Frontiers in Business, Economics and Management
ISSN: 2766-824X | Vol. 20, No. 3, 2025

The Impact of Low-Altitude Economy on the Development of Tourism

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Abstract: This paper focuses on the development of China's low-altitude economy and its impact on the tourism industry. Through literature analysis, it defines low-altitude economy and low-altitude tourism, and conducts in-depth research on the industrial chain and development directions of the low-altitude economy. By examining application scenarios and typical cases, various integration models of the two fields are presented. It then analyzes the current development status, including the growth of market scale, policy support, and technological innovation, while pointing out challenges in safety supervision, cost popularization, and infrastructure. Finally, it puts forward policy optimization suggestions and future development trends, emphasizing the importance of policy innovation and technological research. This study provides a comprehensive perspective for promoting the deep integration of low-altitude economy and tourism.

Keywords: Low-altitude Economy; Tourism; Industrial Integration; Innovative Development.

1. Introduction

China's tourism industry has emerged as a pivotal driver of national economic growth. From 2012 to 2019, domestic tourism revenue surged from 2.27 trillion yuan to 5.73 trillion yuan. In 2023, post-pandemic, the tourism sector demonstrated a robust recovery, with domestic tourism revenue rebounding to 85.69% of the 2019 level. It is estimated that during the 2024 "May Day" holiday alone, total spending by domestic tourists reached 166.89 billion yuan, a 13.5% increase compared to the same period in 2019. As outlined in the Domestic Tourism Enhancement Plan (2023–2025) [1, 2], by 2025, the domestic tourism market is expected to maintain reasonable growth with improved quality; efforts will be made to enhance the effectiveness of tourism promotion, enrich high-quality tourism supply, optimize tourist experiences and satisfaction, upgrade public service efficiency, achieve breakthroughs in key reforms, refine comprehensive market supervision mechanisms, strengthen modern governance capabilities, and further amplify the role of domestic tourism in boosting consumption and driving economic growth. Against this backdrop, the integration of culture and tourism has become increasingly prominent, with growing public interest in exploring diverse cultures, histories, and traditions.

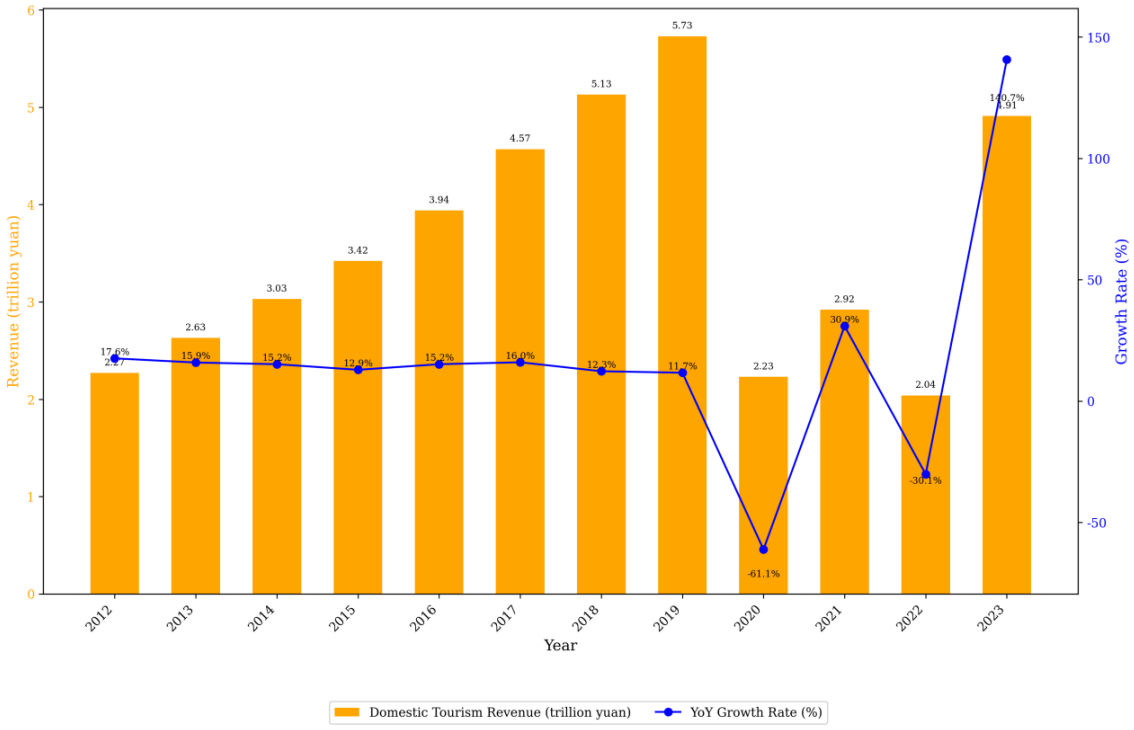

Figure 1. China's domestic tourism revenue and year-on-year growth rate of domestic tourism revenue from 2012 to 2023

Amid the evolving global economic landscape and the continuous upgrading of the tourism market, the low-altitude economy, as an emerging economic form, is gradually emerging as a new engine for economic growth. In recent years, driven by technological advancements and gradual policy liberalization, the low-altitude economy has developed

rapidly. Data from the International Civil Aviation Organization (ICAO) indicates that the global low-altitude economy has maintained an average annual growth rate of over 5% in the past decade, with its applications expanding from traditional sectors such as agricultural and forestry operations and emergency rescue to tourism, logistics, and urban management.

