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Research on the Development of New-Quality Productive Forces Driven by the Low-Altitude Economy under the Coupling of Finance, Technology and Policy

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Abstract: In March 2024, the low-altitude economy was included in the Government Work Report for the first time, marking that it has been elevated to an important development direction at the national strategic level and has become a key carrier for fostering new-quality productive forces. Against the dual backdrop of global industrial transformation and domestic economic restructuring, the low-altitude economy, characterized by its long industrial chain, high technological content, and strong driving force, is gradually reshaping the pattern of economic development. This paper systematically sorts out the core theoretical connotations of the low-altitude economy and new-quality productive forces, and conducts an in-depth analysis of the internal logical connection between the two. Combining with China's low-altitude economy development environment, industrial structure and current situation, it focuses on exploring the coupling mechanism of the three major factors (finance, technology and policy) and their role in promoting the development of productive forces. The research shows that the low-altitude economy takes finance as the medium for capital circulation, technology as the orientation for innovative development, and policy as the support for standardization and guarantee. The synergistic effect formed by the three effectively breaks through the bottlenecks in industrial development, accelerates the process of technological progress and industrial upgrading, and injects sustained impetus into the growth of new-quality productive forces. This paper aims to provide theoretical references and practical paths for the high-quality development of the low-altitude economy and new-quality productive forces.

Keywords: Low-Altitude Economy; New-Quality Productive Forces; Financial Support; Technological Innovation; Policy Coordination

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1.Introduction

Against the backdrop of the accelerated evolution of the new global technological revolution and industrial transformation, the low-altitude economy, as a strategic emerging industry integrating new technologies, new business forms, and new models, is becoming a new economic frontier contested by countries worldwide. In 2024, China's Government Work Report included the low-altitude economy for the first time, explicitly proposing to "actively build new growth engines such as the low-altitude economy," highlighting its strategic position in national economic development[1]. Meanwhile, developing new-quality productive forces has become an inherent requirement and key focus for promoting high-quality development. With

its prominent characteristics of intensive innovation factors, high technological content, and strong industrial driving force, the low-altitude economy is naturally a typical representative of new-quality productive forces.

From the perspective of industrial development trends, China's low-altitude economy is undergoing a critical transition from the concept introduction stage to the high-speed growth stage. Data shows that the market size of China's low-altitude economy reached approximately 505.95 billion yuan in 2023, is expected to jump to 970.25 billion yuan in 2024, will exceed 1.5 trillion yuan in 2025, and is projected to reach 3.5 trillion yuan by 2035. Behind this exponential growth lies the combined effect of policy support, technological breakthroughs, and market demand. At the policy level, the policy system from the central to local governments is continuously improving, removing institutional barriers for the development of the low-altitude economy; at the technological level, the integrated application of new energy, artificial intelligence, and communication technologies is driving continuous upgrades in aircraft performance; at the market level, the increasing demand from diverse scenarios such as logistics and distribution, emergency rescue, and cultural tourism consumption is providing broad space for industrial development. However, the development of China's low-altitude economy still faces many challenges: there are shortcomings in core technology fields, with some components such as high-end chips and key materials relying on imports; the financial support system is still incomplete, with prominent issues of difficult and expensive financing for asset-light enterprises; policy details such as airspace management and safety supervision need further refinement. In this context, in-depth research on the intrinsic connection between the low-altitude economy and new-quality productive forces, and exploration of the coupled development path of finance, technology, and policy, are of important practical urgency.

2.Theoretical Connotations and Relationships between the Low-Altitude Economy and New-Quality Productive Forces

2.1 Definition of Core Concepts

2.1.1 Connotation and Characteristics of the Low-Altitude Economy

The low-altitude economy refers to the general term for economic activities such as production, services, and consumption carried out through the in-depth integration of aircraft with information technology, new energy technology, etc., utilizing low-altitude airspace resources below 1,000 meters above sea level. It is an economic form with both innovativeness and comprehensiveness. Its core composition includes three dimensions: first, the spatial carrier, i.e., low-altitude airspace resources, which are characterized by scarcity and controllability [2]; second, technical support, covering core technologies such as aircraft R&D and manufacturing, communication and navigation, and intelligent control [3]; third, application scenarios, including logistics and transportation, emergency rescue, cultural tourism consumption, and other diverse fields.

