

Artificial Intelligence Empowering the Transformation and Upgrading of Langfang's Cultural and Tourism Industry Chain

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Abstract: Against the backdrop of the in-depth integration of consumption upgrading and the digital economy, Langfang's cultural and tourism industry, despite boasting the geographical advantage of being in the "golden triangle" of Beijing-Tianjin-Hebei (BTH) and abundant historical, cultural, and natural resources, is plagued by issues such as homogeneous products, insufficient industrial chain collaboration, and weak brand influence. Based on the theoretical framework of "Intelligent Coordination of Demand and Supply", this paper systematically explores the path of AI empowering the transformation of Langfang's cultural and tourism industry chain by integrating artificial intelligence technologies including big data analysis, computer vision, and AIGC. It constructs an intelligent product planning system, an AI sharing platform for the industrial chain, and a precision marketing system, aiming to provide support for Langfang to become a model of BTH cultural and tourism collaboration and offer a "AI + Cultural and Tourism" transformation reference for similar cities.

Keywords: Artificial Intelligence; Cultural and Tourism Industry Chain; Langfang City; Intelligent Coordination of Demand and Supply

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1. Background of Langfang's Cultural and Tourism Industry

Located in the core hinterland of the BTH region, Langfang is home to a number of A-level scenic spots and national intangible cultural heritage resources, endowing it with inherent conditions for developing the cultural and tourism industry. Moreover, the emergence of "Meng Hong Lou (Dream Red Mansion)" has brought a new growth driver to Langfang's cultural and tourism sector. As an innovative cultural and tourism format that breaks traditional models, it has been widely acclaimed across the BTH region and even the whole country, becoming a new tourist landmark. However, a single new breakthrough is still insufficient to address the current dilemma of "abundant resources but a small-scale industry":

(1) Over 80% of scenic spots rely on traditional tourism forms such as sightseeing, static exhibitions, fruit-picking, and agritainment.

(2) Data within the industry chain is fragmented. Information fails to flow smoothly among scenic spots, hotels, and transportation sectors, with manual tour guide costs accounting for more than 30% of operating expenses.

(3) The city's cultural and tourism brand has low visibility in the BTH region, and there is a significant gap in comprehensive tourism revenue compared with neighboring cities.

Meanwhile, the application of artificial intelligence in China's cultural and tourism field has become increasingly mature. For instance:

(4) The "AI Cloud Guide" system developed by Hangzhou West Lake Scenic Area enables voice interaction and AR real-scene navigation, extending tourists' average stay time by 1.5 hours.

(5) Suzhou Museum has launched an "AR Experience for Cultural Relics Activation" using AI image recognition technology, increasing the number of visitors to cultural relics by 30%.

(6) Shanghai Yuyuan Garden has optimized tourist routes through a passenger flow prediction model, raising tourist satisfaction to 92%.

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These cases provide a technical path reference for Langfang to address its development bottlenecks.

2.Strategies for Transformation and Upgrading

"Intelligent Coordination of Demand and Supply" is an innovative paradigm in the current AI-enabled cultural and tourism field. Its essence is to take artificial intelligence technology as the core driving force, break the traditional one-way model dominated by the supply side, realize accurate matching, dynamic collaboration, and iterative evolution between the demand side and the supply side, and construct a closed-loop system of "accurate demand perception - intelligent supply response - ecological collaborative optimization".

This concept accurately targets the long-standing pain point of "mismatch between demand and supply" in the cultural and tourism industry, providing a systematic solution for the transformation from a "resource-centric" to a "user-centric" model. Theoretically, applying the "Intelligent Coordination of Demand and Supply" theory to Langfang's cultural and tourism practice can expand its dimensions and enrich the research system of AI integration with cultural and tourism industries. Practically, proposing operable AI solutions for industrial pain points and forming a complete transformation path of "Product - Collaboration - Marketing" will help Langfang shift from "resource-driven" to "technology-driven" development, enhancing its competitiveness in the BTH cultural and tourism market.

3.Current Development Status and Core Pain Points of Langfang's Cultural and Tourism Industry Chain

3.1 Structural Mismatch Between Product Supply and Consumer Demand

Langfang's current cultural and tourism products are relatively homogeneous. For example:

(1)Shengfang Ancient Town lacks interactive projects.