Scholars' earliest research on the low-altitude economy dates back to 2011, with Qin Rui et al.'s article Low-Altitude and Low-Altitude Economy from a Resource-Based Perspective. The concept of low-altitude economy proposed therein differs from its current definition. It was defined as encompassing production activities reliant on low-altitude airspace, the development and utilization of climatic resources, air quality monitoring and management, as well as related industrial activities, forming three categories of industries: first, industries related to climatic resource development, including artificial precipitation/snow and wind power, involving operations and R&D, production, and sales of related equipment; second, industries focused on air quality monitoring and governance (i.e., the "fresh air industry"), covering monitoring, pollution control, and related equipment R&D, production, and sales; third, industries dependent on low-altitude airspace, primarily general aviation, including industrial and agricultural aviation, R&D, manufacturing, and sales of general aircraft and aerostats, as well as operation and management of ground facilities and sites supporting flight operations [3].

Contemporary scholars define the low-altitude economy as a new economic form that operates within airspace 1,000 meters above ground level (with some areas extending to 3,000 meters), utilizing manned and unmanned aerial vehicles (such as drones, helicopters, and eVTOLs) as carriers to conduct multi-scenario economic activities (e.g., passenger transport, cargo delivery, and operational services) and drive the integrated development of related industrial chains [4, 5].

Low-altitude tourism, an innovative integration of the low-altitude economy and the tourism industry, caters to tourists' increasingly diversified demands through its unique aerial perspective and novel experiences. It enriches the supply of tourism products, providing new impetus for the upgrading and high-quality development of the tourism sector. This emerging tourism model offers unprecedented experiences to visitors. In countries with mature low-altitude tourism sectors, such as the United States and Australia, low-altitude tourism projects have become integral to the tourism market, generating significant economic benefits for local industries. In China, alongside rising household incomes and upgraded tourism consumption, low-altitude tourism has witnessed vigorous growth. Data from the Civil Aviation Administration of China in 2023 showed a 20% year-on-year increase in the number of participants in air tours and aviation sports, indicating an expanding market scale.

Synthesizing research from multiple scholars, low-altitude tourism is defined as a distinctive tourism form conducted in low-altitude airspace (typically below 1,000 meters above ground level). It leverages general aviation transportation, general aircraft (e.g., helicopters, light aircraft, and hot air balloons), and drones under specific conditions, integrates surrounding natural and cultural landscapes, centers on low-altitude flight experiences, and combines elements of tourism, aviation, and transportation to provide tourists with unique experiences such as sightseeing, sports and entertainment, and adventure activities [6-8].

The development of low-altitude tourism can drive the coordinated growth of related industries: upstream sectors include material design and aircraft manufacturing; midstream involves tourism project design, development, and aviation services; downstream encompasses the construction of local tourism supporting facilities. This complete industrial chain exerts a positive pull on the economic growth of both the low-altitude economy and the tourism industry. Therefore, promoting the integration of the low-altitude economy and tourism is crucial for advancing high-quality economic development at both national and local levels. Meanwhile, economic growth will stimulate new consumer demands, which in turn drive technological progress and the provision of newer, higher-quality products.

The theory of industrial integration posits that different industries, driven by technological innovation, market demand, and industrial policies, gradually infiltrate and intersect, giving rise to new industrial forms and business models. The integration of the low-altitude economy and tourism exemplifies this: advancements in low-altitude technologies provide new technical support and products (e.g., low-altitude sightseeing and flight experiences) for tourism, fostering innovation; conversely, tourism development creates market demand for the low-altitude economy, driving its expansion. For instance, in the integration process, low-altitude tourism enterprises collaborate with aircraft manufacturers, scenic spots, and hotels to co-develop products, optimize services, share resources, and leverage complementary advantages, promoting industrial synergy.

The economic multiplier effect refers to the phenomenon where the development of one industry drives growth in related sectors, generating a multiplicative impact on overall economic expansion. The low-altitude economy exerts a significant multiplier effect on tourism: the general aviation industry has an input-output ratio of 1:10 and an employment multiplier of 1:12, making it a new growth engine for the national economy [9]. It stimulates growth in aircraft manufacturing, airport construction, and tourism services, increases employment and household incomes, boosts consumption upgrading, and thereby propels tourism development. For example, the growth of the low-altitude economy attracts more investment, upgrades the aviation industry, drives the development of scenic spots, enhances the quality and competitiveness of tourism products, and provides robust support for the tourism sector.