The low-altitude economy has distinct industrial characteristics: first, it has a long industrial chain, covering a complete ecosystem of upstream raw materials and core components, midstream aircraft manufacturing, and downstream application services, which can drive the development of multiple industries such as new materials, electronic information, and high-end manufacturing; second, it has high technological content, integrating cutting-edge technologies such as new energy, artificial intelligence, Beidou navigation, and 5G-A, with a fast pace of technological iteration; third, it has strong driving capacity. It is estimated that every 1 yuan of output value generated by the low-altitude economy can drive related industries to produce 6-8 yuan of added value; fourth, it has great development potential. At present, the utilization rate of China's low-altitude airspace resources is less than 15%, and with the improvement of openness, the market space will continue to expand.

2.1.2 Connotation and Characteristics of New-Quality Productive Forces

New-quality productive forces refer to a new form of productive forces dominated by scientific and technological innovation, with the core connotation of the upgrading of laborers, means of labor, objects of labor, and their optimal combination, and with the improvement of total factor productivity as the core. Its core characteristics are reflected in three aspects: first, innovation-driven, different from the growth model of traditional productive forces relying on the input of resource factors, new-quality productive forces take technological innovation, model innovation, and institutional innovation as the core driving forces; second, quality and efficiency first, focusing on the quality and efficiency of development, pursuing the improvement of total factor productivity rather than mere scale expansion; third, green and low-carbon, conforming to the

requirements of high-quality development, and balancing economic and ecological benefits.

The cultivation of new-quality productive forces needs to rely on strategic emerging industry carriers, and the low-altitude economy is a typical representative. As General Secretary Xi Jinping emphasized, "developing new-quality productive forces is an inherent requirement and important focus for promoting high-quality development." Through technological innovation and industrial integration, the low-altitude economy is becoming an important growth pole for cultivating new-quality productive forces.

2.2 Intrinsic Relationship between the Low-Altitude Economy and New-Quality Productive Forces

2.2.1 The Low-Altitude Economy is an Important Industrial Carrier of New-Quality Productive Forces

The development process of the low-altitude economy is essentially the process of the formation and release of new-quality productive forces. At the level of production factors, the low-altitude economy promotes the upgrading of means of labor. New aircraft such as drones and eVTOLs replace traditional production tools, significantly improving production efficiency; at the level of production methods, the integration of digital and intelligent technologies with traditional industries has spawned new production models such as smart agricultural plant protection and intelligent logistics distribution; at the level of industrial forms, it has cultivated new business forms such as drone operations and low-altitude traffic management, promoting the upgrading of industrial structure to high-end.

For example, the application of drones in the agricultural field has increased plant protection efficiency by more than 50 times and reduced the operation cost per mu by 30%; low-altitude logistics distribution has shortened the delivery time in remote areas from several days to several hours, all of which reflect the core characteristic of new-quality productive forces of "priority to quality and efficiency." Data shows that the total factor productivity of industries related to the low-altitude economy is more than 40% higher than that of traditional industries, becoming an important manifestation of new-quality productive forces.

2.2.2 New-Quality Productive Forces Provide Direction Guidance for the Development of the Low-Altitude Economy

The development requirements of new-quality productive forces have pointed out the upgrading path for the low-altitude economy. In terms of the direction of technological innovation, new-quality productive forces emphasize the independent controllability of core technologies, promoting the low-altitude economy to make breakthroughs in "bottleneck" fields such as high-end chips and autonomous flight control; in terms of industrial development models, new-quality productive forces advocate green and low-carbon development, guiding the transformation of low-altitude economy aircraft to electrification and hydrogenation; in terms of value realization, new-quality productive forces focus on people's well-being, promoting the expansion of the application of the low-altitude economy in public service fields such as emergency rescue and medical care [4]. The two form a positive cycle of mutual promotion: technological breakthroughs and industrial upgrading of the low-altitude economy drive the development of new-quality productive forces, and the development requirements of new-quality productive forces lead the low-altitude economy towards higher quality and more sustainable development.

