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The Optimization Paths for Cultural and Tourism Industrial Ecosystem of Daqing under the Spillover Effects of the "Asian Winter Games"

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Abstract: *The 9th Asian Winter Games provided an important window for Heilongjiang's ice and snow economy to from single-point aggregation to all-round linkage. Based on the spillover effect theory, industrial ecosystem theory and resource-based city transformation theory, this paper uses policy text analysis, public data analysis and case comparison method to construct an analytical framework of "event triggering-multidimensional spillover-capacity absorption-ecological reconstruction". It was found that the impact of the Asian Winter Games on Daqing is not a simple spillover of event-related consumption, but the result of the combined action of passenger flow, brand, technology, knowledge and governance rules; whether spillover can be transformed into sustainable development momentum depends on Daqing's transportation connection, product supply, scenario innovation, organizational collaboration and absorptive capacity of market entities. The rapid growth of ice and snow tourism and sports events in Daqing from 2024 to 2025 shows that the transformation of "cold resources" has a realistic basis, but it still needs to shift from "traffic reception" to "value retention". Based on this, this paper proposes to build a spatial pattern of "one core, two corridors and multiple nodes", develop products of "Asian Winter Games City Extension Tour" and "Ice and Snow + Petroleum Industry Culture", promote the integration of industrial technology with ice and snow equipment and digital cultural tourism, establish a mechanism for mutual exchange and benefit sharing of Harbin-Daqing-Qiqihar tourist sources, and improve brand communication, talent, finance, safety and ecological evaluation system. The purpose of this study is to provide operable policy reference for Daqing to cultivate new drivers of non-oil economy, build characteristic cultural tourism destinations and undertake spillover effects of large-scale events in resource-based cities.*

Keywords: *Asian Winter Games; Spillover Effect; Daqing; Cultural Tourism Industry Ecosystem; Ice and Snow Economy; Resource-Based Cities*

1. Introduction

Large-scale sports events have highly concentrated attention, passenger flow, capital and technical resources. The host city of the event can gain consumption growth and urban exposure in a short term, however, the impact of the event is not limited to the host city, but may also spread to the surrounding areas through transportation networks, media communication, industrial linkages and institutional learning. The 9th Asian Winter Games was held in Harbin from February 7th to 14th, 2025. More than 1200 athletes from 34 countries and regions in Asia participated in the competition, and the scale of the competition reached a record high [1].

National and provincial policies have created institutional conditions for the spillover transformation of events. The "Several Opinions on Stimulating the Vitality of the Ice and Snow Economy through High-Quality Development of Ice and Snow Sports" issued by The General Office of the State Council proposes that ice and snow sports should be used as a guide to promote the development of the whole industry chain of ice and snow culture, ice and snow equipment, and ice and snow tourism. By 2027, the total scale of ice and snow economy will reach 1.2 trillion yuan, and it is clearly supported to give full play to the spillover effect of ice and snow events, and to carry out business, tourism, sports and health integration to promote consumption activities [2]. The "Ice and Snow Economic Development Plan (2022-2030)" of Heilongjiang Province and the revised support policies in 2025 further highlight the coordinated development of ice and snow sports, ice and snow culture, ice and snow equipment and ice and snow tourism, emphasizing the continuous amplification

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of the effect of the Asian Winter Games [3-4].

Daqing is relatively short in terms of transportation time from Harbin, and is on the comprehensive development axis of Harbin, Dalian and Qiqihar. It has the locational conditions to accommodate the spillover of visitors, brands and industries of the Asian Winter Games. More importantly, Daqing is not a simple copy of Harbin ice and snow tourism products. The petroleum industry heritage, iron man spirit, natural lakes, wetland ecology, grassland folk customs, hot spring health and cold ice and snow together constitute a differentiated resource combination. In 2024, Daqing launched two "100-day Actions" for winter ice and snow and summer retreats, hosting 253 events and activities. The number of tourists received and the total spending of tourists increased by 39% and 33% respectively throughout the year [5]. During the winter of 2024-2025, the winter tourism reception and tourism income of Daqing increased by 28 % and 22 % respectively, 11 large-scale ice and snow tourism projects were put into operation, and more than 800,000 tourists were received during the Spring Festival [6]. Above phenomena show that cultural tourism market of Daqing has entered the window period of quality improvement and expansion.