2. Literature Review

A search on CNKI (China National Knowledge Infrastructure) with the theme of "low-altitude economy" shows that the term first appeared in the Anyang Daily in 2010 and was widely mentioned in the same newspaper in 2011 and 2012 [10-15] [10-15]. The earliest academic study on low-altitude economy can be traced back to 2011, in the article Low-Altitude and Low-Altitude Economy from the Perspective of Resource Theory by Qin Rui et al. [3].

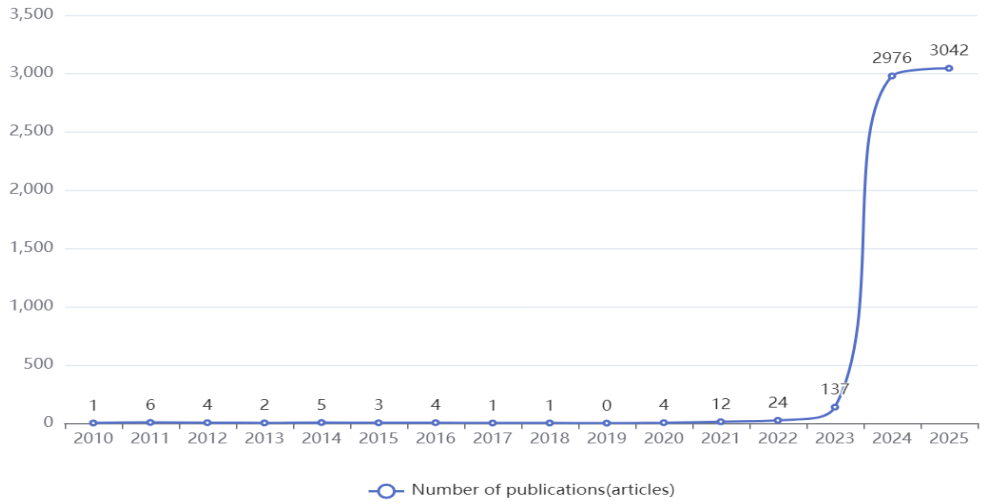

Figure 2. Number of CNKI Literature on Low-Altitude Economy

A CNKI search on "low-altitude tourism" reveals that early studies mainly focused on analyzing the development status and proposing strategies for low-altitude tourism in specific regions. After 2015, research began to explore product design, development dilemmas, and countermeasures of low-altitude tourism. Since 2020, studies on marketing and factors influencing consumption experience of low-altitude tourism have emerged.

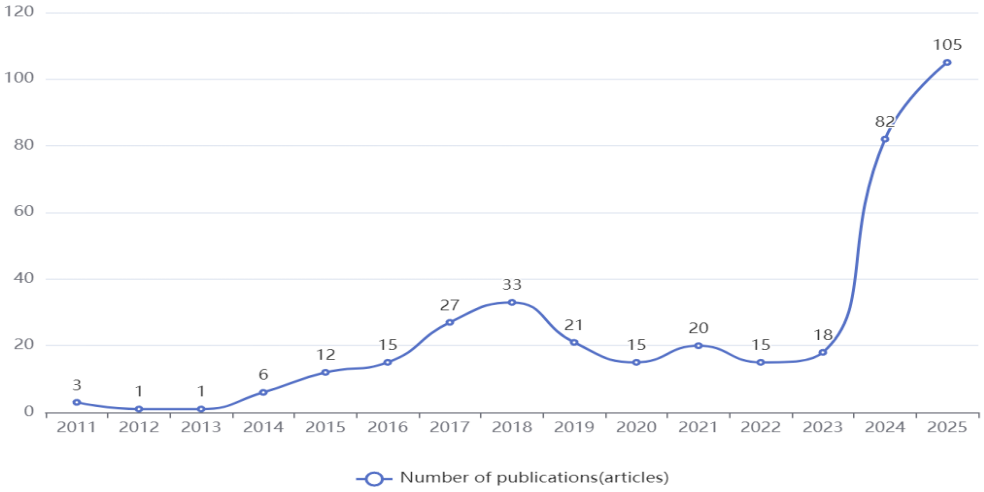

Figure 3. Number of CNKI Literature on Low-Altitude Tourism

According to CNKI data, the number of literature on the theme of low - altitude tourism grew rapidly from 2014 to 2018, reaching a peak of 22 articles in 2018, then dropped significantly, falling to a low of 4 articles in 2023, rebounding to 82 articles in 2024, and as of 2025, the number of published articles has reached 105. For the theme of low - altitude economy, the overall number of literature was stable and small from 2011 to 2022. It increased sharply to 2976 in 2024, and as of now in 2025, the number of published articles is 3042. It can be seen that the proposal and development of low - altitude tourism in practical applications are earlier than those of low - altitude economy. However, after the concept of low - altitude economy was valued and continuously promoted at the national level, the number of research literature has grown rapidly and driven the research on the concept of low - altitude tourism.

