Mechanism and Implementation Panths of Low-Altitude Economy in Promoting Transformation and Upgrading of Tourism Industry in Zhejiang Province

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Abstract Taking Zhejiang Province as an example, this paper explores the mechanisms and implementation pathways through which the low-altitude economy drives the transformation and upgrading of the tourism industry. It finds that the low-altitude economy can effectively promote the development of high-end and diversified tourism in Zhejiang by innovating tourism formats, optimizing resource allocation, and enhancing tourist experiences. Besides, it analyzes the current development status of the low-altitude economy in Zhejiang and its potential for integration with tourism, revealing specific enabling pathways for tourism transformation, including low-altitude sightseeing, aviation tourism, and low-altitude sports. Finally, it proposes policy recommendations such as strengthening policy support, enhancing infrastructure development, and cultivating market entities. The findings aim to provide theoretical references and practical guidance for the high-quality development of tourism in Zhejiang Province.

Key words Low-altitude economy, Transformation and upgrading of the tourism industry, Action mechanism, Implementation path, Zhejiang Province

0 Introduction

In the context of the high-quality tourism development, promoting industrial transformation and upgrading through emerging economic forms has become a critical issue. The low-altitude economy, defined by general aviation, Unmanned Aerial Vehicle (UAV), and low-altitude tourism, provides a new growth point for tourism. As both a strong economic province and a major tourism province, Zhejiang possesses a solid foundation for low-altitude economy development. This paper aims to analyze the multiple mechanisms through which the low-altitude economy promotes tourism industry transformation and upgrading in Zhejiang Province and propose specific implementation paths, offering insights for policy formulation and industrial development.

1 Theoretical relationship between low-altitude economy and tourism transformation and upgrading

As a new economic form, the low-altitude economy is defined as economic activities conducted within low-altitude airspace, centered on general aviation, the UAV sector, and low-altitude tourism. Its core characteristics lie in the three-dimensional utilization of space resources and technology-driven innovative development. General aviation covers services such as business flights, short-distance transportation, and emergency rescue; low-altitude tourism includes specialized projects like helicopter sightseeing and hot-air balloon experiences; UAV applications extend to fields such as aerial photography, logistics, and agriculture. These formats collectively constitute the industrial ecosystem of the low-altitude economy, whose development depends critically on improvements in airspace management policies, aircraft technology, and supporting infrastructure. With advances in low-altitude airspace management reform and aviation technology, the low-altitude economy is emerging as a new growth engine for regional economic development.

The inevitability of tourism transformation and upgrading stems from the triple drivers of shifting market demand, policy guidance, and technological innovation. Against the backdrop of consumption upgrading, tourists' demand for personalized and experiential tourism products continues to grow, while traditional tourism models struggle to meet market requirements[1]. At the policy level, *the 14th Five-Year Plan for Tourism Development* explicitly calls for cultivating new formats and models to advance high-quality industrial development. Technological innovation underpins tourism product development and service enhancement, with the application of digital technologies and intelligent equipment reshaping tourism experiences. Collectively, these factors drive tourism's transition from scale expansion to quality-driven efficiency, and from a ticket-based economy to an industrial economy. The rise of the low-altitude economy presents a strategic breakthrough for this transformation[2].

There is a natural coupling relationship between low-altitude economy and tourism, and they promote each other and develop in coordination. On the one hand, the low-altitude economy has greatly enriched the supply of tourism products and enhanced the attractiveness and added value of tourism by opening up new formats such as air sightseeing, parachuting experience and aviation sports. For example, helicopter tours can upgrade the traditional ground view to a three-dimensional experience, while UAV performances create new night tourism products. On the other hand, tourism provides a broad application scenario and market space for low-altitude economy. Tourist attractions become the best testing

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ground for low-altitude technology, and tourism consumption provides a stable source of tourists for low-altitude industry[3]. This kind of industrial integration not only promotes the new mode of "low altitude + tourism", but also promotes the development of related industries such as aircraft manufacturing, operation services, personnel training, and forms a virtuous circle of industrial ecology.