3.Development Environment, Industrial Structure and Current Status of China's Low-Altitude Economy

3.1 Analysis of Development Environment

3.1.1 Policy Environment: Coordinated Advancement of Top-Level Design and Local Practice

China has established a policy system featuring "central overall planning and local implementation," providing institutional guarantees for the development of the low-altitude economy. At the central level, the National Comprehensive Multi-Dimensional Transportation Network Planning Outline (2021) incorporated the concept of the low-altitude economy for the first time; the 2024 Government Work Report listed it as a new growth engine; and the Interim Regulations on the Management of Unmanned Aerial Vehicle (UAV) Flights officially took effect in January 2024, regulating UAV flight activities. Multiple departments have collaborated to play their respective roles: the Ministry of Transport is responsible for airspace opening and infrastructure construction, the Civil Aviation Administration of China (CAAC) oversees standard-setting and safety supervision, and the Ministry of Industry and Information Technology (MIIT) promotes technological

innovation and industrial development[5].

At the local level, various regions have issued specialized policies, forming a pattern of differentiated development. Shenzhen, known as the "UAV Capital," took the lead in establishing a low-altitude economy legal system through local legislation; Hunan Province released the Low-Altitude Economy Development Plan (2024-2030), proposing to build a central China low-altitude economy hub; and provinces such as Anhui and Sichuan have set up pilot demonstration zones to explore application scenario models. By the end of 2024, more than 20 provinces across the country had issued policies related to the low-altitude economy, and policy dividends continued to be released.

3.1.2 Technological Environment: Multi-Field Technological Breakthroughs Lay the Foundation for Development

China has achieved multiple breakthroughs in low-altitude economy-related technological fields, providing technical support for industrial development. In terms of aircraft manufacturing, a full-range product system—from micro-UAVs to large-scale eVTOLs (electric Vertical Take-Off and Landing aircraft)—has been formed. DJI Innovations holds over 70% of the global consumer UAV market share, and EHang Intelligent's autonomous eVTOLs have launched commercial demonstration operations. In the field of core components, the localization rate of flight control systems has exceeded 60%, and the accuracy of Beidou high-precision positioning modules has reached the centimeter level.

In terms of supporting technologies, China's 5G-A technology leads the world and has achieved low-altitude coverage in multiple pilot areas; the production capacity of carbon fiber composite materials is growing rapidly, expected to reach over 150,000 tons by 2025, effectively reducing aircraft manufacturing costs; the application of artificial intelligence (AI) in autonomous obstacle avoidance and path planning has been continuously deepened, improving flight safety and efficiency. However, there are still shortcomings in areas such as high-end aviation-grade chips and high-energy-density batteries, which require further breakthroughs.

3.1.3 Market Environment: Joint Force of Demand Expansion and Capital Entry

China's large market scale and diversified demand provide broad space for the development of the low-altitude economy. In the consumer sector, demand for aerial tours and film/television aerial photography continues to grow, with the 2024 consumer UAV market scale exceeding 20 billion yuan; in the production sector, industrial applications such as agricultural plant protection and power inspection have spread rapidly, with the national agricultural UAV operation area exceeding 1 billion mu (approximately 66.7 million hectares); in the public service sector, scenarios such as emergency rescue and medical transportation have been continuously expanded, with UAVs participating in over 10,000 emergency rescue operations in 2024.

At the capital level, the low-altitude economy has become an investment hotspot, forming a multi-level capital support system. By the end of 2024, China had established more than 10 provincial-level low-altitude economy industrial funds, among which the Zhejiang Airport Low-Altitude Economy Equity Investment Fund reached a scale of 3 billion yuan. The banking industry has actively deployed resources: banks such as SPD Bank and Bank of Communications have launched specialized financial products. As of 2024, the balance of technology loans of SPD Bank Shenzhen Branch exceeded 80 billion yuan, serving nearly 200 low-altitude economy-related enterprises[6].

3.2 Analysis of Industrial Structure

China's low-altitude economy has formed a complete industrial chain ecosystem covering the upstream, midstream, and downstream, with distinct value distribution and development characteristics in each link.

3.2.1 Upstream: Infrastructure and Core Components Support Industrial Development

The upstream link includes raw materials, core components, and infrastructure, serving as the cornerstone of industrial development, accounting for approximately 30% of the total value. In the raw materials field, the supply of metal materials such as aluminum alloy and titanium alloy is sufficient, with aluminum alloy output expected to reach 17.72 million tons by 2025; the production capacity of carbon fiber composite materials is growing rapidly, gradually realizing import substitution. In the core components field, five core segments are formed: power systems, flight control systems, navigation and communication systems, perception systems, and key chips. Among them, the flight control system has the highest

localization rate, while power systems and key chips remain weak links.

