Features Planning of Daxin International Airport in Beijing

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Abstract: The purpose of the study is to investigate the specifics of planning the territory of the Beijing Daxing airport and to form the principles of rational design of the territory. The main methods of the study were statistical methods of studying the economic situation, analogy and generalization of the received information. Results. In this article revealed Airport planning mainly solves the spatial layout and functional structure problems of civil airport, guides the construction and development of airports through overall planning, scientific layout, ideal structure and reasonable positioning, ensures the optimal allocation and efficient use of resources and improves the sustainability as well as the development ability of Chinese civil aviation. It is determined thatThe spatial layout of the airport is built according to the star-studded principle and the combination of city pairs. The functional level of the airport system is clarified, the structure becomes more reasonable, and the international competitiveness gradually increases. The layout principles of Beijing Daxing Airport are revealed. It is determined that the planning is in line with the global vision, international standards, Chinese characteristics, high position, environmental priority and green development, with the construction of Daxing Airport Comprehensive Hub as the core, the prerequisite of joint maintenance of environmental safety, joint construction of efficient communication vehicles as support and temporary development. Three functional zones have been identified: guarantee service area, aviation logistics area and scientific and technological innovation area.

1 INTRODUCTION

Airports are an important part of an integrated transportation system. After decades of construction and development, China's airport system began to take shape, initially forming a basic structure centered on hub airports such as Beijing, Shanghai and Guangzhou, with airports in other provincial capitals and key cities as the foundation, and many mainline and regional airports. The scheme has played an important role in ensuring the sustainable, rapid, healthy and coordinated development of my country's air transport, promoting economic and social development and opening up to the outside world, and improving the national comprehensive transport system. great importance. However, problems such as insufficient overall airport capacity, unreasonable system structure and functional positioning remain relatively important, and it is difficult to meet my country's future economic and social development needs, especially those of enhancing national competitiveness. Further optimization Airport layout and moderate increase in overall airport capacity have become an important topic for China's airport development in the future.

2 RESULTS

An airport is a complex engineering system and part of a city. Airport planning is an important part of city planning. As a subdivision of a regional airport group, the airport must be integrated into the overall national airport construction scheme and is closely linked to airspace management and optimization. The airport is an integrated transportation system and a center of

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modal transformation that carries passengers and freight. The airport mainly includes the airfield area, passenger terminal area, cargo terminal area, complex support area, aircraft maintenance area and other functional areas.

Airport layout planning mainly solves the spatial layout and functional structure problems of civil airport, guides the construction and development of airports through overall planning, scientific layout, ideal structure and reasonable positioning, ensures the optimal allocation and efficient use of resources and improves the sustainability as well as the development ability of Chinese civil aviation. At the same time, civil aviation is a systematic, interconnected and professional industry. In case of major changes in airport localization management and construction sites, the preparation of national civil airport layout plans is also an important means to strengthen macro-control. of the civil aviation industry. In accordance with the "Civil Aviation Law of the People's Republic of China", the "National Civil Airport Composition Plan" (excluding general aviation airports) is specifically designed in conjunction with the overall strategic deployment of the country's social and economic development in the future. In the process of implementation, the necessary changes and adjustments will be made to this plan in a timely manner in accordance with changes in the internal and external conditions and environment of civil aviation transportation.

The construction and development of the vast majority of airports is based on the needs of the air transport market, and initially formed an airport system compatible with China's national conditions and national strength, which plays an important role in promoting and guiding national economic and social development, strengthening defense construction and ensuring national security. If the land transportation is 100 kilometers or 1.5 hours by car as an indicator of the radius of airport service, the existing airport can serve 52% of the county level administrative units by air, and the population in the service area is 61% of the country's population, and the gross domestic product (GDP) was 82% of the country.

The number, scale and density of regional airport locations are largely consistent with the level of regional economic and social development and the economic and geographic structure of our country. Civilian airports are developing regionally, and a group of airports in the north (North China and Northeast China) with Beijing as the fulcrum and Shanghai as the center were initially formed. The three main groups of regional airports are the East China Airport Group, the Central South China Airport Group, dominated by Guangzhou, the Southwest Airport Group, dominated by Chengdu, Chongqing and Kunming, and the Northwest Airport Group, dominated by Xian and Urumqi. The generated effect of airport cluster can be gradually reflected, which has played an important role in stimulating the economic and social development of the region, expanding the openness to the outside world and enhancing the development potential and influence of the city.