However, the growth of passenger flow is not equivalent to the optimization of industrial ecology. The factors such as the Asian Winter Games, local consumption promotion activities, new project investment and natural market recovery occurred at the same time. The existing public information is not enough to attribute the growth of Daqing tourism to the Asian Winter Games. What is more worthy of study is how Daqing establish an absorption and transformation mechanism to accumulate the attention of one-off events into sustainable products, brands, industries and governance capabilities? Based on this, this paper focuses on three issues: first, what mechanism will the Asian Winter Games produce multi-dimensional spillover to Daqing; second, what is the basis and blocking point for Daqing to undertake spillover; third, how to form a sustainable and evaluable cultural tourism industry ecological optimization path with resource-based city characteristics.

2. Theoretical Basis, Research Methods and Analytical Framework

2.1 Core Concepts and Theoretical Basis

First, the spillover effect of the event: Event spillover refers to the phenomenon where the consumer demand, media attention, technical knowledge, brand value and governance experience gathered by large-scale events break through the boundaries of the host location and event cycle and spread to other industries, regions and time stages. The research on the impact of traditional events pays more attention to the direct economic impact of investment, employment and tourism income. With the deepening of research, scholars have begun to emphasize “event heritage” and “event leverage”, that is, cities must transform short-term event resources into long-term development benefits through active planning [7-9]. For Daqing, the Asian Winter Games itself is only an external trigger factor. Whether the actual benefits can be generated depends on whether the city has the ability to undertake passenger flow, reorganize resources and enlarge brands.

Second, the theory of industrial ecosystem: The cultural tourism industry is not a linear collection of scenic spots, travel agencies and hotels, but a symbiotic network formed by multiple subjects such as government, enterprises, residents, tourists, platforms, universities and financial institutions around resources, products, data and value. The goal of industrial ecological optimization is not only to expand the scale of a certain business format, but to improve the collaborative efficiency, innovation ability, rationality of income distribution and ecological environmental capacity among the main bodies. Therefore, to evaluate the impact of the Asian Winter Games on Daqing, it is necessary to observe product innovation, market growth, cross-industry integration, public services and ecological governance at the same time.

Third, the theory of transformation of resource-based cities: Resource-based cities usually have the characteristics of a solid industrial basis, a relatively single industrial structure, and a solidified urban brand. The development of cultural tourism should not separate the original industrial system, but should transform industrial heritage, technical ability, organizational culture and urban spirit into new industrial elements. Daqing can form a kind of "reverse collaboration": instead of passively accepting the radiation of the central city, but using the technology of the petroleum industry, equipment manufacturing capabilities and red industrial culture to nourish the ice and snow industry and cultural tourism scenarios, thereby forming a two-way cycle of "hard industry empowering soft economy and soft scenarios enhancing the brand of hard industry".

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2.2 Research Methods and Data Sources

Three types of methods are used in this paper. The first is the analysis of policy texts. The national ice and snow economic policy, Heilongjiang ice and snow economic planning and support measures, winter ice and snow tourism action plan and Daqing cultural tourism related public data are systematically sorted out to identify policy tools and regional coordination directions. The second is the analysis of public data. Information on the growth of cultural and tourism of Daqing throughout 2024, winter tourism from 2024 to 2025, and the operation of key projects was sorted out to assess market changes and product supply characteristics. The third is the case comparison. The experience of Beijing Winter Olympic Games, Beijing-Zhangjiakou Sports Cultural Tourism Belt and Harbin Ice and Snow Tourism in event heritage utilization, regional linkage and brand communication is absorbed.

The research adheres to the principle of prudent attribution. Public data can reflect that the cultural and tourism market in Daqing has heated up in tandem with the Asian Winter Games cycle, but it cannot replace strict cause-and-effect identification. Due to the lack of unified data on the flow of tourists, business operations, questionnaires and interviews, this paper does not make a specific numerical estimation of the net economic contribution of the Asian Winter Games, but focuses on the analysis of the transmission mechanism, constraints and policy paths.

2.3 The Framework of "Event Trigger-Multidimensional Spillover-Capacity Absorption-Ecological Reconstruction"

The transformation of the momentum for Daqing's cultural and tourism development from the Asian Winter Games can be divided into four interrelated levels.

