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The Path of Digital Economy-Driven Tourism Industry Resilience Enhancement

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Abstract: With core characteristics such as high permeability, increasing marginal benefits, digital economy provides a core driving force for enhancing the resilience of the tourism industry. This paper clarifies the core connotations of digital economy and tourism industry resilience, analyzes the three-dimensional driving internal logic based on technology-enabled resource integration, real-time perception of market dynamics, and the emergence of new cultural and tourism formats, and elaborates on the four major driving mechanisms of policy, market, technology and society in response to the problems in the enhancement of tourism industry resilience. Finally, it proposes specific implementation paths, including consolidating digital infrastructure, deepening digital-real scenario integration, promoting regionally differentiated development, and building an intelligent emergency system, to inject digital economic impetus into the enhancement of tourism industry resilience.

Keywords: Digital economy; Tourism industry resilience; Driving mechanism; Implementation path

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1. Introduction

Tourism industry plays an irreplaceable role in stimulating domestic demand, promoting economic growth, expanding employment, and inheriting culture, yet it is highly sensitive to external shocks such as public health incidents, geopolitical conflicts and extreme weather. In recent years, multiple adverse factors have led to a contraction in tourism market demand and disruptions in the industrial chain, highlighting the urgency of enhancing tourism industry resilience. Meanwhile, the rapid development of the digital economy, with the iterative upgrading of new-generation digital technologies such as artificial intelligence and blockchain, has become an important engine for solving industrial development bottlenecks [1].

Currently, the integration of digital technology and the tourism industry have evolved from application in single links to penetration across the entire chain, spawning new formats such as smart scenic spots, virtual tourism and promoting the supply-side structural reform of the tourism industry. However, there are

still restrictive factors such as the unbalanced regional digital infrastructure coverage, insufficient adaptation between technology and tourism application scenarios, and the incomplete cross-domain data sharing barriers, which affected the enabling effect of the digital economy. Based on this, this paper systematically analyzes the mechanism and key paths of digital economy-driven tourism industry resilience enhancement, aiming to provide practical references for the high-quality and sustainable development of the tourism industry and the formulation of relevant policies.

2. Connotation of the digital economy and tourism industry resilience

2.1. Connotation of the digital economy

The digital economy is a new economic form that takes digitalized knowledge and information as key production factors, digital technology innovation as the core driving force, and modern information networks as an important carrier, featuring high permeability, increasing marginal benefits, and resource optimization and allocation capabilities [2]. Its key elements include digital infrastructure (internet broadband, mobile terminals); digital industries (information transmission, e-commerce); digital innovation capabilities (patents, R&D(Research and Development) funds); digital inclusive finance (coverage breadth, usage depth); and government digital governance (online services, policy support), which jointly support the development and application of the digital economy in various fields [3–6].

2.2. Connotation of tourism industry resilience

Tourism industry resilience refers to the dynamic capability of the tourism industry as a complex system to resist risks, recover quickly, adjust structures, innovate and reorganize, and achieve sustainable development, with the core of "shock resistance, recoverability, and transformability" [2]. Its core dimensions include resistance capacity, recovery capacity, restructuring capacity and renewal capacity [4]. These four dimensions interact with each other to jointly support the tourism industry in maintaining stability and sustainable development in a complex and changing environment. The three core characteristics of tourism industry resilience support each other: economic resilience is the core support, social resilience is an important guarantee, ecological resilience is the basic premise, which together measure the high-quality development level of the tourism industry.

3. Internal logic of digital economy-driven tourism industry resilience enhancement

3.1. Technology-enabled resource integration

Digital technologies such as big data and cloud computing have deeply integrated resources upstream and downstream of the tourism industry chain, breaking down "information silos" between various links such as transportation, accommodation, scenic spots, and realizing data interconnection, intercommunication, and sharing. Based on the analysis and mining of massive data, it is possible to accurately insight into tourists' consumption preferences, and fully grasp the operational status of each supply end, realizing efficient and precise matching between supply and demand. This not only effectively reduces the idleness of resources, improves the operational efficiency of the entire industrial chain, but also enhances the overall collaborative operation capacity and risk resistance resilience of the industry.

3.2. Real-time perception of market dynamics, agile response to changes

With the help of digital technologies such as the Internet of Things, artificial intelligence early warning, the tourism industry can build a sensitive market perception and risk early warning system. Through the real-time collection and dynamic analysis of multi-dimensional data such as tourist flow, consumption behavior, public opinion feedback, it is possible to quickly capture market consumer demand and various potential risk signals. This enables tourism enterprises and management departments to predict in advance, respond quickly, adjust product supply structures, optimize service processes and operational strategies in a timely manner, effectively shorten the industrial recovery cycle after crisis incidents, significantly improve the coping capacity to market changes [5].

3.3. Emerging new cultural and tourism formats, reconstructing industrial ecology

The in-depth application of digital technologies has continuously spawned new formats such as virtual tourism, VR/AR immersive experiences, and cloud tourism. These new formats have vertically extended the value dimension of the tourism industry chain, and horizontally expanded the industrial boundary, promoting the deep integration of tourism with science and technology, culture, education, and other fields. The tourism industry structure has gradually shifted from traditional "chain-like" linear dependence to "network-like" collaborative development, reducing the risk of over-reliance on single links, or traditional models, increasing the shock resistance buffer space of the industry, and promoting the transformation and upgrading of the tourism industry towards higher quality and more flexible development [6].