3. Practical Modes of Integration Between Low-Altitude Economy and Tourism

3.1. Application Scenarios

3.1.1. Aerial sightseeing and tourism transportation

eVTOL technology is revolutionizing tourists' travel experiences. During peak seasons in popular tourist cities, when ground transportation becomes congested due to surging passenger flows, services such as aerial sightseeing routes and short-distance flights between scenic spots demonstrate unique advantages. Tourists can not only quickly connect airports with core scenic areas from the air, avoiding long waits on the ground, but also shuttle efficiently between different attractions. For example, traveling from urban landmarks to suburban natural scenic spots can be shortened from an hour-long drive to just 15 minutes by air.

The successful first flight of Shaanxi's first eVTOL on December 17, 2024, has injected new vitality into the local tourism industry. In the future, tourists may take it to overlook the magnificent Qinling Mountains or enjoy a "direct air ride" between the ancient city of Xi'an and the Terracotta Warriors scenic area, making the journey more time-efficient while adding a novel experience of viewing beautiful scenery from above [16].

Helicopter tours are an important form of low-altitude sightseeing. In some famous scenic spots, helicopter tours have become popular choices for tourists to enjoy high-altitude scenery [17, 18].

Hot air balloon experiences are another popular aerial sightseeing method. In scenic spots with suitable climate

conditions, hot air balloon projects attract many tourists. Tourists can float in hot air balloons to enjoy natural landscapes. At the aviation sports camp in Yangshuo, tourists can appreciate Guilin's landscapes from the sky via hot air balloons, seeing overlapping peaks with varied shapes; in Mulan Paddock in Hebei, hot air balloons offer a bird's-eye view of the grassland like a green carpet; in Xi'an Qujiang Ruins Park, hot air balloons once allowed visitors to view Qujiang from a new perspective.

3.1.2. Technology-Enabled Experiences

The development of virtual reality (VR) technology has brought new experiences to low-altitude tourism. Tourists can experience the excitement of low-altitude flight on the ground using VR devices without actual low-altitude aircraft. For example, many civil aviation or fighter pilots need ground PC training, and in civilian applications, tourists can now virtually experience fighter pilot training by wearing glasses at various air shows.

UAV formation light shows are a new form of light performance using UAVs. In some scenic spots, UAV formations are controlled via programming or AI technology to form various shapes and patterns in the air, combined with lights to create colorful visual effects. This has become a highlight tourist project for many scenic spots.

Such light shows not only enrich scenic spot activities and provide visual experiences but also enhance the popularity and reputation of tourist attractions. During the 2018 "Xi'an Has the Most Authentic Chinese New Year" event, the UAV formation performance over the city wall attracted many tourists, significantly boosting the event's popularity. Shenzhen's UAV team also impressed foreigners with their performance in Saudi Arabia [19].

3.1.3. Service Upgrades

Scenic spot UAV delivery is a key initiative combining the "last-mile" material delivery in low-altitude economy with tourism. It uses UAVs to quickly deliver supplies and goods to tourists within scenic spots. In scenic spots far from entrances/exits with inconvenient access, after tourists make purchases, merchants can use UAVs based on positioning to deliver goods to tourists in a short time, improving tourism convenience, enhancing satisfaction, and providing new marketing content to attract more visitors. For example, during mountain climbing, if there are no supply stations for a long time, tourists can place orders online, and supply stations can deliver supplies via UAVs.

Low-altitude emergency rescue is an important field integrating low-altitude economy and tourism. Emergencies may occur during travel, and low-altitude aircraft can quickly reach rescue sites to provide emergency assistance in communication and medical resources. During mountain tourism, if tourists encounter natural disasters like landslides or mudslides, low-altitude aircraft can promptly deliver rescuers and supplies, offering timely help. In crowded tourist areas, UAVs can monitor real-time passenger flow to control numbers; even in ordinary scenic spots, low-altitude aircraft can provide medical support for sick or injured tourists. For example, in previous Qinling mountain climbing incidents where tourists were in danger, low-altitude rescue played a key role [20-22].

3.2. Typical Cases

3.2.1. Shenzhen Model

Shenzhen, known for technological innovation, has built a leading domestic low-altitude economy industrial cluster, nurturing a number of influential enterprises in the field.

In aviation UAV manufacturing, DJI Innovation Technology Co., Ltd. is a global leader in consumer UAVs, with its products accounting for 70% of the global market, covering aerial photography, agricultural planting, and logistics transportation.

In low-altitude economy operation, Eastern General Aviation, a leading domestic eVTOL operator, launched the world's first cross-city and cross-bay eVTOL route, promoting commercial manned flight. The eVTOL route between Shenzhen and Zhuhai reduces travel time to only 20 minutes, compared to at least 2 hours by land [23].

In scenario application, Meituan has laid out an urban low-altitude logistics network, launching UAV food delivery in Shenzhen Central Park, business districts, etc., with a daily delivery volume exceeding 1,000 orders, 40% more efficient than traditional models.