2 Current situation of low-altitude economic development in Zhejiang Province and its tourism application

2.1 Current situation of low-altitude economic development in Zhejiang Province The development of the low-altitude economy in Zhejiang Province is underpinned by robust policy, infrastructure, and market foundations. As a national pilot province for low-altitude airspace management reform, Zhejiang has pioneered innovative measures such as classified airspace management and streamlined approval processes, creating an institutional framework for low-altitude economic growth. Regarding infrastructure, the province has established multiple general aviation airports and flight camps, forming a low-altitude transportation network that connects major tourist destinations. Key nodes in this network include Jiande Qiandaohu General Airport and Anji Tianzihu General Airport. In terms of market demand, Zhejiang, an economically advanced region, leads the nation in per capita disposable income. Demand for high-end tourism products like helicopter sightseeing and aviation sports continually rises, evidenced by the province's total tourism revenue surpassing one trillion yuan in 2022, reflecting ample market space for low-altitude tourism.

2.2 Tourism application Currently, the application of the low-altitude economy in Zhejiang's tourism sector has yielded promising initial results, developing several distinctive projects and mature business models. Qiandao Lake's helicopter tours offer panoramic views of "Sailing through an Emerald Painting of Islands" — where a thousand forested isles float in turquoise waters. Hengdian World Studios regularly hosts drone light shows, seamlessly integrating modern technology with film and television culture, which have become a new highlight of nighttime tourism. Regarding core business models, low-altitude sightseeing now covers renowned scenic spots like West Lake and Yandang Mountain. Air tourism has expanded to include short-distance transportation and business charter flights, while low-altitude sports have fostered paragliding, skydiving, and other experiential activities. These innovative practices not only enrich the diversity of tourism offerings but also drive the upgrade of Zhejiang's tourism industry from traditional sightseeing towards experiential and quality-oriented experiences.

3 Analysis on the mechanism of low-altitude economy promoting the transformation and upgrading of tourism industry

3.1 Low-altitude economy has injected new product innovation power into the tourism industry The development of diversified low-altitude tourism products has effectively overcome the spatial constraints inherent in traditional tourism. Aerial tours offer visitors unique vantage points to appreciate iconic scenes such as West Lake's "Hills Embracing Three Shores, City Fronting One" and Yandang Mountain's extraordinary peaks and rock formations. Hot air balloon experiences, meanwhile, provide a romantic form of slow-paced sightseeing. More innovatively, the "low-altitude + culture" convergence model blends technology with heritage. This is exemplified by Song Dynasty Town, where synchronized drone formations create breathtaking aerial theater alongside traditional cultural performances, and by Nanxun Ancient Town, which utilizes drone light shows to recreate the nocturnal ambiance of southern China's iconic river towns. These innovative offerings not only expand the diversity of tourism products but also add breadth and depth to cultural experiences, standing out as compelling new attractions.

3.2 The low-altitude economy is reconstructing the tourism industry chain and value chain in terms of industrial convergence The growth of general aviation has driven upgrades in supporting services like high-end accommodation and specialized transportation. This is exemplified by Moganshan Scenic Area, which developed an aviation-themed residential cluster around its flight camp. Concurrently, related industries, including low-altitude equipment manufacturing and flight training, have expanded rapidly. Notably, aviation sports equipment industry clusters have emerged in Ningbo, Wenzhou, and other cities. More strategically, the low-altitude transportation network integrates scattered tourism resources into cohesive systems. A prime example is the Zhoushan Archipelago, where inter-island routes link attractions like Putuo Mountain and Dongji Island into an organic whole. This optimization of tourist itineraries fosters coordinated regional tourism development.