Civil aviation in China is based on a spatial pattern of star-star airports and a combination of pairs of cities. The route network is gradually formed. The functional level of the airport system is clarified, the structure becomes more reasonable, and the international competitiveness gradually increases. The comprehensive functions of a number of major airports are gradually improving, and their business capabilities are constantly improving. The central status of the three hubs in Beijing, Shanghai and Guangzhou is becoming more prominent.

The main contradictions and problems in airport layout: First, the number of airports is small, and the range of regional services is not wide, making it difficult to meet the requirements of future economic and social development. The contradiction between maintaining social stability and promoting national unity and the development of tourism resources is a relatively important task; Second, the lack of coordination in the civil aviation airport system, the lack of reasonable positioning and a clear division of labor between airports in the region and the coordinated development of air traffic between the airport and the branch. Reasonable leadership role of the airport is weak, and the international hub to participate in global competition has not yet been formed, so it is difficult to effectively allocate resources and fully utilize the overall benefits and functions of civil aviation resources; Third, the construction and development of some airports and their urban development, military aviation planning and other modes of transport The lack of effective link between planning, especially the increasingly acute contradictions of military and civil aviation use, to a large extent There is a large gap between the objective requirements for improvement and the ability to ensure aviation safety and the level of quality of transportation services.

The principles of layout should be highlighted:

1. the overall layout of the airport should be compatible with the overall development strategy of the national economy and society and the needs of the aviation market and contribute to the rational

allocation of productivity, the balanced development of land and resources, the development of the national economy and society.

2. The regional layout of the airport shall be adapted to the level of regional economic geography and economic and social development, consistent with the overall planning of the city and contribute to the optimal allocation of aviation resources in the region, the coordinated development of the social economy and the improvement of urban functions.

3. The layout of the airport shall be related to the layout of other modes of transportation, contribute to the creation of a modern integrated transportation system and optimize the network structure, and take full advantage of the comparative advantages of air transportation to improve overall efficiency. and advantages of integrated transportation.

4. Airport planning should be coordinated with various internal elements of the civil aviation system, such as optimizing the structure of the route network, building air traffic control system, fleet development and training of professional and technical personnel, to enhance the integrated competitiveness of airport clusters. and further improve the overall coordinated development of civil air transport and international cooperation Competitiveness.

5. Airport planning should be combined with resources such as strengthening national defense construction, promoting national unity, and developing tourism. Pay attention to the planning and construction of airports in border areas, ethnic minority areas, especially in new tourist areas, the expansion of air transport services and the strengthening of airport defense functions. At the same time, consider the full and efficient use of aviation resources, giving priority to the use of military airports or adding civil-military airports when conditions permit.

6. Airport planning should be consistent with the principles of conservation of land, energy, and other resources and protection of the environment. Fully utilize and integrate existing airport resources, rationally determine the number of new layouts and scale of construction, focus on scientific separation of functions, avoid haphazard construction and waste of resources, and improve sustainable development opportunities.

Beijing, the capital of the Republic of China and one of the largest cities in the world, had only one international airport and a military airbase, while cities considered on par with it had two or more international airports.

The city was served by Beijing Capital International Airport, which is the second largest passenger airport in the world, but operated at maximum capacity and could not be expanded.

Beijing Capital International Airport has an annual capacity of 75 million passengers. About 205,000 passengers pass through the airport daily, and further expansion is not possible.

Currently, the airport covers an area of 2,100 hectares. Expansion would make it difficult to operate such a large airport. The newly built Terminal 3 of Beijing Capital International Airport, the same size as London's Heathrow Airport, is also operating at maximum capacity.

With increasing economic growth and urbanization, the city has witnessed a massive migration from the countryside. This has put additional strain on existing transportation facilities, including air traffic.

In addition, Beijing's growing economic growth is attracting more business travelers. The city is expected to witness a large number of passengers traveling to and from the country in the next few years. Many of these passengers are expected to be business travelers.

Proposals to build a second airport for Beijing have been discussed for more than a decade, but never implemented. However, the city's growth has necessitated the construction of a new airport.

In improving the passenger transportation network model, the project proposes to expand the main trunk routes between Beijing-Tianjin-Hebei, the Yangtze River Delta, the Great Bay area of Guangdong-Hong Kong-Macao and the Chengdu-Chongqing world. The trunk link between international air hubs and regional air hubs will promote the use of express buses, build a high-frequency high-quality backbone network, and consolidate the basic route network."

Beijing and Hebei Province formally approved the "Beijing Daxing International Airport Economic Zone Outline Plan (2019-2035)" on September 5, 2019. The project includes the economic zone of the international airport (hereinafter referred to as "Daxing Airport"), which has entered the main construction stage.

