International Civil Aviation Organization

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Agenda Item 5: State's/Aerodrome Operator's update and best practices on:

— **Airport master plan**

PRACTICAL EXPLORATION OF INTEGRATED CONSTRUCTION AND OPERATION MODEL IN THE NEW AIRPORT CONSTRUCTION PROJECT

(Presented by China)

SUMMARY

The construction and operation units of the new airport project have long been separated, which has been a persistent issue. The depth of participation of the airport operation unit during the construction phase will directly affect the efficiency of the new airport and the safety and reliability of its subsequent operations. This paper analyzes the potential risks and challenges of the new airport's transition and commissioning from the perspective of the airport operation unit. Taking Xiamen New Airport as an example, it introduces the practical exploration of the airport operation unit in the integrated construction and operation model. This aims to help airports and organizations around the world understand the practical advantages of Chinese airport management companies in this area, advocate for the widespread application of the integrated construction and operation model and promote exchanges and cooperation with Chinese enterprises.

1. INTRODUCTION

1.1 The implementation of integrated construction and operation in the new airport construction project is proposed based on long-standing issues in the development of airport construction. In the past, airport construction units and airport operation units were independent of each other. The construction units were only responsible for construction and would transfer the project to the operation units by completion, which often led to operational risks and a large amount of engineering modifications during the airport transition period and the early stages of operation.

1.2 By collecting and analyzing cases of new airport transition and commissioning within the industry, it is found that during the airport construction phase, the operational units have not fully participated in the planning and design, as well as the preparation for operations. This often leads to issues related to facility systems, process efficiency, flight commencement procedures, physical assets relocation, scheduling, and organizational support.

1.3 In terms of facility systems, the core production operation systems and large-scale systems with high levels of automation (such as baggage handling systems, etc.) carry high risks. If adequate preparation is not made in all aspects of early planning and design, installation, stress testing,

and staff training, any issues that arise could lead to chaos or even paralysis in airport operations. In past cases of new airport transition and commissioning, there have been instances where the cargo system collapsed, or baggage system malfunctions caused long-term disruptions to the normal operation of airports.

1.4 In terms of process efficiency, it is necessary to fully discuss and argue during the design and construction phases for the workflow paths related to aircraft operations, passenger boarding, and transportation connections. Detailed work should be carried out on guiding signs, service facilities, and resource allocation. At the same time, deep integration with related units in the process, such as air traffic control, customs, airlines, and road traffic management departments, is required. Otherwise, it often leads to congestion, conflicts, inefficiency, and risks among various operational elements. In past cases of new airport transitions, unclear guiding signs causing passengers to get lost and unreasonable taxi and ride-hailing vehicle routes causing road congestion are common issues.

1.5 In terms of flight commencement procedures, the new airport's procedures revolve around calibration flights, test flights, industry acceptance, approval of airport operating licenses, publication and activation of aeronautical information, with flight procedures, project acceptance, and port acceptance procedures running in parallel and interrelated. This involves many fields and departments, and any delay in any single link can lead to a chain of impacts. Therefore, it is necessary for the airport operating units to understand the application conditions and cycles of each procedure in advance, and to formulate a detailed plan for the application process to avoid any impact on the normal operation of the new airport due to missing procedures.

1.6 In terms of physical assets relocation, before the new airport becomes operational, there is often a significant amount of work involved in moving ground equipment, including the reuse of old equipment and materials, special vehicles, etc. Especially for airports that need to "transition overnight", they must complete the equipment relocation process of "dismantling, assembling, transporting, unloading, and adjusting "transition overnight" before and after the opening date, ensuring that all steps are safe and orderly. This presents a great challenge and high risk. Therefore, airport operators need to coordinate with traffic management departments before the move to develop a detailed relocation route plan and effectively carry out road control and transportation work.