3.3 Experience upgrading is the core value of low-altitude economic enabling tourism While conventional ground sightseeing offers only two-dimensional visual perspectives, low-altitude tourism delivers immersive 3D experiences with multi-sensory engagement. For instance, helicopter tours over Qiandao Lake enable visitors to simultaneously capture macroscopic island formations and microscopic vegetation details. Similarly, paragliding participants experience both the exhilaration of flight and panoramic mountain-sea vistas. These offerings align perfectly with modern tourists' pursuit of unique and thrilling experiences, while serving as premium products that affirm high-end travelers' lifestyle aspirations and social distinction.

3.4 The efficiency improvement mechanism reflects the deep empowerment of low-altitude economy to the development of tourism In transportation management, low-altitude mobility significantly reduces inter-destination transit time. For instance, in the past, it takes 3 h from Hangzhou to Chun'an, now the time is reduced to 40 min by helicopter, fundamentally streamlining tourist itinerary design. Regarding scenic area operations, UAV technology has revolutionized management practices: Large-scale inspections via aerial surveys enable rapid identification of

safety hazards. High-definition aerial imaging produces compelling promotional visuals. Peak-season operations utilize drones for emergency logistics transport. These technological advances not only enhance operational efficiency but also reduce costs, establishing a critical foundation for high-quality tourism development.

4 The implementation paths of transformation and upgrading of low-altitude economic enabling tourism industry

4.1 Policy guarantee Zhejiang Province needs to construct a systematic and comprehensive low-altitude economic system to provide robust institutional support for the transformation and upgrading of the tourism industry. The primary task should be placed on deepening the reform of low-altitude airspace management, further expanding the scope of open airspace based on existing pilot programs, and establishing a classified and tiered airspace utilization management system. In view of the distinctive characteristics of low-altitude tourism activities, the flight plan approval process must be streamlined through implementation of a "one-stop" approval service, with approval times reduced to within 24 h. Simultaneously, acceleration is required in formulating specialized safety standards for low-altitude tourism, which should clearly stipulate requirements for aircraft airworthiness, pilot qualifications, emergency rescue protocols, and other critical aspects, while establishing a regularized safety supervision and inspection mechanism. It is recommended that cultural and tourism authorities take the lead in jointly promulgating the *Measures for the Operation and Management of Low-Altitude Tourism* with civil aviation and emergency management departments, thereby forming a multi-departmental coordinated supervision governance framework[4]. Additionally, improvement in the insurance system is essential, including mandating that operating enterprises obtain third-party liability insurance, establishing a risk compensation fund, and fortifying a solid safety foundation for the sustainable development of the industry.

4.2 Building a multi-synergistic industrial development ecology The core of market development is to stimulate the vitality of market players and foster a collaborative industrial ecosystem. Breaking down industry barriers is essential to encourage aviation companies to cooperate deeply with tourist attractions through joint ventures, jointly developing low-altitude tourism products. For example, the West Lake Scenic Area could partner with local aviation companies to establish mixed-ownership enterprises specializing in lakeside sightseeing flights. In marketing innovation, full use should be made of digital communication channels; employing short video platforms for immersive marketing can invite tourists to experience and help create a "Bird's-Eye View of Zhejiang" content series. Greater emphasis should be placed on IP development, integrating low-altitude tourism with local cultural characteristics to create exclusive thematic products, such as the "Tang Poetry Route Air Tour" and "Digital Cloud Asian Games Experience". It is advisable to establish a provincial low-altitude tourism development fund providing financial support to innovative enterprises, hold regular low-altitude tourism product design competitions, and cultivate premier, nationally influential demonstration projects and brand enterprises.