(2)Gu'an Willow Weaving mainly focuses on sales and exhibitions.

(3)Rural tourism products are highly homogeneous, with little difference between Yongqing Fruit-picking Gardens and Sanhe Agritainment.

However, tourists' demands have shifted from "cost-effectiveness" to "emotional value", with a stronger emphasis on in-depth travel experiences. Young tourist groups prefer trendy projects, while family groups pay more attention to parent-child interaction. The existing products fail to meet these demands, resulting in short tourist stays and untapped consumption potential.

3.2 Poor Collaboration Mechanism and High Costs in the Industry Chain

There exist "data silos" in the industry chain:

(1)Scenic spots struggle to obtain hotel occupancy data.

(2)Hotels have no access to information on peak passenger flow at scenic spots.

(3)Disconnected information between transportation and scenic spots leads to traffic congestion during holidays.

"Decentralized operation" has pushed up costs:

(4)Various entities conduct repetitive research.

(4)The proportion of manual services is high, with inconsistent service quality.

(5)The lack of passenger flow prediction results in both resource waste in off-seasons and shortages in peak seasons.

3.3 Vague Brand Positioning and Inefficient Marketing Conversion

Langfang's cultural and tourism sector lacks a core IP. Scenic spots and resources such as Shengfang Ancient Town and Wen'an Wa Wetland have not formed a unified brand system, leading to fragmented public perception. In terms of marketing:

(1)The absence of accurate tourist portraits results in wasted marketing resources.

(2)Marketing content mainly relies on traditional images and texts, failing to attract young tourist groups.

(3)Cooperation with Beijing and Tianjin is superficial, and there is no effective mutual customer referral mechanism, which restricts the improvement of brand influence and tourism revenue.

Langfang's cultural and tourism brand has long been in an awkward situation of "having resources but no IP". The lack of a core brand positioning leads to fragmented market awareness, making it difficult to form a differentiated memory point in the competitive BTH cultural and tourism market. From the perspective of brand system construction, although Langfang has high-quality resources such as Shengfang Ancient Town, Wen'an Wa Wetland, and Gu'an Willow Weaving, each resource unit lacks a unified brand core and communication focus:

(4)Shengfang Ancient Town promotes "Northern Water Town Culture" but has not formed a clear label like Wuzhen's "Water Town in the South of the Yangtze River" or Pingyao Ancient City's "Jin Merchant Culture". Tourists' perception of it mostly remains at the superficial level of "ancient building clusters".

(5)As an important ecological wetland in North China, Wen'an Wa Wetland only emphasizes "natural landscapes" in its promotion and has not built a characteristic IP by combining segmented scenarios such as "ecological research" and "wetland health preservation". Compared with Baiyangdian's composite brand of "Kidney of North China + Red Cultural Tourism", its competitiveness is significantly insufficient.

(6)Although Gu'an Willow Weaving is a national intangible cultural heritage, its brand communication is limited to "traditional handicrafts" and has not been deeply integrated with cultural and tourism experiences, making it difficult for tourists to form the consumption awareness of "must-visit Langfang for intangible cultural heritage experiences".

4.Theoretical Framework and Technical Support for AI Empowerment

4.1 Theoretical Framework: "Intelligent Coordination of Demand and Supply" Collaborative Evolution Model

Drawing on the "Intelligent Coordination of Demand and Supply" paradigm, a collaborative model with AI as the core is constructed:

(1)The demand side builds tourist portraits through multi-platform data to grasp the preferences of different customer groups.

(2)The supply side develops products, optimizes services, and improves collaboration efficiency based on demand.

The model includes three closed-loop dimensions: personalized tourist experience, efficient industrial chain collaboration, and precise brand communication, promoting the industrial transformation towards "technology-driven" development.

4.2 Key Technical Support System

Artificial intelligence technologies provide solid support for Langfang's cultural and tourism industry upgrading:

(1)Big data and algorithm analysis technologies integrate tourist behavior and cultural and tourism resource data to build demand prediction models.

