

# Research On The Agglomeration Effect Of Air Industry Development In Shunyi District Of Beijing

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## **Abstract**

*With the continuous deepening of economic globalization, air transportation has become increasingly important. While the aviation economy continues to develop, it also promotes the development of regional economy and forms a new economic growth model. The paper provides an overview of the relevant theories of the airport economy, collects industry data from Beijing and Shunyi District in recent years, analyzes the current development status and agglomeration of the airport industry in Shunyi District, and concludes that the development of the airport industry in Shunyi District has begun to show agglomeration effects through the analysis of the data results.*

**Keywords** –airport economy, industrial development, agglomeration effect

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## **I. Introduction**

In recent years, with the rapid economic growth entering a new stage, China has realized the important impact of the development of airport economy on regional economy, and has continuously established airport economic demonstration zones near airports. The Beijing Shunyi Airport Economic Zone, with the capital airport as its core, is a comprehensive economic zone covering multiple fields such as aviation, logistics, and high-tech industries. It is also an important gateway and high-end industrial base for Beijing's key construction of new cities and international exchanges.

## **II. Related Theories Of Airport Economy**

### **Characteristics of the airport economic zone**

The development of airport economic zones stems from the unique location advantages possessed by airports. As an aviation hub, airports are the central nodes for international transportation and logistics, naturally attracting the convergence of various economic factors. These economic factors include science and technology, capital inflows, as well as a series of production and commercial activities. These activities continue to gather in the surrounding areas of the airport, forming a multifunctional economic zone with the airport as its core and closely connected to it.

The airport economic zone not only relies on the overall development of cities and regions, but also injects new vitality into their development. With the continuous growth of the airport economic zone, its impact on surrounding areas is also increasing. On the one hand, the airport economic zone has attracted more economic factors and resources to gather there, thereby further enhancing its competitiveness. On the other hand, the airport economic zone also radiates its advantages and influence to surrounding areas through diffusion effects, driving the development of the entire regional economy.

### **The development process of the aviation industry**

Based on the research theories of domestic and foreign scholars, the development process of the aviation industry can be divided into three stages.

#### (1) Initial formation stage

In the initial formation stage of the aviation industry, the airport was not established for long, and at this time, the passenger and cargo volume was relatively small, which could not attract the influx of various economic factors. Therefore, the airport was surrounded by aviation related supporting industries, such as aircraft manufacturing, to ensure the basic transportation needs of the airport. At this time, the industries were all traditional aviation industries that met transportation needs and provided operational requirements for the airport. The revenue of the aviation industry in its initial formation stage depends on the passenger and freight volume, and the growth of passenger and freight volume directly determines the revenue growth of aviation related industries.

#### (2) Industrial agglomeration stage

When the passenger and freight volume of the airport grows to a certain stage, the aviation industry enters the agglomeration stage. At this time, not only are there aviation related enterprises around the airport, but many enterprises that rely on good transportation conditions will also be attracted by the location advantages of the airport, such as fresh food transportation, logistics warehousing and other industries that require high transportation timeliness and safety. The entry of these enterprises will also attract the participation of industries such as catering and entertainment, as transportation costs become lower, greatly reducing operating costs. At this time, the agglomeration effect of the airport begins to emerge, with a large influx of capital and the continuous addition of different industries. The impact of the airport continues to expand, and this process continues to cycle and accumulate. At this point, the development of the aviation economy is no longer limited solely by passenger and freight volume. The proportion of non aviation related business revenue is beginning to increase, and the aviation economy can continue to grow on its own.

#### (3) Development and improvement stage

When the aviation economy reaches a certain stage of self growth, the supporting facilities around the airport have been improved, and at this time, a comprehensive and functional economic zone will be formed in the area near the airport, including various industry facilities such as commerce, entertainment, and warehousing. At this time, the real estate industry began to enter, as the surrounding supporting facilities were complete and the proximity to the airport made it very suitable as a residential area. Taking Shanghai Pudong Airport as an example, Eastern Airlines established talent apartments near Pudong Airport to meet the living needs of employees. For employees, commuting time is very important, and the airport provides a large number of job opportunities and absorbs a large amount of labor force. Therefore, the accommodation needs of these laborers enable real estate development to proceed. At this time, the airport economic zone began to form a new urban area, reshaping the spatial pattern of the entire city and expanding its radiation impact, which had a profound impact on the regional economy and continuously promoted its coordinated and sustainable comprehensive development.

### **III. The Current Development Status Of The Aviation Industry In Shunyi District**

#### **Capital international airport**

Capital International Airport is an important aviation hub in China. It is mainly located in Shunyi District. In 2008, Terminal 3 was established, making Capital International Airport the largest single terminal building in

the world at that time. Since then, Capital International Airport has become the first super large international airport in Asia to have three terminals, three runways, and two twin towers operating simultaneously.