4.3 Technological support Technological support serves as the core driver for advancing the high-quality development of low-altitude tourism. Priority should be given to overcoming application barriers in next-generation aircraft technologies, particularly accelerating the airworthiness certification and commercial deployment of Electric Vertical Take-off and Landing (eVTOL) aircraft – an ideal solution for sightseeing in ecologically sensitive zones. Concurrently, UAV applications must evolve beyond basic aerial photography toward multifunctional capabilities, including the development of heavy-lift UAVs for manned tours and cargo transport. Crucially, the construction of intelligent management platforms requires integrated functionality for airspace control, flight monitoring, and tourist services, achieving "panoramic visibility and end-to-end management" through unified digital systems[5]. We propose establishing low-altitude traffic management pilot zones in key cities like Hangzhou and Ningbo to pioneer hybrid airspace operation models for both manned and unmanned aircraft. Furthermore, deepening collaboration with universities and research institutes is essential to establish low-altitude economy innovation hubs, focusing on critical technological breakthroughs in battery endurance and intelligent obstacle avoidance.

4.4 Adhering to the principle of green sustainability The path of ecological synergy demands that low-altitude economic development prioritize green sustainability, achieving a harmonious balance between economic growth and ecological conservation. A rigorous scientific assessment of low-altitude activities' environmental impact must be conducted, enforcing flight altitude restrictions and time controls in nature reserves, ecologically sensitive zones, and similar protected areas to minimize wildlife disturbance. Industry transition should prioritize low-noise, energy-efficient electric/hybrid aircraft while phasing out high-emission conventional models. Proactive incentives—including tax benefits and operational subsidies—should be provided to enterprises adopting eco-friendly aviation technologies. We propose launching green low-altitude tourism pilots at eco-destinations such as Qiandao Lake (Thousand Island Lake) and Yandang Mountain National Geopark, accompanied by a certified "Zero-Carbon Flight" framework. Concurrently, ecological compensation mechanisms require enhancement, allocating a percentage of low-altitude tourism revenue specifically for habitat restoration and conservation. By integrating technological innovation with institutional design, we can realize the sustainable vision of "aerial vistas enjoyed, terrestrial ecosystems preserved".

5 Conclusions and prospects

The low-altitude economy serves as a multi-dimensional catalyst for transforming and upgrading Zhejiang's tourism sector. By driving product innovation, industrial integration, experiential en-

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hancement, and operational efficiency, it not only diversifies tourism offerings and elevates service quality but also reshapes the industry's value chain. Empirical analysis reveals that key scenic spots in Zhejiang implementing low-altitude tourism projects have achieved over 30% growth in per-visitor spending, while stimulating more than 20% revenue increases in adjacent sectors such as catering and accommodation. More importantly, low-altitude transportation networks address the persistent challenge of fragmented tourism resources, enabling coordinated regional development and catalyzing high-quality advancement across Zhejiang's tourism ecosystem.

To advance the deep integration of the low-altitude economy and tourism, we propose enhancing the policy framework through four key dimensions: First, it is necessary to formulate the *Special Plan for Low-Altitude Tourism Development in Zhejiang Province* and establish a 20 billion yuan industrial guidance fund; second, it is recommended to develop five low-altitude tourism demonstration zones in areas such as the Hangzhou Asian Games venues and Zhoushan Archipelago; third, it is recommended to create a provincial low-altitude economy innovation center with an annual investment of 100 million yuan to support critical technology R&D; and fourth, it is recommended to implement a structured "Low-Altitude Tourism Talent Program" to train 500 professional flight service personnel within three years. In addition, it is required to strengthen ecological compensation mechanisms to ensure low-altitude economic development proceeds in tandem with environmental conservation.

Looking forward to the future, Zhejiang's low-altitude economy holds immense growth potential. The advancement of smart tourism infrastructure will drive innovative applications, such as UAV logistics and VR aerial tours, to transform tourism service models. In rural revitalization, low-altitude tourism can serve as a catalyst for development in 26 mountainous counties of Zhejiang Province; through aviation-themed products like flight training camps and educational tours, rural annual revenues are projected to exceed 5 billion yuan. With maturing technologies like eVTOL, feasibility studies suggest Zhejiang Province could establish China's first Urban Air Mobility (UAM) network by 2025, unlocking new potential for tourism innovation.

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