but they do not fully capture the depth of sport participation. Ice and snow scenes can attract large flows of young visitors, but the transformation into sport leisure consumption depends on whether users cross the threshold from watching and photographing to embodied participation. This argument extends sport tourism research by shifting attention from destination image and satisfaction to the conversion process between resource attraction and bodily participation [13]. In winter sport destinations, the first experience can be decisive. A beginner who experiences long queues, unclear equipment fitting, fear of injury and impersonal instruction may withdraw after one attempt. Conversely, a beginner who receives safe

coaching, simple equipment support, clear routing and social encouragement may convert from a symbolic visitor to a participant.

Differentiated activation of tourists and residents

Young tourists and local residents should not be treated as a single market. Young tourists are important for visibility and consumption growth because they bring novelty-seeking motivation, digital sharing and willingness to pay for emotional value [14]. However, their travel cycle is short. Expecting all of them to become repeated, high-frequency winter-sport consumers is unrealistic. The more feasible objective is to provide beginner-friendly experiences that produce positive first participation, recommendation and potential return.

Local residents represent the stable base of Ice and snow sports development. Their participation is related to everyday accessibility, price, family support, school-community linkage and local winter identity. This

suggests that Northeast ice and snow development should avoid a purely destination-resort logic. Community rinks, school programs, family skating, neighborhood competitions and low-cost local clubs can convert ice and snow resources into everyday sport participation.

Scene activation as a service and governance issue

The mechanism model indicates that scene activation requires coordination among sport, tourism, community, education, equipment, transport, media and safety actors. Ski resorts and ice rinks cannot rely only on physical facilities or destination branding. They need to move from resource-oriented thinking to service-oriented thinking. This includes standardized coaching, transparent rental systems, efficient booking, safety notification, insurance, transport connection and social community operation.

Digital platforms should be understood in a balanced way [15]. Digital media can accelerate scene entry and amplify social sharing, but digital exposure alone does not guarantee conversion. If on-site services fail to meet expectations, the same digital channels that attract users can also spread disappointment. Therefore, digital communication should be connected with operational capacity, not isolated as marketing [16].

Theoretical contribution

This study contributes to sport tourism and sport consumption research in three ways [17]. First, it conceptualizes Ice and snow sports leisure consumption as a scene-activation process rather than a direct outcome of destination resources. This perspective integrates resource endowment, service threshold, embodied experience, identity formation and consumption conversion. Second, the study advances a dual-pathway understanding by comparing young tourists and local residents. The former pathway emphasizes mediated attraction and beginner-service conversion; the latter emphasizes everyday accessibility, family/community support and lifestyle normalization. Third, the study links micro-level consumption conversion with regional value spillover, showing that activated sport scenes can contribute to employment, service upgrading, community vitality and destination image.

Practical implications

First, beginner-oriented products should be lighter, clearer and bundled [18]. For young tourists, a zero-basis

package integrating equipment, coaching, insurance, photography and a short social activity may be more effective than separate ticket, rental and coaching transactions. The goal is not to force all visitors into intensive training, but to produce a safe and memorable first participation experience.

Second, coaching and rental services require standardization [19]. Coaches are not only skill instructors; they also provide safety assurance and emotional support. Equipment-rental services should improve size matching, hygiene, appearance, reservation efficiency and delivery convenience. These details determine whether beginners feel respected and capable. Third, community ice and snow scenes should be developed for local residents. City parks, school-community spaces, residential areas and indoor rinks can provide low-cost, nearby activities. Family skating, youth winter sport clubs, neighborhood competitions and community festivals can embed Ice and snow sports into local life.

Fourth, digital communication should be integrated with operational services. Short-video marketing should be supported by booking systems, route guidance, transparent pricing, service explanation and post-activity communities. Digital traffic should be converted into service trust rather than only exposure.

Fifth, cross-sector collaboration is necessary [20]. Sport authorities, tourism departments, community organizations, resorts, equipment providers, coaches, schools, media platforms and insurance services should jointly build a scene ecosystem. Such an ecosystem can transform Northeast ice and snow resources into sustainable sport leisure consumption scenes.

Limitations and future research

This study has several limitations. First, the survey sample was exploratory and relatively small; therefore, the quantitative findings should be interpreted as supplementary evidence rather than generalized population estimates. Future studies should collect larger stratified samples from different provinces, cities and destination types. Second, several questionnaire domains were formative or heterogeneous composites. Future studies should develop and validate more precise scales for service threshold reduction, ice and snow scene experience and consumption conversion. Third, the study was cross-sectional. It cannot establish causal effects or

track whether first-time participants actually become repeat consumers. Longitudinal follow-up would be valuable.

Future research may compare Northeast China with other winter sport regions such as Chongli, Xinjiang or international ski destinations to test whether the mechanism model is context-specific or generalizable. Another promising direction is to examine how smart equipment rental, AI-based route recommendation, digital coaching and platform-mediated sport communities influence sport-leisure conversion.

Conclusion

This study examines the activation mechanism of Ice and snow sports leisure consumption scenes in Northeast China. Based on 66 multi-stakeholder interviews and 133 survey responses, the study identifies a mechanism chain of resource attraction, scene entry, service threshold reduction, experiential immersion, identity formation, consumption conversion and regional value spillover.

Young tourists and local residents follow different but complementary activation pathways. Young tourists require novelty, service convenience, social sharing and beginner-friendly products. Local residents require accessibility, affordability, family/community support and the normalization of Ice and snow sports in everyday life. Service support, scene experience and place identity/value are central to converting ice and snow resources into repeatable sport leisure consumption. The practical task for Northeast China is therefore not only to attract visitors, but also to build service ecosystems that make Ice and snow sports safe, approachable, meaningful and repeatable.

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Authors' contributions

Zhengwei Xie contributed to conceptualization, fieldwork design, data analysis and manuscript drafting. Jiamei Tang contributed to methodology refinement, supervision and manuscript review. The final version should be confirmed by all authors before submission.

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Conflicts of Interest

The authors declare no conflict of interest.

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