International Journal of Trend in Scientific Research and Development (IJTSRD)
Volume 9 Issue 2, Mar-Apr 2025 Available Online: www.ijtsrd.com e-ISSN: 2456 – 6470

Research on Risk Identification and Prevention of Private Enterprises' Participation in Low altitude Economy

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ABSTRACT

Low altitude economy has become an important industry field of global concern. How to promote the development of low altitude economy varies among different countries. This article takes China, which has made significant progress in the field of low altitude economy, as the research object, and explores the path and risks of China's private economy participating in the development of low altitude economy.

KEYWORDS: *low altitude economy, private enterprise, risk*

How to cite this paper: Zhang Yunshan | Zhong Yuan "Research on Risk Identification and Prevention of Private Enterprises' Participation in Low altitude Economy" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-9 | Issue-2, April 2025, pp.450-454, URL: www.ijtsrd.com/papers/ijtsrd76341.pdf

IJTSRD76341

1. INTRODUCTION

1.1. Definition and Development Status of Low Altitude Economy

A. Definition of Low Altitude Economy

Low altitude economy is a comprehensive economic form that utilizes low altitude resources to empower economic development. It generally refers to the low altitude airspace below 3000 meters, which is driven by low altitude flight activities of manned and unmanned aerial vehicles (including traditional general aviation flights), radiating and driving related economic activities from the ground to the air, and from static to dynamic development (Li Xiaojin et al., 2024). The low altitude economy industry chain involves multiple links such as low altitude aircraft manufacturing, operation services, infrastructure construction (airports, navigation equipment, etc.), flight training, and support services. The development of low altitude economy has distinct characteristics such as strong resource dependence, high technological content, and huge market potential. With the gradual opening up of technology and policies, low altitude economy has gradually become an important component of the aviation industry and is considered one of the new driving forces for economic growth.

B. The institutional background of China's development of low altitude economy

In recent years, the development of the low-altitude economy has garnered substantial attention from the Chinese government, leading to the implementation of a series of policies aimed at promoting its industrialization and marketization. In February 2021, the concept of the low-altitude economy was incorporated into the "National Comprehensive Three-Dimensional Transport Network Planning Outline" issued by the State Council of China. This document explicitly emphasized the necessity of improving the low-altitude flight service support system and enhancing the management of low-altitude flights, thereby providing robust policy guidance for the advancement of the low-altitude

economy. In 2022, the Civil Aviation Administration of China (CAAC) released the "General Aviation Development Plan for the 14th Five-Year Plan," which clearly delineated the development objectives and key tasks for the low-altitude economy. These included strengthening collaboration between the administration and provincial authorities, actively participating in pilots for the reform of low-altitude airspace management, optimizing the layout of airport networks, and supporting the establishment of low-altitude economic zones with a focus on the comprehensive development of the unmanned aerial vehicle (UAV) industry chain.

Regarding the specific management of low-altitude airspace, China is progressively advancing the classification of airspace to improve the efficiency of airspace resource utilization. Low-altitude airspace is categorized into three types: controlled airspace, monitored airspace, and reported airspace. Concurrently, the coordination mechanism between military and civilian aviation sectors is being enhanced, and pilot programs for low-altitude flights have been initiated in certain regions. These initiatives provide expanded opportunities for private enterprises to engage in the low-altitude economy.

In terms of industrial policies related to the low-altitude economy, the Chinese government has actively incentivized private enterprises to increase their research and development investments in this domain through measures such as fiscal subsidies and tax incentives. For example, enterprises engaged in UAV research and production benefit from additional deductions for research and development expenses, while financial support is provided for the construction of general aviation airports. These policies collectively foster a more conducive environment for private enterprises to participate actively in the development of the low-altitude economy.