In helicopter operation, CITIC Offshore Helicopter Co., Ltd. provides low-altitude helicopter services covering emergency rescue and aerial patrols.

In UAV application programming, Gaoju Innovation, a leading enterprise in UAV formation performances, participates in the ecological chain construction of Dayun UAV Industrial Park, providing UAV cluster control technology and solutions.

In low-altitude aircraft endurance, Qinghui Energy focuses on power battery R&D, promoting breakthroughs in long-endurance, high-safety battery technology to support performance improvement of low-altitude aircraft.

In industrial UAV development, CETC Special Aircraft Company researches industrial-grade UAVs and special aircraft for geological survey and meteorological monitoring, integrating with Shenzhen's low-altitude meteorological service needs.

E-Volo Aviation specializes in professional UAVs for police and firefighting, participating in the deployment of UAV airports in 10 streets of Shenzhen to support urban management patrols.

Numerous low-altitude economy enterprises provide important technological support for the development of low-altitude tourism in Shenzhen, achieving remarkable results in integrating low-altitude economy and tourism. Additionally, Shenzhen has strengthened infrastructure construction for low-altitude tourism and improved low-altitude flight service guarantee systems, providing a solid foundation for its development [20, 22, 24].

3.2.2. Hainan Model

Hainan Province, a renowned tourist destination in China, boasts rich tourism resources and superior natural conditions, providing broad space for integrating low-altitude economy and tourism, which in turn promotes Hainan's tourism development.

Hainan has many projects combining low-altitude economy and tourism.

In low-altitude aircraft sightseeing: there are helicopter tour routes in Sanya Haitang Bay and Sanya Bay; eVTOL aircraft operate at Sanya Mangrove Flying Base; China Southern Airlines operates cross-sea helicopter routes between Sanya and Zhanjiang, with both transportation and sightseeing functions.

Low-altitude aircraft are widely used in Hainan: UAV light shows and stunt performances are held in Sanya Phoenix Island and Haikou Bay; Hainan Culture and Tourism also uses VR technology and flight simulators in some scenic spots to

provide tourists with virtual low-altitude flight experiences.

Hainan has many characteristic theme tourism projects around low-altitude tourism: paragliding and skydiving in Wanning Shimei Bay and Lingshui Nanwan Monkey Island; plans for low-altitude sports events in Boao Aviation Town; customized services such as eVTOL wedding photography and helicopter marriage proposals in Sanya Mangrove Resort.

As a province with tourism as a pillar industry, Hainan attaches great importance to public safety, deeply integrating low-altitude economy with public services to build a low-altitude rescue network for marine and mountain rescue, and using UAVs for scenic spot security and ecological monitoring.

Hainan uses helicopters for offshore sightseeing tours, allowing tourists to overlook beautiful sea views and feel the charm of the ocean. It has also strengthened the integration of low-altitude tourism with other industries, such as culture and sports, creating a number of characteristic low-altitude tourism complexes to provide richer experiences for tourists [25, 26].

4. Development Status, Challenges and Countermeasures Outlook

4.1. Current Development Status

4.1.1. Market Scale and Growth Trends

In recent years, the integrated development of China's low-altitude economy and tourism has achieved remarkable results, with the market scale expanding continuously. Statistics show that in 2023, China's low-altitude economy scale reached 505.95 billion yuan, a year-on-year increase of 20.5%. As an important part of the low-altitude economy, low-altitude tourism has also shown rapid growth [27-29].

With increasing awareness and acceptance of low-altitude tourism, market demand continues to rise. Particularly in regions with rich tourism resources, such as Yunnan, Sichuan, and Hunan, the low-altitude tourism market has developed rapidly, becoming new highlights of local tourism.

4.1.2. Policy Support and Regional Layout

In recent years, the integrated development of China's low-altitude economy and tourism has achieved remarkable results, with the market scale expanding continuously. Statistics show that in 2023, China's low-altitude economy scale reached 505.95 billion yuan, a year-on-year increase of 20.5%. As an important part of the low-altitude economy, low-altitude tourism has also shown rapid growth [27-29].

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4.1.3. Policy Support and Regional Layout

The state has introduced a series of policies to support the integrated development of low-altitude economy and tourism, providing strong policy guarantees.

