Third Meeting of the Asia/Pacific Aerodrome Design and Operations Task Force (AP-ADO/TF/3)

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Agenda Item 2: Planning, Design, Construction and Operation of Aerodromes

CARGO HUB AIRPORT PLANNING AND CONSTRUCTION IN CHINA

(Presented by China)

SUMMARY

As the region with the highest proportion of global air cargo market, the Asia-Pacific is expected to become a key region of the global air cargo market in the future. However, the world's major air cargo hubs are now concentrated in Europe and the United States. By 2022, Ezhou Huahu Airport, the fourth professional cargo hub airport in the world and the first in the Asia-Pacific region, will be completed and put into operation. During the planning and construction of Ezhou Huahu Airport, the operation mode and characteristics of the cargo hub airport have been fully integrated and valuable experience has been accumulated. It is suggested that the ICAO start to study standards and guidelines for the planning and construction of cargo hub airport as early as possible. China is willing to take advantage of the experience of Ezhou to undertake this task.

1. INTRODUCTION

1.1 Since 2020, the capacity of passenger routes has plummeted. Air cargo, mainly by all-cargo aircraft, has played an extremely important role in transporting medical supplies and vaccines, as well as keeping the international supply chain unimpeded. In 2020, global air cargo generated $129 billion in revenue, accounting for about one third of airlines' total revenue, an increase of 10% to 15% compared to 2019. In terms of the regional share of Freight Tonnage Km (FTK), Asia-Pacific, North America and Europe accounted for 82.8% of the global air cargo market. Especially, the Asia-Pacific region accounted for the largest share (32.4%).

1.2 According to the *Asia-Pacific Trade and Investment Trends Report*, the Asia-Pacific region plays a prominent role in global trade. In 2020, the Asia-Pacific region accounted for 41.8% of global exports and 38.2% of global imports. In 2021, the trade performance of goods in the Asia-Pacific Region was also significantly better than that of other regions, with exports and imports increasing by 23.1% and 22.8% respectively. With the gradual resolution of supply chain problems in developed economies and the relaxation of expansionary fiscal policies, it is expected that the trade in goods in the Asia-Pacific Region will continue to recover in 2022, and the Asia-Pacific is expected to become a key region of the global air cargo market in the future.

2. DISCUSSION

2.1 At present, the world's three major cargo hub airports are concentrated in Europe and the United States, but as the region with the highest proportion of global air cargo market, there is no operational cargo hub airport in Asia-Pacific. Since 2014, China has been planning to select sites for the construction of cargo hub airports. By 2022, Ezhou Huahu Airport, the fourth professional cargo hub airport in the world and the first in the Asia-Pacific Region, will be completed and put into operation.

General situation of Ezhou Huahu Airport

2.2 Ezhou Huahu Airport is located in Ezhou City, Hubei Province, with an airfield area class of 4E. It is planned to build two runways with a length of 3,600m, a width of 45m and a distance of 1,900m, an apron with 132 aircraft stands, a cargo sorting center of 750,000 ㎡ and a MRO maintenance base, a passenger terminal of 15,000 ㎡, and supporting facilities such as air traffic control and jet fuel. The total investment of the project is about 33 billion yuan. The airport is designed to meet the goal of passenger throughput of 1.5 million pax and cargo throughput of 3.3 million tons by 2030. It is planned to be a composite aviation logistics hub with intermodality (water, rail, highway and air). It efficiently joins cargo handling, inspection, sorting and other links. The total sorting equipment of the hub is over 23,000 units, and the total length of conveying equipment is about 52km. The planned capacity of the first phase is 280,000 pieces/hour, and the annual capacity will reach 635 million pieces, and the long-term planned capacity will reach 1.16 million pieces/hour. The route network will cover nearly 90% of the country's GDP and population within two-hour flight, and will connect major air cargo corridor nodes around the world. It aims to build a hub-and-spoke air cargo network, innovate the air cargo business model and service mode, as well as improve operation efficiency and global competitiveness.

Smart airport construction

2.3 Ezhou Huahu Airport, as one of the first **Four Characteristic Airport** (Safety Airport, Green Airport, Smart Airport and Humanistic Airport) demonstration projects announced by the Civil Aviation Administration of China, will be a brand new digital and intelligent cargo airport, mainly including the followings.