In the infrastructure field, the construction of general airports and low-altitude traffic management systems has accelerated. By the end of November 2024, the number of general airports in China had reached 470, an increase of 60% compared with 2020; the civil unmanned aerial vehicle integrated management platform was put into operation, providing integrated services such as airspace delineation and flight application. However, infrastructure still faces the problem of uneven regional distribution—the density of general airports in eastern China is more than three times that in central and western regions.

3.2.2 Midstream: Aircraft Manufacturing Becomes the Core of Value

The midstream link focuses on aircraft whole-machine manufacturing, which is the most technology-intensive and high-value-added segment, accounting for approximately 50% of the total value. This link can be divided into two categories: traditional general aviation aircraft and new-type unmanned aerial vehicles. In the traditional general aviation aircraft field, the manufacturing of helicopters and fixed-wing aircraft has developed steadily, with 3,226 registered general aviation aircraft and 1.23 million flight hours in 2024.

New-type unmanned aerial vehicles are the core of growth, forming two major segmented markets: consumer-grade and industrial-grade. In the consumer-grade UAV market, Chinese enterprises dominate globally, with companies such as DJI Innovations and Zero Tech leading in technology; in the industrial-grade UAV market, enterprises such as SF Express's Fengniao and EHang Intelligent have made breakthroughs in logistics and transportation, with the test flight success rate of eVTOL prototypes exceeding 95%. In 2024, the number of UAV operation enterprises in China was nearly 19,000, with 2.158 million registered UAVs and 25.449 million flight hours, a year-on-year increase of 15.3%.

3.2.3 Downstream: Expansion of Application Scenarios Releases Industrial Value

The downstream link covers diversified application scenarios and services, serving as the outlet for value realization. Although it accounts for only about 20% of the total value, it has the strongest radiating and driving effect. According to application fields, it can be divided into three categories: first, production services, including agricultural plant protection, power inspection, and geographic surveying and mapping, with a 2024 market scale exceeding 300 billion yuan, accounting for the largest share; second, consumer services, including aerial tours, film/television aerial photography, and competitive sports, with the fastest growth rate (a year-on-year increase of 45% in 2024); third, public services, including emergency rescue, medical transportation, and urban patrol, featuring obvious policy-driven characteristics and having been applied regularly in more than 20 provinces.

The innovative development of the downstream link has promoted the transformation of the low-altitude economy from a single business form to a comprehensive economic form. For example, "UAV + logistics" has reduced logistics costs in rural and remote areas, and "eVTOL + medical care" has shortened emergency rescue response time to less than 30 minutes. These scenario applications fully reflect the role of the low-altitude economy in improving productivity.

3.3 Current Development Status and Existing Problems

3.3.1 Current Development Status

China's low-altitude economy has entered a stage of high-speed development, showing a sound momentum of rapid scale growth, continuous structural optimization, and enhanced innovation vitality. In terms of scale, the market size reached 505.95 billion yuan in 2023 and is expected to exceed 970 billion yuan in 2024, nearly doubling in two years; in terms of structure, the proportion of high-value-added industrial applications increased from 40% in 2020 to 60% in 2024, with the industrial structure upgrading to high-end; in terms of innovation, the number of patent applications related to the low-altitude economy exceeded 100,000 in 2024, a 200% increase compared with 2020, leading the world in technological innovation activity.

Regional development has formed a characteristic pattern: eastern China focuses on technology R&D and scenario application, with Shenzhen, Shanghai, and Guangzhou becoming core industrial cities; central China relies on its manufacturing foundation to develop the aircraft manufacturing industry, with Hunan and Anhui forming industrial clusters; western China leverages its airspace resource advantages to focus on low-altitude tourism and logistics services. This pattern of differentiated regional development is in line with China's resource endowments and industrial foundation, promoting the

balanced development of the low-altitude economy.

3.3.2 Existing Problems

Despite significant progress, the development of China's low-altitude economy still faces many challenges. At the technological level, there are shortcomings in core components: the localization rate of high-end aviation-grade MCU (Microcontroller Unit) and FPGA (Field-Programmable Gate Array) chips is less than 30%, and solid-state batteries are still in the laboratory stage, restricting the improvement of aircraft performance; the reliability of autonomous flight control systems under complex weather conditions needs to be improved, affecting large-scale commercial applications.