(2)Natural language processing enables intelligent customer service to respond quickly.

(3)Computer vision supports accurate positioning and explanation services in scenic spots.

(4)AIGC generates diverse marketing content.

(5)VR/AR technologies develop immersive tourism projects.

5.Implementation Path of AI Empowerment

5.1 Accurate Demand Matching: Constructing an Intelligent Product and Service System

First, deeply tap into cultural and tourism resources:

(1)Use natural language processing to analyze documents related to Shengfang Ancient Town and the craftsmanship of Gu'an Willow Weaving.

(2)Apply computer vision to model Wen'an Wa Wetland and establish a resource database.

Second, integrate multi-platform tourist data and build a demand database based on tourist characteristics.

Third, develop an intelligent planning system based on the above databases:

(3)Design a "Millennium Ancient Charm Exploration" route for history and culture enthusiasts.

(4)Create "Intangible Cultural Heritage + Nature" experiential tours for family groups.

(5)Improve the accuracy of tourism product matching.

Finally, deploy "AI Tour Guide + Intelligent Customer Service" systems in scenic spots and place robots in key scenic areas to provide positioning and multilingual explanation services.

5.2 Precise Brand Communication: Constructing an AI-Driven Marketing System

First, establish tourist portraits to identify key customer groups in the BTH region, including high-net-worth groups, young research groups, and family vacation groups.

Second, use AIGC to generate marketing content such as short videos and images tailored to different customer groups, and conduct precise multi-channel promotion to improve marketing conversion rates.

Third, jointly build a BTH cultural and tourism AI database with Beijing and Tianjin, develop a "BTH Cultural and Tourism All-in-One Card", and intelligently recommend cross-city tourism routes.

Fourth, further deepen and expand cross-regional cultural and tourism collaboration to build a model of BTH cultural and tourism synergy. In the future, efforts can be made to:

(1)Deepen the sharing of cultural and tourism data with Beijing and Tianjin, expanding from passenger flow and resource data to in-depth data such as tourist consumption behavior and service evaluations.

(2)Use AI algorithms to explore the complementarity of cultural and tourism resources in the three places and develop more attractive cross-regional routes such as "BTH Cultural Traceability Tour" and "Ecological Health Preservation Loop".

(3)Explore a new model of "AI + Cultural and Tourism Consumption", such as launching a unified BTH cultural and tourism consumption points system. Tourists can accumulate points through consumption in the three places and redeem cross-regional cultural and tourism services, further strengthening the synergy of cultural and tourism development in the three places and helping Langfang become a "hub city" for the coordinated development of BTH cultural and tourism industries.

6.Conclusions and Prospects

Artificial intelligence can address the pain points of Langfang's cultural and tourism industry chain through three key paths: demand matching, supply collaboration, and brand communication. Constructing a full-chain system of "resource digitalization - product intelligence - service precision - operation collaboration - marketing personalization" can promote the transformation of the cultural and tourism industry towards "technology-driven" development. This model also provides a replicable and implementable "AI + Cultural and Tourism" transformation reference for similar cities.

For cities adjacent to core urban agglomerations, with high-quality resources but facing problems of homogenization and weak collaboration (such as Baoding in Hebei Province and Dezhou in Shandong Province), they can refer to Langfang's path of "prioritizing resource digitalization, taking precise portraits as the core, and relying on industrial chain platforms for support":

- (1)First, complete the digital transformation of local characteristic resources through AI technology.
- (2)Then, build customer portraits to develop customized products.
- (3)Finally, establish an industrial chain sharing platform to achieve collaborative operation.

At the same time, they can leverage AIGC and cross-regional cooperation to expand brand influence, effectively avoiding the mistake of "focusing on resource development while neglecting technological empowerment" and quickly addressing the pain points of their local cultural and tourism industries.

In conclusion, the practice of AI empowering Langfang's cultural and tourism industry is not only the application of technology in specific scenarios but also a complete solution encompassing "accurate identification of pain points - matching of technical paths - full-chain system support - model replication and promotion". It provides a clear practical framework for the transformation of the cultural and tourism industry from "traditional operation" to "smart upgrading".

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