The first level is the event trigger. The Asian Winter Games form a high-intensity flow and attention center through competitive activities, opening and closing ceremonies, media coverage, urban reception and policy mobilization.

The second level is multidimensional spillover. The event resources spread outward along the Harbin-Daqing-Qiqihar transportation network and digital communication network, which is manifested in the cross-city flow of tourists, the diffusion of ice and snow brands, and the dissemination of event service standards, the demonstration of digital technology, the promotion of investment cooperation and the enthusiasm of social participation.

The third level is capacity absorption. Surrounding cities need to transform external flow into local stay, consumption and word-of-mouth by means of traffic connection, product mix, price mechanism, marketing reach, public service and subject coordination. If there is a lack of cross-city products that can be purchased and recognizable scenarios, the spillover will only "go through" and not "stay".

The fourth level is ecological reconstruction. After successful absorption, short-term increments are reinvested in the industrial chain, promoting the integration of cultural tourism with industry, sports, education, health care, agriculture and digital technology, forming long-term results of employment expansion, enterprise growth, brand appreciation and public space improvement, as show in Table 1

Table 1 Mechanism for Transforming the Asian Winter Games Spill-over Effects into Cultural-Tourism Industrial Ecosystem of Daqing

Event Trigger Level	Multidimensional Spillover Level	Capacity Absorption Level	Ecological Reconstruction Level
Events, Media, Policies, International Communication	Passenger Flow, Brand, Technology, Knowledge, Governance Rules	Traffic, Products, Scenarios, Organizations, Services, Data	Industrial Integration, Subject Symbiosis, Value Retention, Green Development

The framework reveals that the event spillover is not an automatic linear process, but a conditional process regulated by the city's absorption capacity. The key to the ecological optimization of Daqing Cultural Tourism is not to pursue the same ice and snow landscape as Harbin, but to recombine external event resources with local petroleum industry culture, ecology and manufacturing capabilities.

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3. Multi-dimensional Spillover Effects of the Asian Winter Games and Reception Logic of Daqing

3.1 Spillover of Passenger Flow and Consumption: From "Visiting Harbin" to "Touring Heilongjiang"

The Asian Winter Games attracted athletes, media, staff, spectators and ordinary tourists to enter Harbin, and formed cross-city travel demand through high-speed rail, highway and aviation networks. There is a convenient transportation link between Daqing and Harbin, which is suitable for the development of one-to-two-day extended tours, parent-child study tours and ice and snow hot spring vacation. The spillover of passenger flow is not only reflected in the increase of new tourists, but also in the extension of the consumption chain: after watching the competition or visiting Harbin, tourists turn to Daqing to experience the petroleum industry culture, ice and snow sports, hot springs and winter fishing, which can increase the residence time and drive the consumption of accommodation, catering, transportation, cultural and creative and entertainment.

During the winter of 2024-2025, the reception and tourism income of ice and snow tourism in Daqing increased by 28% and 22% respectively [6]. The growth rate of reception volume is higher than that of revenue, indicating that the market scale expands rapidly, but there is still room for improvement in per capita consumption and value transformation. The focus of the next stage should not merely be on increasing the number of visitors to the park, but rather on raising the overnight rate, the rate of secondary consumption and the cross-industry consumption mix, so as to shift the event visitor flow from "short stays" to "multi-scenario experiences".

3.2 Spillover of Brand and Cultural: From Provincial Capital City Popularity to Regional Image Assets

Large-scale events have strong media agenda-setting capabilities. The Asian Winter Games has enhanced the overall awareness of “Heilongjiang ice and snow”, so that other cities in the province can share the trust basis of regional brands. Daqing needs to form a unique sub-brand under the parent brand of “Heilongjiang Ice and Snow”, rather than competing with Harbin for the scale of ice and snow landscape. The history of oilfield campaign, the iron man spirit, the modern industrial city landscape and the hundred-lake wetlands are the irreplaceable cultural assets of Daqing. By embedding industrial culture into ice and snow projects, a narrative of “understanding Chinese industrial spirit in ice and snow” can be formed.