At the financial level, the adaptability of the financing system is insufficient. Most low-altitude economy enterprises are asset-light technology-based enterprises, lacking traditional collateral and thus struggling to meet bank credit requirements; venture capital is mostly concentrated in enterprises in the growth stage, with prominent financing difficulties in the early R&D stage; financial product innovation is insufficient, and there are few exclusive products for the low-altitude economy (such as specialized insurance and supply chain finance), which cannot cover the diversified needs of industrial development.

At the policy level, airspace management still needs optimization: the delineation of low-altitude airspace is not clear enough, the cross-regional flight approval process is complicated, and some regions face the problem of "visible airspace but unallowable flights"; the standard system is not yet sound: standards in aircraft certification, flight safety, and data management are missing or inconsistent, affecting the standardized development of the industry; safety supervision capabilities need to be enhanced: the coverage of low-altitude traffic management systems is insufficient, and supervision methods for illegal activities such as "unauthorized flights" are limited.

4.Mechanism of the Low-Altitude Economy Driving the Development of New-Quality Productive Forces under the Coupling of Finance, Technology, and Policy

4.1 Financial Factor: Core Support for Capital Circulation and Risk Sharing

4.1.1 Main Paths of Financial Support for the Low-Altitude Economy

Finance provides all-round support for the development of the low-altitude economy through three core functions: capital circulation, risk sharing, and resource allocation. In terms of capital circulation, a multi-level system of "debt + equity + policy funds" has been established.

For debt financing: Banks have launched products such as intellectual property pledge loans and supply chain finance. For instance, Bank of Shanghai provides patent pledge loans for agricultural UAV enterprises, while China Minsheng Bank supports aircraft projects through park development loans.

For equity financing: Venture capital institutions and industrial funds have actively deployed resources. The first phase of the Zhejiang Airport Low-Altitude Economy Fund, with a scale of 1 billion yuan, has completed investments, focusing on supporting aircraft manufacturing enterprises.

For policy funds: The central and local governments have set up special subsidies to provide financial support for technology R&D and scenario demonstration projects.

In terms of risk sharing, insurance institutions have developed exclusive products to cover the full-chain risks of aircraft manufacturing, operation, and maintenance. For example, a combined insurance product ("aircraft hull insurance + third-party liability insurance + cargo transportation insurance") has been launched for logistics UAVs, effectively reducing the operational risks of enterprises.

In terms of resource allocation, financial institutions guide capital to concentrate on core technology and high-value-added fields through credit orientation and investment preferences. In 2024, financing for the core technology sector of the low-altitude economy accounted for 70% of the total, promoting the upgrading of the industrial structure.

4.1.2 Case Analysis of Finance Addressing Development Bottlenecks of the Low-Altitude Economy

The practice of SPD Bank (Shanghai Pudong Development Bank) serves as a typical example of financial support for the low-altitude economy. Its Shanghai Branch, in collaboration with Shanghai Low-Altitude Economy Development Co., Ltd., jointly established the "Low-Altitude Financial Service Research Institute"—China's first professional financial research institution dedicated to the low-altitude economy.To address the asset-light nature of low-altitude economy enterprises, SPD

Bank innovatively launched a "technology-driven" credit model. Instead of relying on traditional collateral, credit is granted based on indicators such as an enterprise's R&D investment, number of patents, and technical team. By the end of 2024, the bank had provided financing support to nearly 200 low-altitude technology enterprises, with start-ups accounting for 40%, effectively resolving the financing difficulties faced by early-stage enterprises.

The Zhejiang Airport Low-Altitude Economy Fund exerts its role through a "fund + scenario + infrastructure" model. In addition to providing capital support to enterprises, the fund leverages the resource advantages of Zhejiang Airport Group to offer invested enterprises resources such as apron space, flight test sites, and scenario demonstration opportunities. For example, an eVTOL enterprise invested by the fund obtained test site support from Hangzhou Xiaoshan Airport through the fund platform, accelerating the commercialization of its technology and shortening the cycle from R&D to demonstration operation by 18 months.

4.2 Technological Factor: Core Driver of Innovation and Efficiency Improvement

4.2.1 Path of Core Technological Breakthroughs Promoting Industrial Upgrading

Technological innovation is the core driver of the low-altitude economy's development. It fosters and advances new-quality productive forces by upgrading production tools, transforming production methods, and innovating industrial forms.