2.4 In the planning and construction stage: Ezhou Huahu Airport carries out digital construction based on simulation and Building Information Modeling (BIM) technology. Firstly, the simulation system has been independently developed to assist in the comparison and selection of the overall planning scheme of the airport to ensure the optimal scheme with the goal of full time-effectiveness and full cost optimization. Secondly, the "physical" and "virtual" digital twin airports have been built from the planning stage, and the granularity has been gradually refined to the minimum quality inspection unit of each pile, column, beam, steel bar, cable, equipment and components. The total data of the engineering information model has reached 246G, containing 33.47 million component information. Thirdly, using computers and digital monitoring equipment to track and assist construction operations and engineering testing, streamline and index the standards and regulations, make the production process more transparent and traceable, so as to improve the standardization of construction and maintain the order of safe production.

2.5 In the intelligent operation and maintenance stage: Firstly, through 5G network and other communication systems, the "neural network" of the airport has been constructed to realize real-time and all-domain information perception, including: 53,000 sensors are laid with grating array sensing technology to accurately sense the health status of the pavement and the operation elements of the airport. A 32-line lidar berth guidance system is adopted to achieve higher precision aircraft detection and parking safety monitoring, and automatic acquisition of support link is realized at the same time. The unified video monitoring system is adopted to realize the dynamic collection of running

state. Through GNSS, field surveillance fusion positioning, audio positioning, visual positioning, etc., to provide location services for the whole airport. Secondly, a highly collaborative airport operation system has been built by simulating airport operation through the combination of virtual and real. Data of air traffic control, airport, airline and express are integrated and shared, including: adopting "simulation + AI + BIM" technology to independently develop simulation system, which can run hundreds of versions of simulation at the same time, and virtual reality-based simulation training system has been established. Thirdly, Ezhou Huahu Airport has integrated construction and operation, carried out the construction of air-side automatic driving and less-staffed apron, completed the research and development of 8 types of vehicles and 15 models, and promoted more than 15 innovative applications such as smart sorting, smart passenger transport and smart security. Fourthly, to build a green airport, using new energy technologies such as roof photovoltaic, electric vehicles, green buildings and LED to reduce the carbon emission of the airport by 50,000 tons annually.

Characteristics of cargo hub airport

2.6 The cargo hub airport mainly provides all-day efficient air freight service for large aviation logistics enterprises, takes into account the freight demand of other third-party aviation logistics enterprises and freight forwarders, and undertakes a small part of the regional passenger transport function. Compared with traditional passenger airports, its main features are as follows.

2.7 Firstly, airplanes take off and land in groups, the utilization of the apron is low (daily turnover rate is 1-1.2), there are intensive takeoff and landing flights in peak hours (40-50 flights/h), as well as the intensive arrival of airplanes and trucks. Thus, there is a large demand for the number and capacity of airport runways and the resources on the air and land side (parking spots and parking spaces).

2.8 Secondly, hub-and-spoke hub operation mode requires high level of logistics informatization coordination (electronic waybill, code sharing, public platform), and high level of automation and intelligence of loading, unloading and sorting facilities.

2.9 Thirdly, peak night operations (23:00 to 06:00) require high level of facility and equipment scheduling, and have great potential safety hazards for artificial operations. Therefore, it is more suitable for promoting air-side automatic driving and construction of less-staffed apron.

2.10 Fourthly, the classification of security level and fire rescue level is different from that of passenger airports, and new requirements and possibilities are put forward for customs clearance efficiency, security inspection efficiency and mutual recognition standards of security inspection for intermodality.

2.11 To sum up, different from the three existing cargo hub airports in Europe and the United States, most of them are built on the basis of existing airports and gradually renovated, expanded, developed and transitioned to form the current scale. Ezhou Huahu Airport is a completely newly built large scale cargo hub, which is a set of new planning concepts and innovative construction explorations. On the one hand, it fully meets the new round of scientific and technological revolution and industrial transformation of global civil aviation led by information technology and characterized by "smart". At the same time, the efficient, collaborative, intelligent and low-carbon operation requirements of cargo hub have been fully considered in the planning and construction stage. In the absence of applicable construction standards and specifications, Ezhou Huahu Airport has conducted a lot of scientific demonstration and research and accumulated valuable experience in the aspects of site selection, functional layout, scheme comparison and selection, operation mode, hub coordination, management mode and new technology application, and fully combined with the characteristics of night peak operation, group takeoff and landing, and efficient and intelligent operation of cargo hub airport.

3. ACTION BY THE MEETING

3.1 The meeting is invited States to:

a) share any study conducted on the planning and construction standards and guidelines applicable to specialized cargo hub airports to contribute to the formulation of future global or regional guidance including the scientific research achievements and practical products accumulated at Ezhou Huahu Airport; and

b) discuss any relevant matters as appropriate.

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