1.7 In terms of time planning, the two main timelines of the engineering construction plan and the operation preparation plan need to be closely linked. During the construction period, the airport operation unit must simultaneously carry out procedural processing, commercial recruitment, airline negotiations, and human resources recruitment. After the completion of the project, the airport operation unit needs to carry out a large amount of testing, training, drills, and acceptance work within a limited time frame. If the operation preparation plan is disconnected from the engineering construction plan, the preparation work may be too rushed, leading to omissions and deficiencies in work, and potentially causing operational risks.

1.8 In terms of organizational support, the operating units of new airports often face a complex situation where they must ensure the daily operations of the old airport while also investing efforts in the preparation for the new airport. It is difficult to effectively balance organizational structure, division of labor, and professional capabilities. If the preparation for the new airport's operations lacks efficient organization and mechanisms, it will be challenging to effectively address and resolve the aforementioned risks.

1.9 In summary, airport operating units undertake different tasks at various stages of the new airport construction project and play a crucial role. The implementation of integrated construction and operation, which is guided by operational needs, maximizes the coordination and unity of construction and operational goals. This is an important measure to ensure the high-quality completion and operation of the new airport.

2. DISCUSSION

2.1 Taking Xiamen New Airport as an example, Xiamen Iport Group, as the future operator of Xiamen New Airport, has been advancing the integration of construction and operation in various aspects such as planning and design, construction implementation, and operational preparation. The following text introduces the overview of Xiamen New Airport, highlights of the planning, and the exploration of integrated construction and operation practices.

2.2 Xiamen New Airport is an important international airport in China, with a flight area grade of 4F. The overall planning core area covers 20.16 square kilometers. The terminal construction includes approximately 1 million square meters of terminal buildings and 338 parking positions. The passenger throughput for this phase is 45 million, with a long-term goal of 85 million passengers. The cargo and mail throughput for this phase is 750,000 tons, with a long-term goal of 2 million tons.

2.3 Xiamen New Airport Planning Highlights

2.3.1 In terms of architectural design, the terminal area buildings incorporate elements of "Southern Fujian traditional houses" and "Tan Kah Kee architecture", continuing the urban architectural memory of Xiamen Airport. The main building's roof is designed in the form of a three-tiered eave, resembling a white stork spreading its wings, complemented by a dragon boat-shaped skylight.

2.3.2 In terms of terminal configuration, the terminal is designed with the concept of "convenience for passengers and humanized design," adopting a radial layout of "one main building plus six concourses. " The process is straightforward, and the space is efficient, with passengers having an average walking distance of no more than 640 meters. The 550,000 square meters terminal has as many as 97 close stands, ranking among the top in terms of usage efficiency for airports of the same scale nationwide. The airside waiting area features three multi-level rooftop gardens, accommodating both international and domestic passengers, from which one can overlook the apron and gaze upon the distant islands

2.3.3 In terms of process and services, Xiamen New Airport extensively applies various intelligent devices, enabling passengers to go through the entire process of security checks and boarding with "face-scanning" only. In addition to comprehensive service facilities and abundant commercial spaces, Xiamen New Airport has also focused on creating a "Humanistic Twenty Scenes" themed experience area that deeply integrates with the boarding process and commercial formats. Combining the characteristics of the city, it introduces experience projects such as piano performances, concerts, stone carving art, and aviation photography enthusiasts' photography, creating an "unbounded airport" with cross-boundary innovation.

2.3.4 In terms of transfer capabilities, Xiamen New Airport is committed to building an international transfer hub. The total area of the international transfer function zone is 10,000 square meters, including three flow lines: international to domestic, international to international, and domestic to international. It integrates an efficient and convenient customs clearance process, and is equipped with intelligent equipment systems, as well as passenger service facilities such as overnight rest areas. The transfer capabilities of Xiamen New Airport, in terms of area size, process design, and MCT transfer guarantee time, are among the leading levels among all airports in China.