The value of brand spillover also lies in the renewal of city image. The outside world's cognition of Daqing has long been focused on oil fields and industrial production, and cultural tourism products can show its ecological, life and innovation dimensions. Taking the ice and snow events as a window, expanding the “City of Oil” into a “City of Striving Spirit, City of a Hundred Lakes, City of Ice and Snow Experience” will help to enhance the city's talent attraction, investment attraction and residents' identity.

3.3 Spillover of Technology and Industry: From Event Service Demonstration to Industrial Integration Capability

The Asian Winter Games has formed technology and management demonstrations in venue operation, ticketing, payment, media communication, stage monitoring, intelligent transportation, volunteer service and security. Daqing can absorb relevant experience through personnel exchange, enterprise cooperation, standard transplantation and platform sharing. Technology spillover should not be limited to copying smart tours, but should serve supply innovation, such as establishing scenic passenger flow monitoring, ice and snow project safety warning, digital twin display, global reservation and tourist portrait system.

The industrial basis of Daqing provides cross-border possibilities for ice and snow equipment and operational services. The equipment manufacturing enterprises in the oil field have accumulated technology in low-temperature resistant materials, mechanical working, power systems, and special vehicles, sensor monitoring and other aspects. They can explore removal equipment for ice and snow, components and parts of recreation facility for ice and snow, low-temperature outdoor equipment and scene operation and maintenance services. In 2025, the support policy of Heilongjiang Province clearly encourages the development and production of ice and snow products and the innovation of ice and snow equipment, which provides a policy entrance for Daqing to realize the linkage of “industrial

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technology-ice and snow equipment-cultural tourism scene" [4].

3.4 Spillover of Social and Governance: From Short-term Mobilization to Urban Collective Participation

The social spillover brought by the event includes mass sports enthusiasm, volunteer service culture, public space improvement and cross-departmental collaboration ability. Activities such as ice and snow sports, ice dragon boats, ice and snow car races, and youth snowball competitions can expand residents' participation and shift the city from "tourist viewing" to "co-creating by residents and tourists". Mass participation is not only the atmosphere of cultural tourism, but also an important source of destination authenticity.

The event preparation will also promote the collaboration among departments such as culture and tourism, sports, transportation, public security, market supervision, and business. Daqing should transform this kind of special collaboration into a regular governance mechanism, and establish a joint approval system, data sharing and emergency response linkage system for major cultural, sports and tourism activities. Only when the governance rules are institutionalized, the organizational learning brought about by the event will become a long-term institutional asset.

4. Realistic Basis and Main Constraints of Cultural-Tourism Industrial Ecosystem for Daqing

4.1 The Realistic Basis of Ecological Optimization

First, there exists diversity in the resource combinations. Daqing has many kinds of resources, such as petroleum, iron man spirit, lake wetland, grassland folk custom, hot spring health care, winter fishing and ice and snow sports. Compared with single ice and snow tourism, this combination can support multiple products such as study-tourism, vacation, health-wellness, event-based tourism and industrial tourism.

Second, there is a synchronous increase in market heat and project supply. In 2024, Daqing hosted 253 events and competitions while the number of tourists received and the total spending of tourists increased by 39% and 33% respectively [5]. During the winter of 2024-2025, 11 large-scale projects including the Ice Age Mammoth Park and the Daqing Oilfield Ice and Snow Carnival were in operation. Among them, the Mammoth Park has received over one million visitors in total and has driven a relatively obvious consumption in the surrounding areas [6]. Market growth and the supply of new scenarios promote each other, creating a product foundation for absorbing the spillover effect of the Asian Winter Games.

Third, there is a high degree of recognition in red-themed study tourism and industrial tourism. With the theme of "Learn from Daqing in Industry, Study-tour in Daqing", Daqing transforms the spirit of iron man, oil field industrial heritage and urban development history into study courses. The further emergence of "ice and snow+ study-tourism" products in the ice and snow season links the scene of petroleum campaign, industrial culture and ice and snow experience, proving that industrial culture can not only be static display, but also be transformed into participatory scenes.

Fourth, there is a continuous improvement in regional transportation and policy environment. The high-speed railway and expressway of Harbin-Qiqihar shorten the time distance between Daqing and Harbin. The provincial "100-day action" and the ice and snow economic support policy provide support for attracting tourists to the province, project investment, personnel training, product development and scene improvement [4][10] . Daqing has already had the basic conditions for the transformation from single project development to industrial ecological construction.