C. The Current Status of Low altitude Economic Development in China

In recent years, the development of China's low altitude economy has shown the characteristics of gradually increasing policy intensity and continuously expanding industrial scale, demonstrating a distinct policy orientation. From the perspective of industrial scale, China's general aviation, unmanned aerial vehicles, low altitude tourism and other fields are growing rapidly, and unmanned aerial vehicle technology is widely used. Some private enterprises led by DJI Innovation, Zongheng Co., Ltd., Tengdun Sci Tech Innovation and other enterprises have achieved significant technological advantages in the international unmanned aerial vehicle field. China has now become a major global manufacturer and exporter of unmanned aerial vehicles.

However, in the process of thriving low altitude economy, there are also many problems and challenges. Firstly, there is the issue of low altitude airspace management. Airspace is a key resource for the development of low altitude economy, and low altitude airspace management is a systematic project that involves collaboration and linkage among multiple industries, departments, and fields. The coordination mechanism between military aviation and civil aviation air traffic control is not yet sound, and the airspace planning and route planning between different cities have not been fully integrated. At the same time, the infrastructure related to low altitude economy is also relatively lacking. Low altitude economy involves the comprehensive application of various technologies, including 5G communication technology, artificial intelligence, big data, Internet of Things, etc. The compatibility, interoperability, and complexity of system integration between different technologies pose serious challenges to the technological implementation of low altitude economy (Xie Jie et al., 2024).

1.2. The Role and Existing Challenges of Private Enterprises

Private enterprises play a crucial role in the development of the low altitude economy.

Firstly, private entities are the main force in developing the low altitude economy (Chen Shiyin, 2024). The low altitude economy requires a variety of aircraft, with diverse market demands, multiple categories, and batches. The private economy with the "small, fast, and agile" model has more advantages. Therefore, the main players in developing the low altitude economy are private entities. Focusing on a certain type of low altitude travel demand, private enterprises turn around quickly, make quick decisions, respond quickly to market changes, and meet customer needs. Their products can achieve rapid iteration, forming low altitude aircraft products that better meet market demand. At the same time, private enterprises are also the main source of technological innovation in the field of low altitude economy. The entry of private enterprises into the low altitude economy has promoted the rapid development of fields such as drone manufacturing, equipment research and development, and navigation technology. For example, DJI Innovation's leading position in the international drone market. In addition, private enterprises are also a key link in the industry chain, providing support for flight training, equipment maintenance, data services, and more. Private enterprises are also the driving force behind the

market-oriented operation of the low altitude economy. Driven by interests, private enterprises actively explore new business forms and models, such as low altitude tourism, freight logistics, agricultural aviation and other sub sectors, injecting strong development momentum into the low altitude economy. At the same time, through infrastructure construction and service innovation, it has promoted local economic growth and created considerable employment growth.

However, private enterprises also face many challenges in the development of low altitude economy. Firstly, the limitations of low altitude airspace greatly restrict the development of private enterprise flight activities. At the same time, the relevant policies for low altitude aircraft are still in the immature initial stage, and the approval process is complex and lacks transparency. In addition, the coordination mechanism between military aviation and civil aviation management is not yet sound, which makes it more difficult for private enterprises to operate low altitude aircraft. Secondly, low altitude aircraft belong to technology intensive industries, with large R&D investment in core technologies, long cycles, and slow realization of results. Compared to private enterprises, which are small in scale and have limited funds, they are prone to causing serious financial pressure and risks to private enterprises

2. Main risk identification

Private enterprises participating in the low altitude economy face many severe challenges. This article uses risk analysis theories such as PEST analysis framework and SWOT analysis to classify the risks that private enterprises may face into policy and legal risks, market and demand risks, security and social responsibility risks, and technical and financial risks. The following provides a detailed analysis.