Table 1. Policies Related to Low-Altitude Economy Development Issued by the Central Government

Time	Issuer	Document/Meeting	Main Content
March 2024	Ministry of Industry and Information Technology, Ministry of Science and Technology, Ministry of Finance, Civil Aviation Administration	General Aviation Innovation Pilot Application Implementation Plan (2024-2030)	By 2027, form large-scale applications such as aviation rescue and logistics, realize commercial operation of urban air mobility, and promote low-altitude economy development.
March 2024	Second Session of the 14th National People's Congress	-	"Low-altitude economy" was first included in the government work report, emphasizing accelerating its development and coordinating related industries.
December 2022	Civil Aviation Administration	National Airspace Basic Classification	Divides national airspace into 7 categories (A, B, C, D, E, F, G), with A and E as controlled airspace and G as uncontrolled.
December 2022	Central Economic Work Conference	-	Includes low-altitude economy in strategic emerging industries.
November 2022	State Council	Regulations on the Administration of Airspace of the People's Republic of China (Draft for Comment)	Proposes establishing a new airspace management system driven by strategic emerging industries.
October 2022	Ministry of Housing and Urban-Rural Development, Ministry of Emergency Management	Technical Standards for Urban Operation Management Service Platforms	Specifies general requirements for UAV systems operating in island scenarios and serving urban operations.
June 2022	State Council, Central Military Commission	Interim Regulations on the Administration of Unmanned Aircraft Flights	Implemented on January 1, 2024, marking the entry of China's unmanned aircraft into the era of law-based management.
February 2022	Civil Aviation Administration	Special Plan for General Aviation Development During the 14th Five-Year Plan Period	Proposes consolidating and expanding general aviation infrastructure, striving for growth in flight volume (including UAVs), and improving supervision capabilities.
January 2022	State Council	14th Five-Year Plan for Tourism Development	Promotes the implementation of tourism service quality improvement plans, with low-altitude tourism as an innovative development field.
January 2022	State Council	14th Five-Year Plan for the Development of Modern Comprehensive Transportation System	Improves low-altitude economy services integrating multiple transportation modes and strengthens safety supervision.
February 2021	Civil Aviation Administration, National Development and Reform Commission, Ministry of Transport	14th Five-Year Plan for Civil Aviation Development	Proposes building an aviation service system covering both transport aviation and general aviation, with extensive and diversified services.
February 2021	Central Committee of the Communist Party of China, State Council	Outline of the National Comprehensive Transportation Network Plan	Proposes developing new transportation platforms and formats, emphasizing low-altitude economy.
May 2019	Air Traffic Management Office of Civil Aviation Administration	Guiding Opinions on Promoting the Development of Civil Unmanned Aircraft (Draft for Comment)	Proposes starting with industry and social applications, gradually accumulating experience and operational data, and improving low-altitude flight service capabilities for industry applications.
September 2018	Civil Aviation Administration	Overall Plan for the Construction of Low-Altitude Flight Service Support System	Clarifies the construction of a three-level low-altitude flight service support system (national, regional, and flight service stations).
May 2016	General Office of the State Council	Guiding Opinions on Promoting the Development of General Aviation Industry	Proposes goals such as building over 500 general airports and having over 5,000 general aircraft by 2020.
July 2014	Civil Aviation Administration	Regulations on the Administration of Low-Altitude Aviation Market (Trial) (Draft for Comment)	Specifies content related to general aviation operation permits and operation management.
November 2010	State Council, Central Military Commission	Opinions on Deepening the Reform of Low-Altitude Airspace Management in China	The overall goal is to form a new low-altitude airspace management model through 5-10 years of comprehensive construction and deepening reform.

For example, policy documents such as Guiding Opinions on Promoting the Development of General Aviation Industry and Several Opinions on Promoting the Development of Low-Altitude Economy clearly propose to promote the integration of low-altitude economy and tourism and encourage localities to develop low-altitude tourism projects.

Local governments have also actively responded to national policies, introducing relevant measures to support the integrated development of low-altitude economy and tourism.

Table 2. Policies Related to Low-Altitude Economy Development Issued by Local Governments

Region	Time	Key Policy Content
Beijing	September 30, 2024	Action Plan for High-Quality Development of Low-Altitude Economy Industry (2024-2027)
Shanghai	August 16, 2024	Action Plan for High-Quality Development of Low-Altitude Economy Industry (2024-2027)
Guangdong Province	May 21, 2024	Action Plan for Promoting High-Quality Development of Low-Altitude Economy (2024-2026)
Zhejiang Province	August 7, 2024	Several Opinions on Building a Strong Civil Aviation Province at a High Level and Creating a Highland for Low-Altitude Economy Development
Jiangsu Province	September 4, 2024	Implementation Opinions on Accelerating the High-Quality Development of Low-Altitude Economy
Shandong Province	July 2024	Three-Year Action Plan for High-Quality Development of Low-Altitude Economy (2024-2026)
Anhui Province	April 1, 2024	Implementation Plan for Accelerating the Cultivation and Development of Low-Altitude Economy (2024-2027) and Several Measures
Hunan Province	June 13, 2024	Several Policies and Measures to Support the High-Quality Development of Low-Altitude Economy in the Province
Jiangxi Province	August 9, 2024	Opinions on Promoting the High-Quality Development of Low-Altitude Economy (Draft for Comment)
Heilongjiang Province	July 29, 2024	Implementation Plan for Accelerating the Development of Low-Altitude Economy (2024-2027)
Hubei Province	July 18, 2024	Action Plan for Accelerating the High-Quality Development of Low-Altitude Economy (2024-2027)
Henan Province	July 5, 2024	Implementation Plan for Promoting the High-Quality Development of Low-Altitude Economy in the Province (2024-2027)
Shaanxi Province	July 2024	Work Plan for Promoting the High-Quality Development of Low-Altitude Manufacturing Industry (2024-2027)
Sichuan Province	June 4, 2024	Guiding Opinions on Promoting the Development of Low-Altitude Economy
Inner Mongolia Autonomous Region	June 19, 2024	Implementation Plan for High-Quality Development of Low-Altitude Economy (2024-2027) (Draft for Comment)
Tibet Autonomous Region	June 11, 2024	Several Policies to Support the High-Quality Development of Low-Altitude Economy (Draft for Comment)
Hebei Province	May 31, 2024	Several Measures to Accelerate the High-Quality Development of Low-Altitude Manufacturing Industry in Hebei Province
Shanxi Province	May 16, 2024	Several Measures to Accelerate the Development of Low-Altitude Economy and the Construction of a Demonstration Province for General Aviation