In upgrading production tools: New aircraft such as UAVs and eVTOLs have replaced traditional tools, achieving a leap in production efficiency. For example, power inspection UAVs have replaced manual inspection, increasing efficiency by more than 10 times and raising the fault detection rate from 60% to 95%.

In transforming production methods: Digital and intelligent technologies have driven the in-depth integration of the low-altitude economy with traditional industries. In smart agriculture, UAVs combined with AI technology enable precise sowing, fertilization, and plant protection, increasing per-mu yield by 10% and reducing pesticide usage by 30%. In intelligent logistics, UAVs integrated with big data realize path optimization and intelligent scheduling, improving distribution efficiency by 50%.

In innovating industrial forms: Technological breakthroughs have spawned new business formats such as urban air mobility, low-altitude tourism, and UAV logistics, expanding the space for economic development.

4.2.2 Typical Case of Technological Innovation Fostering New-Quality Productive Forces

EHang Intelligent's autonomous eVTOL technology is a typical representative of technological innovation fostering new-quality productive forces. The company's independently developed EH216-S autonomous eVTOL integrates multiple core technologies, including flight control systems, navigation and communication, and artificial intelligence, enabling fully autonomous flight, intelligent obstacle avoidance, and cluster scheduling.In the demonstration operation in Nansha, Guangzhou, this aircraft has completed over 10,000 manned flights, with an on-time rate of 99%, shortening the 30-kilometer ground travel time from 1 hour to 15 minutes.

This technology has not only driven the innovation of low-altitude transportation formats but also promoted the development of upstream and downstream industries.Upstream: It has advanced the upgrading of material and component industries such as carbon fiber composites and high-energy-density batteries.Midstream: It has formed large-scale manufacturing capabilities for autonomous eVTOLs.Downstream: It has spawned new business formats such as air taxis and sightseeing tours.

It is estimated that the industrial chain related to this technology has created an output value of over 10 billion yuan, with total factor productivity 60% higher than that of the traditional aviation industry—fully demonstrating the role of technological innovation in fostering new-quality productive forces.

4.3 Policy Factor: Core Guarantee for Standardized Guidance and Support

4.3.1 Main Dimensions of Policy Support for the Low-Altitude Economy

Policies provide guarantees for the development of the low-altitude economy through three key dimensions: institutional supply, planning guidance, and regulatory standardization.

In institutional supply: A sound legal and regulatory system defines the institutional framework for industrial development. The Interim Regulations on the Management of Unmanned Aerial Vehicle Flights clarifies the classified management standards and flight rules for UAVs, resolving the issue of "lack of legal basis." At the local level, legislation on the low-

altitude economy refines policy measures based on regional realities, providing specific guidance for industrial development.

In planning guidance: Development plans at the central and local levels clarify the direction and key tasks of industrial development. National-level plans focus on core technological breakthroughs, infrastructure construction, and airspace opening. Local plans, based on regional advantages, define differentiated development paths—for example, Shenzhen focuses on technology R&D and scenario application, while Hunan focuses on aircraft manufacturing.

In regulatory standardization: A supervision system featuring "government supervision + industry self-regulation + technical support" has been established. Intelligent supervision is realized through the Civil Unmanned Aerial Vehicle Integrated Management Platform, ensuring the safe development of the industry[7].

4.3.2 Practical Case of Policies Guiding the Healthy Development of the Industry

Shenzhen's policy practice on the low-altitude economy serves as a model for policies guiding the healthy development of the industry. As a pioneer city in China's low-altitude economy development, Shenzhen has promoted the rapid development of the low-altitude economy through a policy path of "legislation first, planning guidance, and pilot breakthroughs."

In legislation: The Regulations on Promoting the Low-Altitude Economy of the Shenzhen Special Economic Zone, issued in 2024, is China's first local regulation on the low-altitude economy, clarifying key systems such as airspace management, infrastructure construction, and safety supervision[8].

In planning: Shenzhen has formulated the Low-Altitude Economy Development Plan (2024-2030), proposing an industrial layout of "one core, two zones, and three belts" and setting a target of achieving a low-altitude economy scale of over 100 billion yuan by 2025.

In pilots: Low-altitude economy demonstration zones have been established in districts such as Bao'an and Longhua to carry out scenario pilots in UAV logistics and air transportation, forming a policy implementation mechanism of "pilot - summary - promotion."