4.2 The Event-related Tourist-Flow Reception Chain Remains Incomplete

Daqing and Harbin have convenient transportation, but "accessible transportation" is not equal to "products are available for purchase". The current cross-city routes, joint tickets, luggage transfer services, transfer connections for night-time arrivals, unified consulting and foreign language services still need to be improved. After obtaining the information of the Asian Winter Games and ice and snow in Harbin, tourists may not be able to quickly find Daqing extended tour products. There is a lack of stable combination sales mechanism among travel agencies, railways, scenic areas, hotels and platforms, and passenger flow spillover is easy to stay at the level of spontaneous individual passengers.

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4.3 The Coexistence of Product Homogeneity and Seasonal Problems

Some ice-snow projects are still dominated by slides, snow tubes, light installations and amusement facilities, and the differences between scenes are limited. A content chain hasn't been fully formed for the petroleum industry culture, the iron man spirit, the hundred-lake ecology and the ice and snow experience of Daqing. If the project mainly relies on ticket sales and short-term entertainment, consumption is likely to be concentrated during the ice and snow season and holidays, making it difficult to drive year-round operation. High value-added products such as cultural and creative industries, performing arts, courses, event training, equipment experience, hot spring health care and night consumption still need to be expanded.

4.4 The Insufficiency of Coordination between Industrial Chain and Market Entities

Cultural tourism projects are not closely connected with equipment manufacturing, educational training, digital enterprises, and agriculture and community business. Some activities can form short-term passenger flow, but may not form stable purchase, local employment and enterprise growth. There is a lack of joint research and development and income distribution mechanism for specific products among state-owned platforms, private enterprises, scenic area s, travel agencies and universities, and the channels for middle and small-sized enterprises to enter the supply chain of large projects are not clear enough.

4.5 The Revitalization of Industrial Heritage Faces the Dual Constraints of Protection and Utilization

Industrial heritage has historical, technical and spiritual value, but its revitalization needs to solve the problems of ownership, safety, pollution control, facility updating and narrative transformation. Simple landscape may weaken the authenticity of history, and excessive commercialization may also damage the serious connotation of iron man spirit and industrial culture. Daqing needs to establish a hierarchical evaluation of industrial heritage, adaptive reuse and content review mechanism to achieve protection priority, education-oriented and moderate management.

4.6 The Underdeveloped Regional Collaboration and Data Governance Mechanisms

Asian Winter Games-driven spillovers cross administrative boundaries, but cultural tourism planning, marketing budget, tourist statistics and income attribution are usually divided by cities. If Harbin, Daqing and Qiqihar lack a regular coordination platform, it is easy for routes to be duplicated, brands to compete and information to be fragmented. At the same time, Daqing still needs to improve the monitoring of tourist sources, duration of stay, consumption structure, degree of satisfaction and environmental carrying capacity. The lack of comparable data will lead to the fact that the policy evaluation is still dominated by the total number of tourists and the number of activities, and it is difficult to judge the value retention and ecological quality.

5. The Optimization Path for Cultural and Tourism Industry Ecosystem of Daqing under the Spillover Effect of the Asian Winter Games

5.1 Optimize Spatial Organization to Form a Pattern of "One Core, Two Corridors And Multiple Nodes"

"One core" is the core of comprehensive service and cultural display in the central city. Relying on museums, iron man- themed memorial venues, urban public cultural space, Rand Lake and other resources, it gathers tourists' distribution, digital display, night consumption, cultural and creative exhibition and sales, and event activities to form the first station service after arriving in Daqing.

The "two corridors" are respectively the petroleum industry culture- urban renewal corridor and the lake wetland- hot spring grassland- ice and snow leisure corridor. The former connects oilfield industrial heritage, iron man spirit education, industrial study tours and equipment experiences, highlighting "hardcore industry + striving culture". The latter connects lake wetlands, winter fishing, hot springs, grassland folk customs and ice and snow sports, highlighting ecological vacations and national cultures.

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"Multi-node" refers to specialized scenarios centered around each county and district as well as key project construction, including oilfield ice and snow carnival, mammoth- themed ice and snow project, winter capture and hot spring at Lianhuan Lake, Du'erbote grassland folk customs, Yinhu Mountain skiing, wetland bird-watching and rural ice-snow experiences. Each node should have a clear theme and target customer group to avoid duplication of construction. Through bus tour lines, self-driving signs, digital maps and combined ticketing, decentralized resources are transformed into networked products.