Through strengthening policy support, optimizing industrial layout, and improving infrastructure, these regions have promoted in-depth integration of low-altitude economy and tourism, achieving remarkable results.

4.1.4. Technological Innovation and Application Expansion

With continuous innovation and development of low-altitude technologies, the integration of low-altitude economy and tourism has further deepened. The emergence of eVTOLs has provided more convenient and efficient transportation tools for low-altitude tourism, expanding its market scope.

Meanwhile, UAV technology, AR/VR technology, etc., have been widely applied in low-altitude tourism. Aerial photography technology offers tourists high-altitude views; AR/VR technology allows tourists to experience the excitement of low-altitude flight on the ground, providing richer and more realistic flight tourism experiences while cultivating their interest and experience in actual flights.

4.2. Core Challenges

4.2.1. Safety and Supervision

Low-altitude airspace management involves multiple military and civilian departments, with complex procedures such as airspace division and flight approval, leading to management conflicts. For example, conflicting flight demands between military and civil aviation reduce the efficiency of airspace resource utilization. Additionally, the diversity and complexity of low-altitude flight activities pose challenges to airspace management [30].

The variety of low-altitude aircraft makes supervision difficult. Issues such as UAV flight safety and privacy protection need effective solutions. For instance, UAVs may threaten aviation safety during flight and infringe on others' privacy. Furthermore, aircraft maintenance needs to be strengthened to ensure flight safety.

4.2.2. Cost and Popularization

Low-altitude tourism products have high prices and entry barriers, restricting participation of ordinary tourists. This results in market demand focusing on high-end consumer groups, hindering popularization [31].

Moreover, the concept of low-altitude economy has only recently become known to the public, leading to low awareness of low-altitude tourism. The public may have doubts about its safety and reliability, resulting in insufficient market demand. For example, tourists may worry about the safety of low-altitude flights, fearing accidents.

The low-altitude tourism industrial chain is incomplete, with potential gaps in supporting sectors such as aircraft manufacturing, airport construction, and tourism services, leading to insufficient product quality and service levels. For example, the lag in general airport construction in some regions cannot meet the development needs of low-altitude tourism.

4.2.3. Inadequate Infrastructure

The number of general airports in China is small with low coverage, failing to meet the needs of low-altitude tourism. For example, in regions rich in tourism resources like Yunnan and Sichuan, the small number of general airports cannot

provide sufficient support for low-altitude tourism, increasing operational costs and restricting its development [30, 32].

The low-altitude tourism route network is also inadequate, failing to meet tourists' travel needs. For example, inconvenient routes between some scenic spots require tourists to spend more time traveling, affecting market competitiveness.

4.3. Policy Optimization Paths

4.3.1. Government Level

The government should promote integrated development of low-altitude economy and tourism from multiple aspects.

It should strengthen communication and coordination with relevant departments, simplify low-altitude airspace approval procedures, create favorable conditions for enterprises or individuals to use low-altitude airspace, and strengthen management and supervision to ensure safety of low-altitude airspace and ground areas.

The government should formulate sound safety standards for the low-altitude tourism industry, strengthen supervision of enterprises' projects, clarify safety responsibilities and obligations in tourism projects, regulate aircraft maintenance and pilot operating procedures, improve flight safety, and ensure the safety of all stakeholders.

It should increase policy support for integrated development, introduce preferential policies such as tax incentives and financial subsidies for low-altitude tourism enterprises, encourage tourism enterprises to develop low-altitude tourism, and promote healthy and sustainable development of the industry.

4.3.2. Enterprise Level

Enterprises should develop differentiated low-altitude tourism products based on market demand to meet personalized needs of different tourists. While launching diverse products, they should continuously strengthen innovation, improve quality and service levels, and enhance market competitiveness.

Enterprises should strengthen brand building to improve visibility and reputation. This can be achieved through enhanced marketing to increase brand exposure, providing high-quality products and services to establish a good brand image, and organizing brand activities to enhance influence.