As of October 2023, there are a total of 49 airlines stationed at the Capital International Airport, including 28 foreign airlines and 21 domestic and regional airlines. The Capital International Airport serves 208 destinations in 47 countries and regions, including 131 domestic destinations and 77 international destinations.

### **Development of the aviation industry**

Based on the ratio of the three major industries to the total industry in Shunyi District from 2012 to 2022, it can be seen that Shunyi District has been continuously improving and upgrading its industrial structure in the past decade. The second and third industries are the main industrial forces in Shunyi District. During this decade, the primary industry has been continuously declining, from 2.3% in 2012 to 0.8% in 2022, basically separating from industries in Shunyi District. The output value of the secondary industry in Shunyi District has been continuously increasing over the past decade, from 48.8 billion yuan in 2012 to 56.84 billion yuan in 2022, but its proportion to the total output value has been declining. In the period of 2016-2017 alone, the proportion of the secondary industry to the total output value decreased by 6.9%. However, after 2019, the proportion of the secondary industry in the total output value gradually stabilized, indicating that the industrial transformation and upgrading of modern advanced manufacturing in Shunyi District has been basically completed.

During the period of 2012-2022, the most obvious development trend is the tertiary industry, which has always dominated the total output value of Shunyi District. During the past decade, the tertiary industry in Shunyi District has developed rapidly from 53.5% in 2012 to 71.8% in 2022. Although the impact of the epidemic on industrial development slowed down in 2020, the overall trend still shows an upward trend.

## **IV. The Agglomeration Effect Of Aviation Industry In Shunyi District**

### **The calculation method of location entropy**

To analyze the agglomeration of the aviation industry in Shunyi District, this article uses the location entropy analysis method, and the calculation method of location entropy is as follows.

$$LQ_{ij} = \frac{\frac{q_{ij}}{q_j}}{\frac{q_i}{q}} \quad (\text{Formula 1})$$

Among them,  $LQ_{ij}$  is the location entropy of the  $i$ -industry in Shunyi District in Beijing, and  $q_{ij}$  is the relevant indicators of the  $i$ -industry in Shunyi District (such as output value, employment number, etc.);  $q_j$  is the relevant indicator for all industries in Shunyi District;  $q_i$  refers to the relevant indicators of the  $i$  industry in Beijing;  $q$  is the relevant indicator for all industries in Beijing. Location entropy is the ratio of the proportion of a certain industry within a fixed regional scope to its proportion in the entire economic scope. When the location entropy is greater than 1, it indicates that the industry has a competitive advantage in the region. The larger the location entropy, the more competitive the industry has.

### **Analysis of the Agglomeration of Air Industry in Shunyi District**

To analyze the agglomeration effect of various industries in Shunyi District, this article uses the GDP data of each industry in 2022 from the Beijing Statistical Yearbook and Shunyi District Statistical Yearbook, as shown in Table 1. Then, the location entropy formula is used to calculate the area entropy of each major industry in Shunyi District in 2022, and the calculation results are shown in Table 2.

**Table 1 Gross Domestic Product of Various Industries in Beijing and Shunyi District in 2022 (Unit: Yuan)**

Industry name	In Shunyi District	In Beijing
Agricultural and sideline food processing industry	251863.6	2654579
Food manufacturing industry	293457.1	2898075
Alcohol, beverage, and refined tea manufacturing industry	1064877	2170281
Textile and apparel industry	94034	7575553
Furniture manufacturing industry	260183.2	574403
Paper and paper products industry	29963.8	581754
Printing and Recording Media Reproduction Industry	88798.4	1167523
Manufacturing of cultural and educational, industrial and artistic, sports and entertainment products	124840.8	254202
Chemical raw material and chemical product manufacturing industry	498090	2797323
Pharmaceutical manufacturing industry	964866.7	17484493
Non metallic mineral products industry	845207.3	4812459
Metal products industry	223956.9	2435433
General equipment manufacturing industry	955302.3	6667541
Specialized equipment manufacturing industry	408604.3	10104349
Automotive manufacturing industry	5564634.4	33985865
Railway, ship, aerospace and other transportation equipment manufacturing industry	186174.4	5089708
Electrical machinery and equipment manufacturing industry	151954.6	7955894
Computer, communication, and other electronic equipment manufacturing industry	655121.9	35170374
Instrument and Meter Manufacturing Industry	386037.5	3231274
Metal products, machinery and equipment repair industry	753411.7	876664
Electricity, heat production and supply industry	208038.5	79557459