2.1. Policy and Legal Risks

At present, the control policies for low altitude airspace are lagging behind, and the utilization of airspace in various cities is greatly restricted and difficult to break through. Private enterprises often face problems such as long approval cycles and limited airspace use rights in flight activities. The allocation and management of airspace resources are unclear, which limits the operational space of enterprises (Zhao Kun et al., 2024). At the same time, the existing legal system's failure to timely cover emerging areas such as the low altitude economy can result in a lack of legal guidance for private enterprises, leading to compliance risks. Secondly, there is a lack of coordination in the industry regulation of low altitude economy. As low altitude economy involves many regulatory departments, such as the Civil Aviation Administration of China, the Ministry of Transport, and the Ministry of Science and Technology, the coordination among various government departments in emerging industries is not strong, which may lead to different interpretations and requirements of the same issue by different regulatory agencies, causing confusion in implementation for enterprises.

2.2. Market and Demand Risks

The current economic growth in China is mainly driven by "high exports, high investment, and low consumption". This low consumption concept is reflected at the macro level, resulting in people's actual income growth rate being lower than the economic growth rate, and residents' disposable income being relatively low, directly reducing people's consumption ability and forming a consumption containment effect. This not only fails to provide sufficient impetus for the sustained growth of the low altitude economy, but also fails to provide sufficient expected revenue space for technological innovation for innovation entities, which restricts the full play of the advantages of the super large scale market of the low altitude economy (Du Yuwei et al., 2020). Secondly, the current profit model of low altitude economy is still in the early exploration stage, with limited services and application scenarios, making it difficult to meet the diverse needs in the market. In summary, the fluctuations in the market environment and the shortage of demand for low altitude economy may pose certain risks for private enterprises to participate in low altitude economy.

2.3. Safety and Social Responsibility Risks

In recent years, ESG (Environmental, Social, and Governance) has evolved from a relatively niche concept to a core element in global corporate strategy and investment decision-making. The increasing attention from governments, regulatory agencies, investors, businesses, and the general public has driven the gradual improvement of ESG related policies, standards, and practices. Next, we will analyze the security and social responsibility risks of private enterprises in the low altitude economy sector from the perspective of ESG framework.

Firstly, from an environmental perspective (E). Low altitude flight activities may interfere with the ecological environment. If it interferes with the flight trajectory of birds and poses a threat to their survival. Meanwhile, due to the fact that drones and aircraft in the low altitude economy are mostly powered by batteries, their waste batteries and equipment may cause electronic waste pollution to the environment. All of these will lead to potential social responsibility

risks for private enterprises in participating in the low altitude economy process.

Secondly, from a social perspective (S). Due to the fact that most low altitude aircraft have functions such as taking photos and videos, and their flight areas are mostly public areas, their aerial data may violate personal privacy and cause public outrage. At the same time, due to the imperfect flight control technology of low altitude aircraft, the probability of loss of control or collision of low altitude aircraft is much higher than that of conventional traditional aircraft such as commercial airliners, which may pose a threat to public safety (Wang Ying et al., 2024). The above issues may all lead to social responsibility problems for enterprises, thereby reducing the acceptance of products by the public.

Finally, from a governance perspective (G). The low altitude economy still lacks a compliant and transparent operational mechanism. The existing legal system's failure to timely cover emerging areas such as low altitude economy will result in a lack of legal guidance for private enterprises, making them highly susceptible to compliance risks.

2.4. Technical and Financial Risks

Firstly, from a technical perspective. The field of low altitude economy involves multiple cutting-edge technological areas. For example, flight control systems, drone technology, sensor technology, artificial intelligence, etc. Due to the high complexity and innovation of these technologies, private enterprises are prone to encountering problems such as immature technology, rapid technological iteration, and technological backwardness in the process of technological innovation, resulting in unstable investment returns and operational risks. At the same time, the safety of low altitude aircraft (such as drones, air taxis, etc.) directly affects public trust and market demand. If the aircraft has technical defects that lead to accidents, it will not only cause property damage, but may also lead to legal liability and a crisis of public trust. The above are the risks faced by private enterprises in the operation process due to technical issues.