By the end of 2024, Shenzhen had over 3,000 low-altitude economy enterprises, accounting for 25% of the national total, demonstrating the remarkable effectiveness of policy guidance.

4.4 Coupling Mechanism of the Three Factors and Their Role in Driving New-Quality Productive Forces

4.4.1 Formation Path of the Finance-Technology-Policy Coupling Mechanism

The three factors—finance, technology, and policy—do not function in isolation but form a mutually promoting and supporting coupling mechanism:

Policy provides institutional guarantees for the development of finance and technology. It guides financial capital to flow into core technology fields by establishing special funds and introducing subsidy policies.

Finance provides capital support for technological innovation. It drives technology from the laboratory to the market through R&D loans and venture capital.

Technological breakthroughs provide support for financial innovation and policy optimization. The application of new technologies generates new financial demands and promotes the continuous improvement of policies.

Specifically, the formation of the coupling mechanism includes three stages:

Policy Guidance Stage: The government guides financial capital to focus on the low-altitude economy's technology sector by issuing development plans and support policies.

Financial Empowerment Stage: Financial institutions innovate products and services to provide capital support for technology R&D and industrialization.

Collaborative Upgrading Stage: Technological breakthroughs drive industrial development, which in turn triggers new policy demands and financial innovations, forming a positive cycle.

4.4.2 Internal Logic of the Coupling Effect Driving New-Quality Productive Forces

The coupling effect of the three factors drives the development of new-quality productive forces by improving total factor productivity[9], which is specifically reflected in three aspects.Efficiency Improvement Effect: Policies optimize airspace resource allocation, finance supports infrastructure construction, and technology enhances aircraft performance. The three

factors work together to improve the operational efficiency of the low-altitude economy, thereby driving efficiency upgrades in related industries.Innovation-Driven Effect: Policies provide innovation incentives, finance shares innovation risks, and technology achieves innovation breakthroughs. This forms an innovation ecosystem, promoting technological progress and model innovation.

Structure Optimization Effect: By guiding capital and technology to concentrate in high-end fields, it drives the industrial structure toward high-end, intelligent, and green upgrading, fostering new industrial growth points.

Take the UAV logistics industry as an example:At the policy level: The Civil Aviation Administration of China (CAAC) has approved pilot projects for the construction of low-altitude UAV logistics systems, simplifying flight approval procedures.At the financial level: Industrial funds invest in logistics UAV enterprises, and banks provide supply chain financial services.At the technical level: Breakthroughs have been made in autonomous flight control and navigation communication technologies.

The coupling of these three factors has promoted the large-scale application of UAV logistics. In 2024, the national UAV logistics delivery volume exceeded 100 million items, a 300% increase compared with 2022. Logistics efficiency has more than doubled, and logistics costs have decreased by 30%—fully demonstrating the role of the coupling effect in driving new-quality productive forces.

5.Conclusions and Path Recommendations

5.1 Research Conclusions

Through theoretical and practical research on the low-altitude economy and new-quality productive forces, this paper draws the following conclusions:First, there is a close intrinsic connection between the low-altitude economy and new-quality productive forces. As a strategic emerging industry intensive in innovation factors, the low-altitude economy serves as an important industrial carrier for new-quality productive forces; meanwhile, the development requirements of new-quality productive forces provide directional guidance for the low-altitude economy, and the two form a positive cycle of mutual promotion.Second, major countries around the world have formed differentiated development models for the low-altitude economy. The market-led model of the United States, the collaborative linkage model of Europe, and the policy-driven model of Japan all reflect the synergy of financial, technological, and policy factors. Their experiences in airspace management, technological innovation, and policy coordination hold important reference value for China.Third, China's low-altitude economy has formed a complete industrial ecosystem, with a continuously optimized policy environment, continuous breakthroughs in technological innovation, and growing market demand. However, it still faces problems such as shortcomings in core technologies, insufficient financial support, and incomplete policy details, which restrict the high-quality development of the industry.Fourth, the coupling mechanism of the three major factors—finance, technology, and policy—is the core driving force for the development of the low-altitude economy. Policies provide institutional guarantees, finance provides capital support, and technology provides innovation momentum. The synergistic effect formed by the three effectively breaks through the bottlenecks in industrial development, and promotes the sustained growth of new-quality productive forces through efficiency improvement, innovation-driven development, and structural optimization.