Through the three paths of "technology-enabled resource integration, real-time perception of market dynamics, and emerging new cultural and tourism formats," the logic of ultimately realizing the enhancement of tourism industry resilience is shown in **Figure 1**.

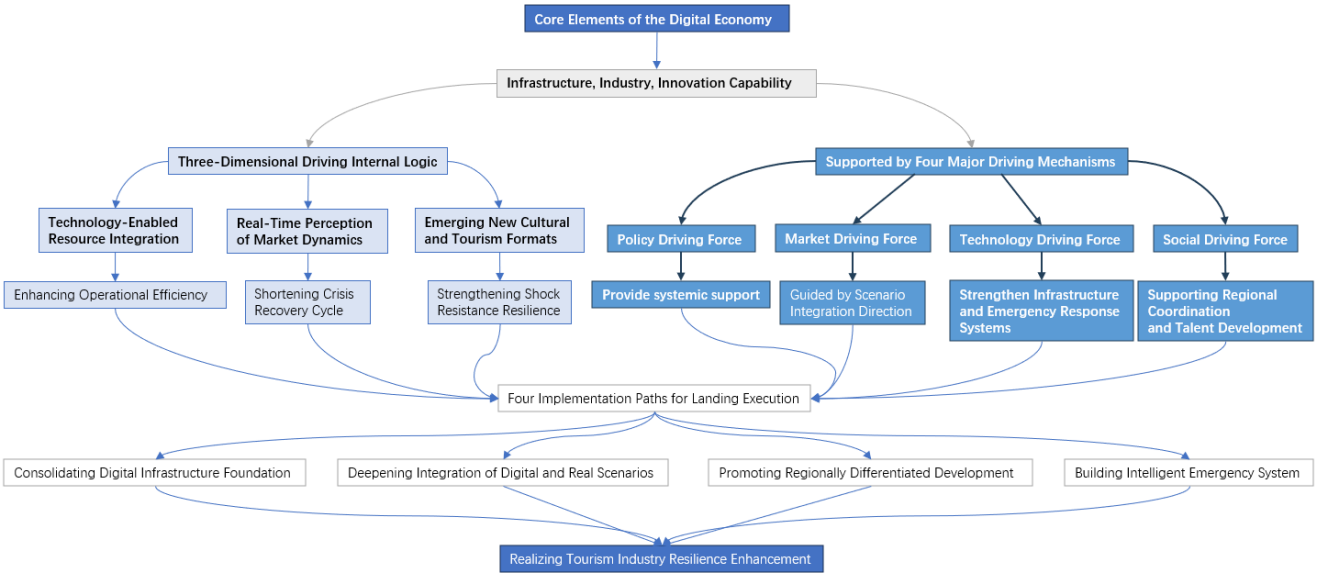

Figure 1. Logic of digital economy-driven tourism industry resilience enhancement.

4. Driving mechanisms of digital economy-driven tourism industry resilience enhancement

4.1. Policy driving force

National policy documents clearly propose the development direction of promoting the deep integration of the digital economy and the tourism industry, pointing out the path for industrial integration and development [3]. In terms of policy support, for tourism enterprises under external shocks, policies such as tax reductions and exemptions, financial subsidies have been introduced, and enterprise support service platforms have been built to help enterprises recover. In terms of standardization and guidance, the standard system and regulatory system for tourism digital development have been improved, regulating the application of digital technologies and the use of data resources, significantly optimized the application environment of digital technologies in the tourism field, and provided policy guarantee and institutional support for the digital economy-driven enhancement of tourism industry resilience.

4.2. Market driving force

With the surge in demand for personalized, immersive, and intelligent tourism products and services, forcing the tourism industry to accelerate digital transformation. Digital technologies realize the accurate collection and analysis of tourism demand data, helping industrial entities adjust supply strategies in advance, and promote the transformation of industrial resilience from "passive recovery" to "active adaptation." Digital platforms (such as OTA platforms, short video social platforms) have greatly broadened the channels for the dissemination and transaction of tourism consumption information, effectively activated potential tourism demand. At the same time, the mining of user behavior data realizes precise marketing, significantly enhancing the vitality of the tourism market and becoming an important force promoting the deep integration of the digital economy and the tourism industry.

4.3. Technology driving force

Digital technologies such as big data, artificial intelligence, VR/AR are widely used in key links such as tourism risk early warning, personalized product customization, and crisis emergency response, greatly improving industrial operational efficiency and service quality. The continuous improvement of digital infrastructure such as 5G base stations, computing power networks provides a stable and efficient technical foundation for the full-process digital transformation of the tourism industry. The cultivation of new formats such as smart scenic spots, digital cultural tourism has broken the bottlenecks of traditional industrial development, cultivated new growth poles, and further strengthened the industrial risk resistance capacity.