2.3.5 In terms of comprehensive transportation, a multi-level integrated transportation hub is planned in front of the terminal building, where passengers can quickly transfer between various modes of transportation such as long and short-distance buses, public buses, subways, intercity railways, ride-hailing services, and private cars, with an overall walking distance of 100-200 meters.

2.3.6 In terms of smart airports, during the construction phase, a three-dimensional intelligent integrated application was adopted in areas such as quantity surveying and pricing, BIM5D management platform, intelligent construction on-site, digital monitoring, and smart operation and maintenance, comprehensively advancing a new model of intelligent construction. During the operational preparation phase, with the two main lines of "AI comprehensive airport management" and "international hub airport construction, "the construction of 62 key systems was promoting a comprehensive enhancement in ten major scenarios including intelligent safety, intelligent joint operation control, digital operations, full-scenario visualization, intelligent passenger journey, and seamless customs clearance.

2.4 Xiamen New Airport Construction and Operation Integration

2.4.1 In terms of organizational support, Xiamen Iport Group has commissioned Panport Construction Company to be responsible for the overall implementation and promotion of the construction project. In addition, it has specially selected experienced personnel with airport operation background (aircraft operation, terminal management, commercial management, integrated transportation management, etc.) to establish a new airport liaison office, which comprehensively promotes the integration of construction and operation and the preparation work for the transition operation. Throughout the entire process of airport construction, through measures such as the "one master plan" task, "dual line connection" plan, "three-level decision-making" mechanism, "on-site collaboration" office, and "weekly and monthly meetings" coordination, the quality of both the new airport construction and operation is enhanced.

2.4.2 In terms of work planning, Xiamen Iport Group has compiled the "Overall Schedule for the Preparation of the Xiamen New Airport’s Transition Operation" around the project's target schedule. This plan covers 14 related units on site and involves 4,323 tasks, which are broken down into four stages: planning, preparation, actual operation, and sprint. Each task is detailed accordingly. The overall preparation for the new airport's transition operation is centered around a framework layout of "1 main line + 7 business lines" (main line for transition critical conditions + operational procedures, operation management, business preparation, human resources preparation, logistics support, cargo operations, and publicity planning). With the help of task supervision and platform coordination systems, the transfer work is steadily advanced.

2.4.3 In terms of special projects, Xiamen Iport Group has conducted specialized research around key areas such as process optimization, model innovation, service standards, airworthiness support, digital construction, and the construction of an international hub. More than 300 research achievements have been formed and implemented in each aspect of airport construction, ensuring a comprehensive improvement in the quality of construction for Xiang'an Airport, and striving to build a high-quality project.

2.5 New Airports Worldwide Facing Widespread Safety Challenges when put into operation

2.5.1 With the rapid development of global civil aviation, airport construction is becoming more intelligent and complex. How to manage a newly built airport and ensure its safe operation is a very worthy question to consider. Relevant situations indicate that newly built airports are most prone to unsafe incidents and even accidents during the initial phase of operation.

2.5.2 Through years of exploration and practice, China actively promotes the concept of entrusting the management of new airports. By engaging more professional airport operation teams to participate in the later stages of airport construction, it is possible to achieve a smoother integration of airport construction and operational safety. Many airports in China have adopted this model to ensure the safe operation of newly constructed airports.

2.5.3 Xiamen Iport Group has also applied the model of entrusted management during its over 40 years of development. The group operates airports of various operational scales and construction sizes, including Xiamen, Fuzhou, Wuyishan, and Longyan. It has accumulated management capabilities throughout the entire lifecycle, from investment and financing to construction management and maintenance. Moreover, in the dozens of overseas airports it has participated in building in China, it is actively promoting related concepts.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) Encourage States to share new concepts for the planning and construction of new airports, and promote the improvement of airport planning and design standards;

b) Encourage States to share integrated experiences in airport construction and operation, and in the organization of airport transition operations; and

c) Call on States to pay attention to the operational safety risks that new airports may bring to ensure the safe operation of newly built airports.

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