**Table 2 Location entropy of various industries in Shunyi District in 2022**

Industry name	location entropy
Agricultural and sideline food processing industry	1.54
Food manufacturing industry	1.65
Alcohol, beverage, and refined tea manufacturing industry	7.99
Textile and apparel industry	0.20
Furniture manufacturing industry	7.37
Paper and paper products industry	0.84
Printing and Recording Media Reproduction Industry	1.24
Manufacturing of cultural and educational, industrial and artistic, sports and entertainment products	7.99
Chemical raw material and chemical product manufacturing industry	2.90
Pharmaceutical manufacturing industry	0.90
Non metallic mineral products industry	2.86
Metal products industry	1.50
General equipment manufacturing industry	2.33
Specialized equipment manufacturing industry	0.66

Automotive manufacturing industry	2.67
Railway, ship, aerospace and other transportation equipment manufacturing industry	0.60
Electrical machinery and equipment manufacturing industry	0.31
Computer, communication, and other electronic equipment manufacturing industry	0.30
Instrument and Meter Manufacturing Industry	1.94
Metal products, machinery and equipment repair industry	13.99
Electricity, heat production and supply industry	0.04

From the calculation results, it can be seen that many modern manufacturing and high-tech industries in Shunyi District have shown agglomeration effects, such as chemical raw material and chemical product manufacturing, automobile manufacturing, instrument manufacturing, and general equipment manufacturing. The location entropy of these industries is greater than 1, indicating the formation of industrial clusters. These industrial products have the characteristics of high added value, high transportation safety requirements, and large transportation volume, so they have a strong dependence on air transportation and can afford the price of air transportation, with strong air transportation directionality.

The location entropy of the agricultural and sideline food processing industry, food manufacturing industry, alcohol, beverage, and refined tea manufacturing industry is also greater than 1. These catering industries have a certain degree of air transportation orientation because some fresh foods have high transportation conditions and high timeliness, so the catering industry tends to choose air transportation. At the same time, these catering industries can provide air catering services for airports, and the continuously growing passenger and freight volume has also brought huge markets to these catering industries.

The location entropy of the manufacturing industry of cultural and educational, industrial and aesthetic, sports and entertainment products is much higher than 1. This manufacturing industry is closely related to the development of modern service industry and is an indispensable part of the new urban area with complete supporting facilities in the airport economic zone. Although the aviation transportation direction of this industry is relatively weak, in order for the airport economic zone to attract the real estate industry, it needs to have comprehensive facilities, and its Chinese entertainment industry is essential.

Pharmaceutical manufacturing industry, as a high-tech industry with high air transportation orientation, currently has a location entropy of less than 1, indicating that agglomeration has not yet formed. However, it is believed that industrial agglomeration will soon form. The railway, shipbuilding, aerospace, and other transportation equipment manufacturing industries, as aviation supporting industries, have been hindered in their development speed due to the impact of the epidemic, and have not formed industrial clusters. However, with the economic recovery and the continuous growth of passenger and freight volume, industrial clusters will eventually form.

Printing and recording media reproduction industry, as an industry with weak air transportation directionality, lack of technological content, and low added value, has generated industrial agglomeration, which is obviously unreasonable. Similarly, as a light industry furniture manufacturing industry, its location entropy is as high as 7.37, which is also quite unreasonable. The clustering of these two indicates that the Shunyi Airport Economic Zone has deficiencies in spatial planning.

Non-metallic mineral products industry and the metal products industry have formed industrial clusters as heavy industries. On the one hand, this is because Beijing is already part of the Beijing Tianjin Tangshan industrial base, and heavy industry is relatively developed. On the other hand, it also indicates that the Shunyi Airport Economic Zone still relies on traditional heavy industry.

The location entropy of the metal products, machinery, and equipment repair industry is as high as 13.99. Although the aviation transportation direction of this industry is weak, the aviation transportation equipment and related supporting facilities need to be regularly maintained, whether it is aircraft engines, external aircraft wings, landing gear, etc., or internal aviation electronic equipment, which require regular inspection and maintenance. At the same time, all high-tech industries, modern manufacturing and other related equipment in Shunyi District also need regular maintenance. So the location entropy of metal products, machinery, and equipment repair industry is very high.

The above analysis shows that with the development of the Capital International Airport, the impact of the airport continues to expand, and a large amount of capital flows into Shunyi District. Many industries with aviation transportation orientation have already shown agglomeration effects and formed corresponding industrial chains, such as metal products, machinery and equipment repair industry, metal products industry, and automobile manufacturing industry, forming an industrial chain cluster. At the same time, some industries with low technological content and low air transport directionality have also emerged, indicating that there are unreasonable aspects in the planning of the Shunyi airport area. Most importantly, the emergence of some cultural and entertainment industries marks that the modern service industry necessary for the development of Shunyi District's airport economy has been met, and the related comprehensive service supporting facilities have tended to be perfect. It is believed that soon, Shunyi Airport Economic Zone will enter the stage of development and become a new urban area with complete supporting functions.

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