"The overall airport economic zone plan" provides the basic framework for subsequent planning and construction works and is of great significance to unload the non-capital functions of Beijing, optimize the development pattern of the Beijing-Tianjin-Hebei world class urban agglomeration, and promote the integrated, coordinated and sustainable development of the region. The layout of Beijing Daxing International Airport is shown in Figure 1.

Figure 1: Diagram of Beijing Daxing International Airport.

The planning is in line with the global vision, international standards, Chinese characteristics, high position, environmental priority and green development, with the construction of the Daxing Airport Comprehensive Hub as the core, the prerequisite of joint maintenance of environmental safety, joint construction of efficient transportation links as support and temporary development.

As part of the design, the 700,000-square-meter passenger terminal building is inspired by traditional Chinese architecture and includes a central building with six arms, resembling a phoenix spreading its wings from a bird's-eye view. The distance from the far end of the terminal to the center is 600 m. Figure 2 shows the top view of the airport.

Figure 2: Beijing Daxing International Airport (top view).

The roof of the airport building is a 350,000-square-meter hyperboloid-shaped steel structure. It is supported by giant C-shaped columns that connect smoothly to the curve of the roof and consists of more than 170,000 steel elements.

Based on the air economy, innovative industrial clusters and guaranteed reliable and diverse government services, we will focus on promoting regional coordination and coordinated urban and rural development, and comprehensively improve the integration, modernization and internationalization of the airport economic zone.

The Daxing Airport Economic Zone is positioned as an international communication center carrier zone, a leading national innovation zone for aviation technology and a demonstration zone for Beijing-Tianjin-Hebei coordinated development. By 2025, the industrial and residential support facilities directly serving Daxing Airport will be built, and the modern airport green economic zone, which is jointly built and managed by Beijing and Hebei, will initially be formed, an economically and socially stable, highly efficient, convenient transportation interchange.

The airport economic zone has a total area of about 150 square kilometers (of which the Beijing part is about 50 square kilometers and the Hebei part is about 100 square kilometers), including three functional areas: warranty service area, aviation logistics area and scientific and technological innovation area. Let us characterize them as follows:

- The aviation logistics zone focuses on functions such as aviation logistics, e-commerce, integrated customs services, international exhibitions and airline services;
- The science and technology innovation area focuses on aviation-oriented innovation in R&D, technology incubation, high-tech manufacturing, technology financing and other functions;
- The Service Assurance Area primarily serves functions such as aviation science and education, character finance, recreation and entertainment, and technology innovation services.

A schematic of the planned airport infrastructure areas is shown in Figure 3.

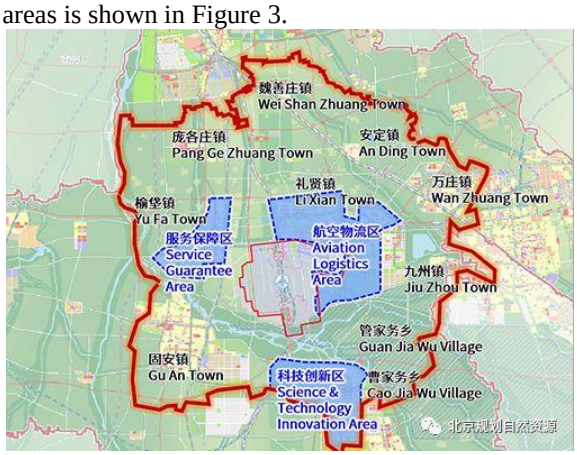

Figure 3: Planned Infrastructure Zones of Beijing Airport.

Airport Economic Zone adheres to the principles of reasonable division of labor, additional dislocation and coordinated development with Xiongang New Area, Capital Airport Economic Zone, Zhongguancun National Independent Innovation Demonstration Zone, Tianjin Binhai New Area, etc. to build the airport. with a strong focus on global market, high-tech high-tech industrial cluster with high importance to aviation, paying particular

attention to aviation logistics development, innovation

Beijing Daxing International Airport was built on a 2,679.01 hectare (6,620 acre) site located 46 km south of Beijing's political center, Tiananmen Square. The project included the construction of air bases, an intercity railroad, a high-speed subway, a highway and a control tower.