4.4. Social driving force

The general improvement of national digital literacy has significantly enhanced the acceptance and application capabilities of tourists and tourism enterprises for digital tools such as online booking, digital payments, greatly expanding the coverage of the digital tourism market. The employment structure is transforming towards digitalization and intelligence, spawning a number of compound cultural and tourism talents who are proficient in both tourism business and digital technologies provide core human support for the enhancement of tourism industry resilience [7]. The growing demand for cross-regional social collaboration promotes the sharing of digital tourism resources, strengthens the collaborative linkage of tourism resilience between regions, injecting a sustained and stable social driving force into the digital economy-driven enhancement of tourism industry resilience [8].

5. Implementation paths of digital economy-driven tourism industry resilience enhancement

5.1. Consolidate the digital infrastructure foundation, break down data sharing barriers

Improving digital infrastructure is essential to support the transformation and resilience of the tourism industry. This involves accelerating the comprehensive deployment of gigabit fiber broadband across key tourism areas, including scenic spots and tourist resorts, to ensure stable and high-quality network connectivity. In parallel, it is necessary to establish a unified tourism data sharing and management platform at provincial and national levels, enabling the integration of data resources from multiple sectors such as tourism, transportation, and public security. The formulation of standardized protocols for data collection, storage, transmission, and application, along with clear definitions of data ownership, is critical to enhancing data governance and utilization efficiency [9]. Furthermore, efforts should be made to promote the intelligent upgrading of terminal equipment, optimize network resource allocation, and improve both the real-time transmission capacity of tourism data and the processing efficiency of large-scale datasets. Collectively, these measures provide a solid technical foundation for advancing the digital transformation of the tourism industry.

5.2. Deepen the integration of digital and real scenarios, optimize supply-demand adaptation efficiency

Efforts to enhance tourism industry resilience should center on tourists' core consumption demands for personalization and immersion by ensuring the precise alignment of digital technologies with diverse tourism scenarios. This can be achieved through the development of advanced digital applications, including multilingual intelligent navigation systems, AR-based interactive experiences, and VR roaming products, all of which enrich tourists' experiential depth. In addition, the establishment of big data-driven precision marketing platforms enables the targeted promotion of tourism products based on detailed tourist profiles, thereby improving demand-supply matching efficiency. It is equally important to promote the deep integration of digital technologies into key tourism scenarios such as consumption processes and risk early warning systems. For instance, intelligent monitoring technologies can be employed to track real-time crowd density in scenic areas, while online service platforms can facilitate "one-click complaint" mechanisms and rapid response systems. Together, these measures significantly enhance the overall tourist experience and improve the operational efficiency and adaptive capacity of the tourism industry.

5.3. Promote regionally differentiated development, release spatial spillover effects

Based on the reality of unbalanced regional development, build a differentiated digital cultural and tourism development pattern. Developed regions share digital cultural and tourism development experience, technological achievements, and market resources through industrial transfer, technology export, and project cooperation. Central, western, and northeastern regions can rely on their own characteristic tourism resources to build vertical digital tourism ecosystems [10]. For example, the western region can develop immersive ecological tourism digital products relying on natural landscape resources, and the northeastern region can build an intelligent ice and snow tourism service system relying on ice and snow resources to avoid homogeneous competition. Through carriers such as cross-regional digital cultural and tourism alliances, narrow the gap in regional digital economic development, fully release the positive spatial spillover effect of the digital economy on tourism industry resilience, and realize the coordinated and high-quality development of the tourism industry on a large scale.

5.4. Build an intelligent emergency system, improve dynamic adaptation capabilities

To strengthen the resilience of the tourism industry, it is essential to leverage advanced technologies such as big data analytics and Internet of Things monitoring to establish an intelligent crisis response mechanism. This includes developing a multi-dimensional risk monitoring index system capable of accurately identifying and providing early warnings for potential threats, including natural disasters, epidemic outbreaks, and safety incidents. In parallel, comprehensive digital emergency response plans should be formulated, clearly defining response procedures, roles and responsibilities, and mitigation measures, while enabling the rapid dissemination of early warning information and the efficient allocation of emergency resources through online platforms.

Furthermore, post-crisis recovery strategies should be optimized by utilizing digital platforms to conduct market research and demand analysis, thereby supporting the implementation of targeted promotional campaigns and tourism product innovation. At the same time, digital technologies can facilitate the restructuring and upgrading of the tourism industry, enhancing its capacity for dynamic adaptation and accelerating recovery in the face of both internal and external shocks. Consequently, these measures contribute to building a more responsive, flexible, and sustainable tourism economic system.

6. Conclusion

In conclusion, the digital economy serves as a powerful catalyst for strengthening tourism industry resilience by enhancing resource integration, enabling real-time market responsiveness, and fostering innovative tourism formats. Through coordinated policy, market, technological, and social drivers, it helps the industry better withstand shocks, recover quickly, and adapt to changing environments. By advancing digital infrastructure, deepening technology-scenario integration, promoting region-specific strategies, and building intelligent emergency systems, the tourism sector can achieve more sustainable, flexible, and high-quality development in the face of future uncertainties.

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Disclosure statement

The author declares no conflict of interest.

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