5.2 Path Recommendations

5.2.1 Build a Multi-Level Financial Support System and Strengthen Capital Guarantee Capabilities

First, innovate financial products and services. In response to the asset-light characteristics of low-altitude economy enterprises, promote financing models such as intellectual property pledge and equity pledge; develop combined "loan + insurance + guarantee" products to reduce financing risks. Draw on SPD Bank's "technology-focused" credit model to establish a credit evaluation system suitable for technology-based enterprises.

Second, improve capital market support. Encourage qualified low-altitude economy enterprises to go public for financing and set up a dedicated low-altitude economy section on the Science and Technology Innovation Board (STAR Market); expand the scale of industrial funds, guide the participation of social capital, and form a multi-level investment system consisting of "government-guided funds + industrial funds + venture capital funds". Refer to the model of Zhejiang Airport Fund to realize comprehensive empowerment of "capital + scenarios + resources".

Third, improve the risk-sharing mechanism. Promote insurance institutions to develop exclusive products such as aircraft

manufacturing insurance, operation insurance, and liability insurance; establish a government risk compensation fund to provide appropriate compensation for low-altitude economy loan losses of financial institutions; explore a "regulatory sandbox" mechanism to provide a fault-tolerance space for financial innovation.

5.2.2 Break Through Core Technology Bottlenecks and Enhance Independent Innovation Capabilities

First, focus on key technology research. Establish a list of "bottleneck" technologies and prioritize breakthroughs in core fields such as high-end aviation-grade chips, solid-state batteries, and autonomous flight control systems. Build an industry-university-research collaborative innovation platform, encourage enterprises to set up joint laboratories with universities and research institutes, and accelerate technology transformation.

Second, improve the technological innovation ecosystem. Strengthen intellectual property protection, establish a low-altitude economy patent pool to promote technology sharing; set up a technological innovation reward fund to offer heavy rewards for original breakthroughs; promote the formulation of technical standards, participate in the construction of international standard systems, and enhance international discourse power.

Third, promote the integrated application of technologies. Facilitate the in-depth integration of low-altitude economy technologies with new energy, artificial intelligence, 5G-A, and other technologies; accelerate scenario-based demonstration applications, create a number of benchmark technology application projects in logistics, emergency response, cultural tourism, and other fields, and form a transformation path of "technology - scenarios - industry".

5.2.3 Optimize the Policy System and Strengthen Institutional Guarantee Capabilities

First, improve the airspace management mechanism. Accelerate the delineation of low-altitude airspace and clarify the boundaries between controlled airspace and usable airspace; establish a national unified low-altitude flight service platform, simplify the flight approval process, and realize "one-stop online handling"; expand the scope of low-altitude opening pilot projects to accumulate regional management experience.

Second, improve the standardization system. Formulate national standards in fields such as aircraft design and manufacturing, safe operation, and data management; establish an aircraft certification system to achieve alignment with international standards; improve the qualification certification system for practitioners and enhance the professionalization level of the industry.

Third, strengthen policy coordination and linkage. Establish an inter-departmental coordination mechanism to coordinate policies of civil aviation, industry and information technology, transportation, finance, and other departments; strengthen regional policy coordination to break down local protectionism and regional barriers; promote coordination between policies and the market, giving play to the guiding role of the government while fully stimulating market vitality.

5.2.4 Promote the Coupling and Coordination of Factors to Release Synergistic Development Momentum

First, build a factor coordination platform. Establish a national-level low-altitude economy collaborative development center to coordinate financial, technological, and policy resources; set up a factor matching mechanism and regularly hold low-altitude economy investment and financing matching meetings and technical exchange conferences.

Second, build industrial ecological clusters. Construct low-altitude economy industrial parks in regions with solid industrial foundations to gather enterprises engaged in R&D, manufacturing, operation, services, and other links; promote coordination between the upper, middle, and lower reaches of the industrial chain, and cultivate a number of industrially leading enterprises with international competitiveness.

Third, strengthen international cooperation and exchanges. Draw on advanced international experience and participate in global low-altitude economy governance; attract international high-end technologies and capital to enter China's market, while supporting domestic enterprises to "go global" and participate in international competition and cooperation.

With the in-depth coupling of financial, technological, and policy factors, the low-altitude economy will usher in explosive growth, become a core growth pole of new-quality productive forces, and provide solid support for China's high-quality economic development and the construction of a modern industrial system.

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