5.2 Establish a Cross-City Product System to Transform Event-related Tourist Flows into Local Stay and Consumption

Based on the urban cognition formed by the Harbin Asian Winter Games, the cross-city products of "Game Viewing (City Viewing) in Harbin+ Study tour and Vacation in Daqing" are developed. For different customer groups, four types of standardized combinations can be formed: a three-day product of "ice and snow park + museum + hot spring" for families; a study tour product of "iron man spirit+ industrial science and technology+ ice and snow practice" for students; a product of "ice and snow events + night Tours + digital experiences" for young tourists; a product of "hot spring health care+ winter fishing folk custom+ wetlands ecosystems" for middle-aged and elderly people.

Product design should focus on time coordination and purchase convenience. Cooperation with railway operators, travel agencies, online platforms, scenic spots, and hotels will be promoted to jointly launch combined packages including high-speed rail tickets, transfer services, attraction tickets, and accommodation. Service points will be established at the entrances of extended tourism routes in Daqing, as well as at airports, high-speed railway stations, key scenic spots in Harbin, and on online platforms. Available services include luggage delivery, assistance for delayed arrivals, next-day group travel services, and multilingual consultation. Cross-city products should not only be launched temporarily during the event, but should be solidified as a regular route in the "post-Asian Winter Games era".

5.3 Deepen the "Ice and Snow+ Petroleum Industry Culture". and Create an Irreplaceable Content Scenarios

Daqing should transform its industrial culture from background symbols into product content. The first is to build immersive industrial research and study courses. Focusing on oil exploration, drilling, oil extraction, transportation and urban construction, industrial processes are demonstrated through digital twins, augmented reality and interactive devices, and low-temperature operations, engineering safety and teamwork are transformed into participatory courses. The second is to develop industrial heritage ice and snow scenes. In areas that meet protection and safety requirements, the history of the Petroleum Campaign is recreated through lighting, ice sculptures, art installations and situational performances, allowing visitors to understand the Daqing spirit and the iron man spirit in a winter environment. The third is to promote the transformation of industrial culture from merely utilitarian to artistic and creative. Focusing on pumping equipment, industrial workwear, historical photographs, industrial logos, and the ecological resources of Baihu Lake, aesthetically pleasing and practical products will be developed, thereby forming a value chain that extends from visits to purchases and from dissemination to collection.

The revitalization of industrial heritage should adhere to the principle of classification and grading. For sites of significant historical value, the main focus should be on protection, research and educational display; for workshops and facilities that can be used adaptively, exhibitions, study tour, cultural and creative industries and light catering can be introduced; for areas with safety or environmental risks, Governance should be prioritized before opening up. Simple replication of thematic modules under the "one place, one policy" framework should be avoided.

5.4 Give Full Play to the Advantages of Industrial Technology and Cultivate a New Chain of Ice and Snow Equipment and Digital Cultural Tourism

Based on equipment manufacturing, petroleum engineering and university scientific research foundation of Daqing, a list of ice and snow equipment application scenarios is established. It can be given priority to the links with high technical correlation and relatively moderate market entry difficulty, such as low temperature sensors, site monitoring, special lighting, components of ice and snow removal equipment, mobile thermal insulation facilities, outdoor safety equipment and ice and

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snow project operation and maintenance services. The demand is put forward by the cultural tourism project, the manufacturing enterprise provides the scheme, the university carries out the test evaluation, and the government reduces the innovation risk through the first set of demonstration, procurement connecting and research and development subsidy.

Digital cultural tourism infrastructure shall be built simultaneously. Ticketing, passenger flow, transportation, tourist complaint, weather, and consumption data shall be integrated to construct a comprehensive cultural tourism operation analysis dashboard. Passenger flow early warning, equipment status monitoring, and emergency dispatch functions shall be deployed for key ice-and-snow scenarios. A unified tourist membership and benefit system shall be established to provide data support for precise marketing, seasonal adjustment, and product iteration. The focus of digitalization is not to increase display screens, but to enhance operational efficiency and service experience.