The airport has four civilian runways and one military runway. Figure 4 shows a schematic diagram of the geographical location of Daxin Airport

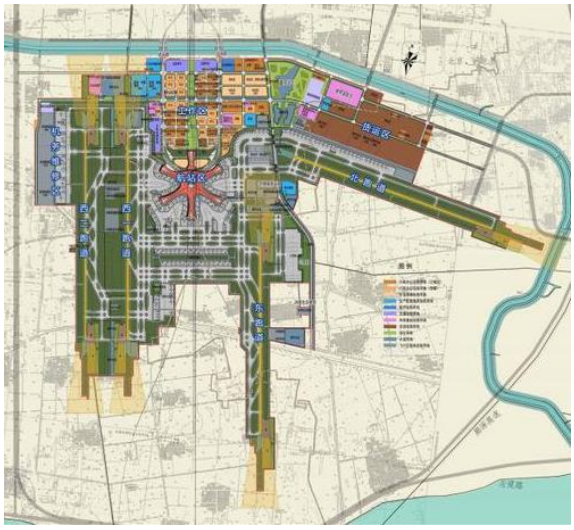

Figure 4: Schematic diagram of the geographical location of Daxin Airport (airport on the central axis).

It is a key transportation hub for Beijing-Tianjin-Hebei region. Figure 5 is a diagram of the nearest Daxin airports.

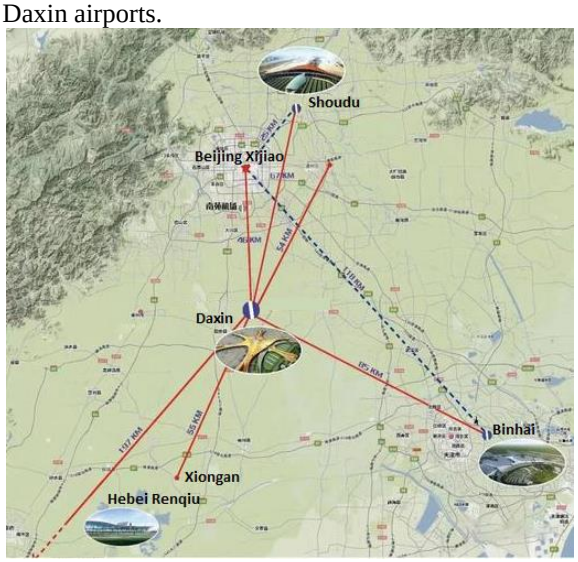

Figure 5: A diagram of the nearest Daxin airports.

The new airport terminal is concentrated at one point, allowing a balanced layout of six corridors to be extended. The angle between each two corridors is 60 degrees. Interestingly, the six corridors are exactly opposite three axes. They point to Beijing, Xiongang and Tianjin, respectively, as well as serving Beijing, Tianjin, Langfang, Baoding, Hengshui and the new Xiongang district.

Beijing Daxing International Airport is integrated into the city through a multitude of transportation facilities. Its design includes various types of ground transportation systems, such as high-speed trains, subway, and trains between airports. This railroad fully implements zero transfers. All transportation systems are managed through an 80,000 m2 ground transportation center built in front of the airport terminal building.

A total of three underground train stations were built under the terminal building, totaling 200,000 m² for five rail lines, so that passengers can easily transfer to different modes of transport.

The terminal is a two-story departure building and a two-story arrival building.

The terminal, surrounded by four expressways, has a comprehensive transportation system with strong regional capabilities.

The interior of the terminal is currently impressive. The concept of the airport project is shown in Figure 6.

Figure 6: Airport Design Concept.

Beijing's new airport is like a storage box, a transit station hall, a transfer center, and a baggage transfer channel in order.

The new terminal complex is designed with a double-entry and double-exit mode, which promotes the efficiency of passenger travel and transfers. At the same time, the distance from the boarding area to the gate is more than 600 meters.

The new terminal has the largest roof area in the world - up to 180,000 square meters.

This airport has good airport facilities and location and is considered suitable for transit passenger traffic.

It is expected to serve 72 million passengers by 2025 and, with further expansion, up to 100 million passengers and four million tons of cargo.

This concept greatly expands the horizons of passenger planning. It allows to unload regional airports in all neighboring provinces.

3 CONCLUSIONS

National civil airport planning, as spatial planning of civil aviation infrastructure, serves national economic development, social progress, opening up to the outside world and modernizing national defense, reflects the country's desire to build an integrated transportation system and develop air transportation, and clarifies the orientation of public policy, guides the orderly construction of civil airport facilities, optimizes the distribution of air transport resources and serves as the basis for the development of the civil airport.

In seeking to solve the airport capacity problem, the capacity of each part must be systematically studied. The key to solving the capacity problem is identifying bottlenecks. Combined with the real-world situation, there needs to be a way to permanently shift the runway threshold, which is useful for addressing land requisitioning, investment reduction, and noise control to meet the needs of airport reconstruction and expansion.

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