Secondly, from a financial perspective. As a technology intensive industry, the low altitude economy can be developed with huge investment and long return cycles, which will put certain financial pressure on enterprises. Meanwhile, as an emerging industry, the low altitude economy faces high risks and uncertainties. This means that companies may face many difficulties in the financing process, with low interest in the industry such as venture capital, making it difficult to obtain sufficient financial support. Meanwhile, due to the high-risk nature of its industry, it may face higher financing costs than traditional industries, affecting the overall profitability of the enterprise and causing a certain degree of financial risk.

3. Risk prevention strategies

3.1. Policy and Legal Risk Prevention

Faced with policy and legal risks, enterprises should establish a dedicated compliance department responsible for monitoring and interpreting industry policies and regulations to ensure that their business activities comply with relevant government requirements. Hire professional legal consultants, regularly conduct legal risk identification and training, so that management and employees understand relevant laws and regulations, and avoid risks caused by legal blind spots. At the same time, enterprises should actively participate in policy formulation, participate in the standard setting and policy discussions of the low altitude economy industry, and strive for more policy support and discourse power through industry associations and related organizations to gain advantages for their own development.

3.2. Market and Demand Risk Prevention

Faced with market and demand risks, enterprises should conduct sufficient market research, understand market changes, industry trends, and consumer demands, adjust their operating models in a timely manner, and flexibly adjust their strategies according to market changes. Simultaneously diversifying market layout, avoiding excessive reliance on a single market or business, and exploring multiple profit models. For example, dispersing market risks through different business lines such as drone delivery, e-commerce cooperation, and logistics transportation.

3.3. Safety and Social Responsibility Risk Prevention

Faced with safety and social responsibility risks, enterprises should establish a sound safety management system. This includes regular maintenance of aircraft, pilot qualification training, emergency response plans for unexpected events, and strengthening the research and development of safety technologies such as automation control and obstacle avoidance systems to reduce accident rates. At the same time, enterprises need to pay attention to the impact of their operations on society and the environment, assess and reduce issues such as noise pollution and environmental damage, and fulfill their environmental responsibilities through clean energy and technological innovation. Strengthening communication with the public and government, transparently disclosing operational information, and establishing effective crisis management mechanisms

can help address unexpected issues and maintain corporate reputation. By comprehensively deploying in the fields of safety and social responsibility, enterprises can not only reduce potential risks, but also enhance social recognition and create conditions for sustainable development.

3.4. Prevention of Technical and Financial Risks

In terms of technology risk prevention, enterprises should balance research and other non research investments to ensure the continuous optimization of core technologies. Especially in key aspects such as aircraft safety and energy efficiency. At the same time, enterprises should pay attention to the evaluation of research and development results and avoid overly relying on immature and high-risk technologies.

In terms of preventing financial risks, enterprises should broaden their financing channels and raise funds through various means such as equity financing, venture capital, and government subsidies to improve the stability of funding sources. In addition, enterprises should strengthen financial management, improve the efficiency of fund utilization, introduce management accounting, specify scientific financial budgets, and ensure efficient use of funds.

Through the dual guarantee of technological innovation and fund management, enterprises can reduce the risk of technical errors and fund chain breakage, enhance their competitiveness, and lay a solid foundation for the sustainable development of private enterprises in the low altitude economy field.

4. Summary

Through this study, it can be seen that the participation of private enterprises in the low altitude economy has great potential, but also faces many challenges. Through effective risk prevention strategies, private enterprises can achieve sustainable development and promote the prosperity and growth of the low altitude economy while ensuring safety, compliance, and technological innovation. China's low-altitude economic development has not only become a new driving force for economic development, but also a new source of accelerating scientific and technological innovation and industrial reform and upgrading. With the gradual improvement of low-altitude economy-related policies and China's continuous opening up of the low-altitude market, China's private enterprises will play a greater role in this field and make new contributions to the prosperity and development of the motherland and the construction of a better society. In the future, with the further breakthrough of science and technology and the continuous expansion and extension of application scenarios, low-altitude economy will be able to become a key force to promote the coordinated development of regional economy and enhance national competitiveness, and private enterprises will also usher in more development opportunities and new challenges in this process.

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