5.5 Shape the Brand of "Ice-Snow Hundred-Lakes · Petroleum City" and Establish a Full-Cycle Communication Mechanism

Brand positioning should reflect both provincial commonality and urban differences. “Ice and snow” connects the overall brand of Heilongjiang, “hundred-lakes” reflects the ecological space, and “Petroleum City” carries industrial culture and urban spirit. The communication content can form a stable narrative around “watching ice and snow, reading industry, soaking hot springs, tasting winter fishing, learning spirit”, and avoid frequent replacement of slogans.

The communication mechanism should be shifted from festival marketing to year-round content operation. Before the competition, routes were warmed up with the topic of the Asian Winter Games; during the event, extended products will be pushed to inbound tourists, media and spectator; after the competition, the popularity was maintained through athlete stories, tourist-generated content, study tours and city events. A content production mechanism involving cultural tourism authorities, key enterprises, universities, and online creators shall be established. Communication effects shall be assessed using indicators including search index volume, content conversion rate, repurchase intention, and brand relevance, instead of taking exposure volume alone as the measurement criterion.

5.6 Build a Cultural and Tourism Community of Harbin-Daqing-Qiqihar and Improve Cross-Regional Benefit Sharing

The spillover effect of the Asian Winter Games calls for efforts beyond the marketing of a single city. Joint mechanisms should be established among Harbin, Daqing, and Qiqihar covering culture, sports, and tourism. Annual work plans should be formulated with respect to travel routes, ticketing, transportation, publicity, investment promotion, and data collaboration. These three cities can jointly issue ice and snow tourism maps and cross-city tickets, unify the quality standards of key products, promote travel agencies to send tourists to each other, and incorporate products from Daqing and Qiqihar into Harbin's inbound tourism and event reception system.

The key to the collaborative mechanism lies in the fact that benefits can be calculated and shared. Settlement rules can be established based on the source of tourists, actual stay, and consumption contribution and marketing investment; passenger attraction rewards will be offered to the joint lines; the tax revenue, operation and brand equity of the joint investment promotion projects will be clearly defined. The transformation from "event-based cooperation" to "order-based cooperation" provides a stable business foundation for cross-regional collaboration.

5.7 Improve Policies, Talents, Finance and Security Assurance

Policy support should shift from subsidies for individual projects to ecological capacity building. Classified policies should be set up around the revitalization of industrial heritage, the research and development of ice and snow equipment, cross-city tourist attraction, night consumption and digital transformation, and a competitive review and performance-based exit mechanism should be established. In terms of finance, banks can be guided to develop credit products suitable for seasonal cultural and tourism enterprises, explore equipment financial leasing, insurance and social capital cooperation, and lower the capital threshold for small and medium-sized enterprises to enter new scenarios.

In terms of talent, relying on universities such as Daqing Normal University, and in collaboration with scenic areas, travel agencies, and manufacturing enterprises, a cultural, sports, and tourism

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integration practice base will be established. Talents in ice and snow event planning, study tours, industrial heritage interpretation, digital operation, foreign language services, and safety management will be trained. Volunteer training certification and competition practice files will be established, and the human resources formed in large-scale events will be accumulated into urban service teams.

Safety and ecology are the bottom line of industrial expansion. The ice and snow project should establish meteorological early warning, ice surface monitoring, equipment inspection, passenger flow ceiling and emergency rescue system; wetland, lake and grassland projects should set ecological capacity, waste recycling and energy use indicators; the opening of industrial heritage should complete the assessment of structure, fire protection, pollution and ownership. All of these need to be enhanced through security measures and third-party evaluations in order to increase the trust of tourists.

6. Implementation Steps and Evaluation System

6.1 Phased Implementation

At the initial stage, efforts will focus on "improving the supply chain", aiming to launch cross-city tourism products within roughly one year, realize differentiated transformation of key scenarios, develop dedicated tourist routes, and build a unified information portal. One or two demonstration projects that integrate industrial heritage and ice-snow resources will be selected, and basic data ledgers for culture, sports, and tourism will be established.

In the middle stage, it is mainly based on "strong chain", and it takes two to three years to promote the mature operation of ice and snow equipment application demonstration, digital cultural tourism platform and Harbin-Daqing-Qiqihar joint ticket mechanism, cultivate a number of market entities with stable revenue and independent brands, and form four types of regular products, such as red study tour, hot spring health care, event-based tourism and industrial cultural and creative products.