4.4. Future Trends

4.4.1. Technology-Driven Development

The integration of low-altitude economy and tourism should be technology-driven.

The continuous development of eVTOL technology and its gradual commercial application have expanded tourists' travel options, providing more convenient and efficient transportation in tourism and becoming part of tourism project development.

With the advancement of real-time high-definition image transmission technology, tourists can experience the charm of low-altitude viewing through first-person UAV aerial photography without actual flight.

The popularization of flight simulators brings new opportunities to low-altitude tourism. VR devices provide more realistic flight experiences, stimulating tourists' interest and popularizing flight knowledge.

The rapid development of UAVs, artificial intelligence, and 5G communication technologies has driven the extension of the low-altitude economy industrial chain and enrichment of application scenarios. Mature UAV formation performance technology enhances the appeal of UAV light shows, enriching tourism projects; AI and 5G technologies provide more efficient safety management and communication links for low-altitude flights. Continuous technological innovation to reduce costs, improve efficiency, and enhance tourist experiences is essential for the integrated development of low-altitude economy and tourism.

4.4.2. Industrial Synergy

As an emerging economic form, the low-altitude economy is deeply integrating with agriculture, culture, and other industries, developing more characteristic tourism products and injecting new vitality into the tourism market.

Integration with agriculture has spawned unique tourism experiences. For example, low-altitude agricultural tourism projects allow tourists to overlook farmland scenery by low-altitude aircraft or even control UAVs or pesticide sprayers. This enriches rural tourism, creates jobs for local residents, increases incomes, and provides tourists with popular science experiences combining technology and agriculture. Integrating with rural tourism, it creates characteristic rural tourism products and comprehensive tourist destinations.

Integration with culture has brought new growth points to the cultural tourism industry. Low-altitude aircraft allow tourists to appreciate cultural heritage, historical buildings, and natural landscapes from new perspectives, enhancing experiences. Additionally, low-altitude aircraft can be used in cultural performances, such as UAV light shows and aerial stunt performances, further enriching cultural tourism content.

5. Conclusion

5.1. Structural Transformation Role of Low-Altitude Economy in Tourism

5.1.1. Consumption Upgrading

The development of low-altitude economy has brought new consumption experiences to tourism, meeting tourists' personalized and diversified needs. The emergence of low-altitude tourism products allows tourists to appreciate natural landscapes from the air, driving consumption upgrading in tourism. For example, low-altitude sightseeing and flight experiences offer new perspectives of scenic spots, increasing tourism interest and attractiveness.

Meanwhile, the development of low-altitude economy has promoted upgrading of tourism consumption. Tourists now pay more attention to product quality and service, and are willing to pay higher prices for high-quality products and services.

5.1.2. Industrial Chain Extension

The integration of low-altitude economy and tourism has extended the tourism industrial chain, promoting development of related industries. It has driven growth in aircraft manufacturing, airport construction, and tourism services, providing strong support for tourism. For example, low-altitude tourism requires high-quality aircraft from manufacturers, complete airport facilities from construction enterprises, and quality services from tourism providers. The development of these industries not only supports low-altitude tourism but also injects new vitality into tourism.

5.2. Dual-Drive of Policy Innovation and Technological R&D

5.2.1. Importance of Policy Innovation

Formulating relevant policies provides institutional

guarantees for the development of low-altitude economy and tourism, solves industrial development problems, and promotes healthy growth.

Since 2021, both central and local governments have continuously introduced policies and regulations on low-altitude economy, greatly promoting its development. Strong policy support is a powerful pillar for integrating low-altitude economy and tourism. The government can introduce policies to encourage enterprises related to low-altitude economy to develop low-altitude tourism equipment and tourism enterprises to develop projects, achieving balance between supply and demand sides.

5.2.2. Supporting Role of Technological R&D

Technological R&D provides innovative impetus for the integrated development of low-altitude economy and tourism, promoting high-quality industrial growth.

The emergence of low-altitude economy stems from continuous technological innovation in the low-altitude industrial chain, making R&D crucial for integration. Only through strengthened R&D can safer and more comfortable low-altitude tourism projects be provided, while the expanding market can drive technological progress in the low-altitude economy industrial chain. Joint efforts from both supply and application sides are needed to promote sustainable development of low-altitude economy and tourism.

In summary, the integrated development of low-altitude economy and tourism is an important trend in future tourism development. Governments and enterprises should strengthen cooperation to promote in-depth integration, drive innovation in tourism service models and high-quality development. Tourism development can also feed back and promote the low-altitude industrial chain. Through policy innovation, technological R&D, and continuous improvement of low-altitude tourism products and services, we can enhance safety and comfort, meet diversified tourist needs, and make greater contributions to economic growth and social development.

Acknowledgements

This work is supported by Shaanxi Provincial Social Science Fund Project Project Number: 2024R047 and Graduate Research Fund Project of Xi'an International Studies University Project Number: 2025SS049.

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