In the later stage, it is mainly based on “ecology-oriented development”, and it takes three to five years to form a mechanism of regional tourist exchange, industrial cooperation, talent flow and brand co-construction, so that Daqing will transform from a seasonal ice and snow tourism city to a characteristic cultural tourism destination that can be visited in four seasons, industrial integration and sharing between hosts and guests.

6.2 Establish an Evaluation Indicator Ranging from “Event-driven Tourist Flows” to “Value Output”

The evaluation system should change the practice of focusing on the total number of tourists and the number of events, and form five categories of indicators. The category of market transformation includes the Asian Winter Games related source acceptance rate, average residence time, per capita consumption, overnight rate and re-visit rate; The category of industrial collaboration includes the proportion of local procurement, the number of joint projects between culture and tourism and manufacturing, the participation of small and medium-sized enterprises, and new employment. The category of product brand includes cross-city product sales, repurchase of study tours, cultural and creative product sales, and the correlation between brand search and characteristic tags of Daqing. The category of public service includes transportation convenience, timeliness of complaint handling, tourist satisfaction and volunteer service coverage; the category of green and safe includes energy consumption per tourist, garbage recycling rate, ecological capacity implementation rate and safety accident rate.

Establish an annual monitoring, quarterly analysis and special evaluation system for major events. The closed-loop method of " baseline assessment before construction, real-time monitoring during operation, and post-annual evaluation " is adopted for key projects, and more detailed passenger flow analysis is gradually carried out by using anonymous movement of tourists, ticket service and consumption data of tourists. After the data conditions are mature, the net spillover effect and industrial cooperative degree of the Asian Winter Games can be quantitatively tested by means of difference-in-difference, input-output or social network analysis.

7. Conclusion and Discussion

The Asian Winter Games have provided an uncommon external impetus for the development of Daqing's cultural and tourism industry. However, its value does not lie in replicating Harbin's

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ice-snow-related tourist-flow in the short term, but in promoting Daqing to re-recognize and recombine its own resources. This paper shows that the Asian Winter Games spread to Daqing through multi-dimensional channels such as passenger flow, brand, technology, industry and governance; whether the spillover of the event can be converted into long-term benefits depends mainly on the absorptive capacity of the city. Convenient transportation is only the foundation. What really determines the value retention is whether cross-city products can be purchased, whether there are differences in urban content, whether market players can cooperate, and whether data and governance can support continuous operation.

The comparative advantage of Daqing lies in the composite structure of “ice and snow+ petroleum industry culture+ hundred-lake wetland + hot spring and grassland”. On this basis, Daqing should build a spatial network of “one core, two corridors and multiple nodes” to form cross-city extended tours, industrial study tour, ice and snow events, hot spring health care and digital experience products; Give full play to the foundation of industrial technology and equipment manufacturing, and cultivate a new chain of ice and snow equipment and scene operation and maintenance; with “ice-snow hundred-lake· petroleum city” as the core, the brand operation is carried out throughout the year; through the joint mechanism of Harbin-Daqing-Qiqihar, mutual delivery of tourists and benefit sharing, regional symbiosis is realized; at the same time, an evaluation system covering market, industry, brand, public service and ecological security is established.

From the perspective of the transformation of resource-based cities, the ecological optimization of Daqing cultural tourism should not be understood as replacing the oil industry with tourism, but as the re-value of industrial civilization, manufacturing capacity, urban spirit and ecological resources. Through "hard-industry empowerment for soft-economy development, and soft-scenario feedback to urban brand building", Daqing can turn the one-time attention of the Asian Winter Games into a long-term driving force for non-oil economic growth, urban renewal and residents' sharing.

This article mainly relies on policy documents, official public data and typical project materials. It has not yet obtained unified micro-operation data of enterprises and large-scale tourist surveys. Therefore, the identification of the net effect of the Asian Winter Games is still limited. Subsequent research can establish comparative data of Harbin, Daqing and other neighboring cities, track the cross-city trajectory, stay and consumption changes of tourists, and carry out case tests on the activation of industrial heritage, the integration of ice and snow equipment and the distribution mechanism of regional interests, so as to further improve the accuracy of policy recommendations.

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